Digital literacy: Myths and realities

Julian Fraillon
Australian Council for Educational Research

Julian Fraillon is Research Director of the Assessment and Reporting (mathematics and science) research program for ACER Group. Julian has directed a range of large-scale assessment projects with a focus on digital literacy, and civics and citizenship education. He is currently director of the International Computer and Information Literacy Study 2018 (ICILS 2018), which is conducted across 14 countries, and was the inaugural director of ICILS 2013. Julian has also directed ACER's work across four cycles of the Australian National Assessment Program sample assessments of NAP ICT Literacy and NAP Civics and Citizenship commissioned by the Australian Curriculum Assessment and Reporting Authority. In the recent past, Julian has also directed ACER's work on national assessments in literacy, numeracy and science in Saudi Arabia and the development of the Australia-wide literacy and numeracy assessment for students enrolled in initial teacher education courses (launched in 2015).

Abstract

Digital literacy, under a wide variety of names, is routinely classified as a 21st-century skill and is frequently reported as an area of high priority in school education systems internationally. In comparison with students in other countries, Australian students have high levels of access to digital technologies both at and outside of school. With this access comes the expectations that students will be highly-proficient users of digital technologies and that schools will use digital technologies in transformative ways to support student learning. This session will examine how concepts of digital literacy have developed over time, what data from large-scale assessments of student digital literacy tell us about students' learning in this area (both in Australia and across countries) including how it has changed over time. We will also reflect on the differences between the rhetoric and the realities of digital literacy and what these mean for the future direction of this critical area of learning.

An incomplete history of computing instruction in schools

Introduction

Computing instruction became pervasive in schools during the 1980s with the advent of affordable personal computers. In these early days, the focus of computer instruction was on programming and software and computer use (Haigh, 1985). During the 1980s and 1990s, while computing and computer literacy were still a focus of computer education, the use of computers in libraries led to the need for students to develop skills in searching for and using information. This gave rise to information literacy, which extended beyond searching for information to include critical thinking and evaluation skills relating to the research skills that include: establishing research questions; searching for and finding information; and, evaluating the credibility, relevance, and usefulness of found information. The rapid development of the internet as an information resource during the 1990s gave further importance to the value of the critical aspects of information literacy. Early conceptualisations of digital literacy, such as information and communication technologies (ICT) literacy emphasised information literacy skills and deliberately de-emphasised computing skills. During that time, computers were regarded as tools for information seeking and production and the technical skills associated with using computers were of little importance. In 2003, a feasibility study commissioned by the Organisation for Economic Co-operation and Development (OECD) supported the inclusion of ICT literacy in the Programme for International Student Assessment (PISA). For the study, ICT literacy was defined as:

> … the interest, attitude, and ability of individuals to appropriately use digital technology and communication tools to access, manage, integrate, and evaluate information, construct new knowledge, and communicate with others in order to participate effectively in society (Lennon, Kirsch, Von Davier, Wagner, & Yamamoto, 2003).

In the 21st century, the role of understanding aspects of computing in the use of computers has been reflected in curricular and assessment constructs associated with digital literacy. Initially this was through a greater emphasis on understanding computing as an aspect of digital literacies, but more recently this has been evident in the establishment of programs relating to digital technologies that include coding and computational thinking. Figure 1 shows the relationship between three main areas of emphasis in digital competence that have evolved over recent decades: computer science, ICT/digital literacies, and computational thinking/digital technologies.

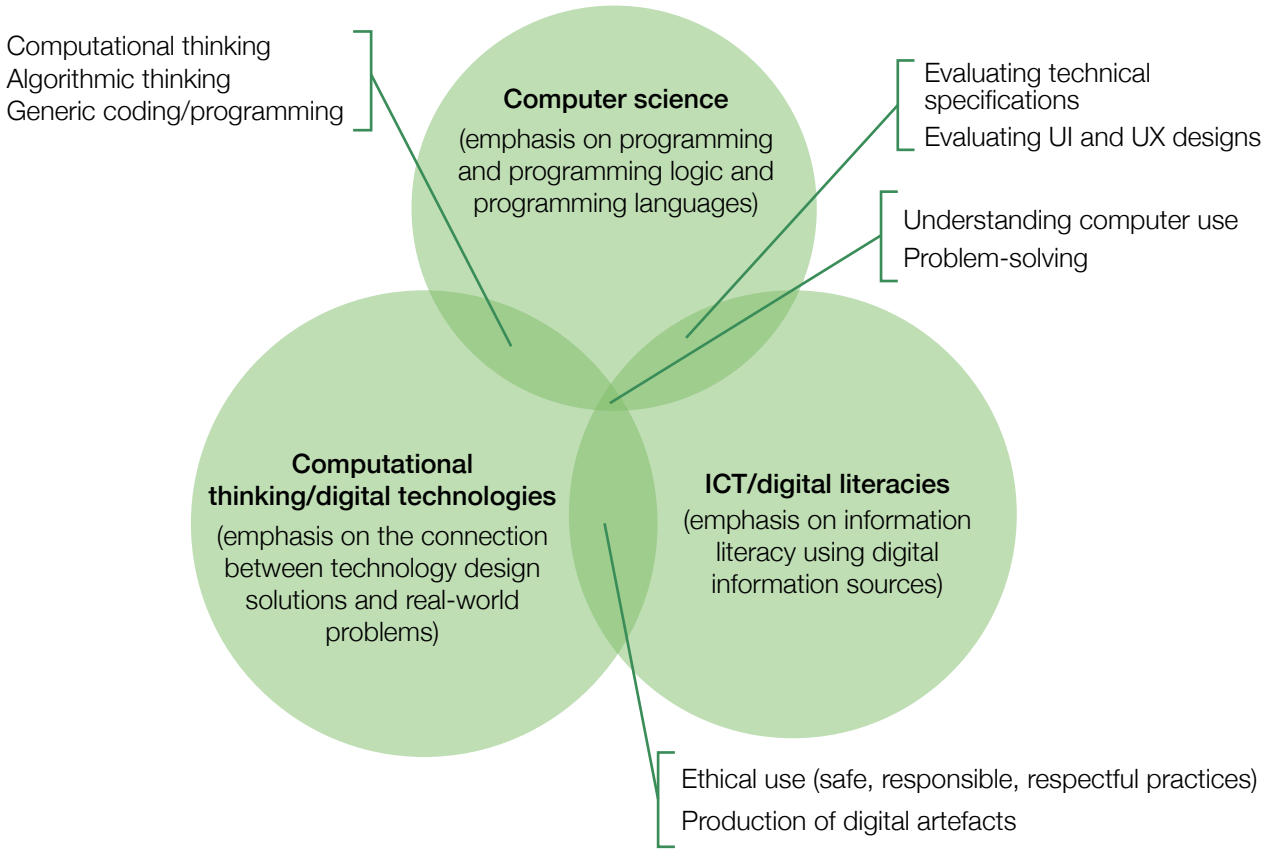

Figure 1 Relationships between the three main areas of emphasis in digital competence

Examples of work measuring and reporting on ICT/digital literacies

Two examples of work measuring and reporting on digital competence that are relevant to the Australian context are the Australian National Assessment Program, ICT Literacy (NAP – ICTL) and the International Computer and Information Literacy Study (ICILS). NAP – ICTL is part of the Australian National Assessment Program (NAP), managed by the Australian Curriculum Assessment and Reporting Authority (ACARA), and established as an 'initiative of ministers of education in Australia to monitor outcomes of schooling specified in the 1999 Adelaide Declaration on National Goals for Schooling in the 21st Century' (ACARA, 2018, p. 1). NAP – ICTL has collected and reported on achievement data in ICT Literacy from nationally representative samples of Australian Year 6 and Year 10 students every three years from 2005.

ICILS is a cross-national, large-scale assessment of computer and information literacy (CIL) commissioned by the International Association for the Evaluation of Educational Achievement (IEA). The first cycle of ICILS was conducted in 2013 across 21 countries, including Australia, to collect achievement data from Year 8 students in representative samples of schools in each participating country as well as data from teachers, school leaders and system-representatives about the teaching and learning of CIL. A second cycle of ICILS was conducted in 14 countries in 2018. In addition to the core data collection established for ICILS 2013, ICILS 2018 included an optional test of computational thinking for students. Australia did not participate in ICILS 2018. The ICILS 2018 international report will be released on 5 November 2019.

Data from NAP – ICTL and from ICILS 2013 can shed light on some of the myths and realities associated with the learning and teaching of aspects of digital competence in Australia and across a range of other countries. In the following section, we will explore some of these myths and realities.

Myth 1: The rise of the digital natives

The idea that young people who are growing up with access to digital technologies develop 'sophisticated knowledge of and skills with information technologies' as well as learning styles that differ from those of previous generations (Bennett, Maton, & Kervin, 2008, p. 777) is naturally seductive to those of us who did not grow up with this same access. This notion of a self-developed capacity to use digital technology is at the heart of the concept of the 'digital native' (Prensky, 2001). Adults frequently comment on the ease and apparent expertise with which young people use digital technologies. However, there remain questions about the sophistication and value of some of these skills.

Both ICILS and NAP – ICTL measure and report the achievement of student digital literacy skills on empirically-based achievement scales that include descriptions of the knowledge, skills and understanding expressed by students at different 'levels'. Table 1 includes the descriptions of the lowest level of achievement measured in each of ICILS (Fraillon, Ainley, Schulz, Friedman, & Gebhardt, 2014, p. 74) and NAP – ICTL (ACARA, 2018, p. 24).

The NAP – ICTL program reports on student achievement from Years 6 and 10 and consequently the lowest level in the scale represents achievements that are somewhat easier than those in Level 1 of ICILS, which focuses on Year 8 students. However, neither of the levels shown in Table 1 represents sophisticated use of digital technologies. Examples of achievements at Level 1 of NAP – ICTL are, 'basic file and computer management functions such as dragging and dropping files' or applying generic commands such as 'save as' or 'paste'. Examples of achievements at Level 1 of ICILS include 'insert an image into a document' or 'use software to crop an image'.

In NAP – ICTL 2017, 13 per cent of Year 6 and 3 per cent of Year 10 students nationally were at Level 1 or below on the NAP – ICTL scale (ACARA, 2018). In ICILS 2013, across all countries, 40 per cent of Year 8 students were at Level 1 or below and in Australia, which was one of the more highly achieving countries in ICILS, 23 per cent of Year 8 students were at Level 1 or below on the ICILS scale (Fraillon et al., 2014).

Table 1 Lowest level of achievement measured in each of ICILS

NAP – ICTL Level 1 descriptor	ICILS Level 1 descriptor
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	Students working at Level 1 demonstrate a functional working knowledge of computers as tools and a basic understanding of the consequences of computers being accessed by multiple users. They apply conventional software commands to perform basic communication tasks and add simple content to information products. They demonstrate familiarity with the basic layout conventions of electronic documents.

So, regardless of the observation that young people embrace technology, there remain large proportions of young people who continue to have very low levels of practical functional digital knowledge skills and understandings. As Koutropoulos (2011, p. 351) suggested when looking at the research into young people's digital skills:

> … we see that there is no one, monolithic group that we can point to and say that those are digital natives. As a matter of fact, the individuals who would fit the stereotype of the digital native appear to be in the minority of the population.

Myth 2: Boys use technology better than girls do

Data from each of NAP – ICTL and ICILS both contradict the general belief that boys will perform better than girls when using digital technologies. What the data tell us clearly thus far is that the opposite is true. Across all cycles of NAP – ICTL since 2005, the performance of Year 6 female students was significantly higher than that of male students and this was the same for Year 10 students across all cycles except for the first assessment in 2005 (in which the difference in performance between female and male students was not statistically significant) (ACARA, 2018). Similarly, in ICILS 2013, female students outperformed male students in all but two countries (where again the difference in performance between female and male students was not statistically significant) (Fraillon et al., 2014). At the end of 2018, the release of ICILS 2018 data on computational thinking will include analysis of gender differences in achievement in an area that is hypothesised to be one of relative strength for male students.

Myth 3: Digital technologies have transformed classrooms and pedagogy

There is no question that digital technologies offer teaching opportunities that previously had not been readily feasible. The internet provides opportunities to immediately access to up-to-date information from around the globe. The ongoing evolution of (for example) communications, planning, simulation and online learning applications are resources that provide opportunities for a new world of teaching and learning. However, while examples of highly innovative uses of digital technologies in schools are (rightly) promoted and lauded, the data suggest that these practices are the exceptions rather than the norm.

In NAP – ICTL 2017, students were asked about the frequency with which they used digital tools for school-related purposes. The most commonly used tools reported by Year 6 and Year 10 students were word-processing software, presentation software and computer-based information resources (such as websites or wikis). Each of these tools was reported to be used at least once a month and by more than 60 per cent of Year 6 students and by more than 70 per cent of Year 10 students. In contrast, simulations and modelling software, computer-aided drawing (CAD) software, data logging or monitoring tools and concept mapping software were reported to be used far less frequently by students. Typically, these were reported to be used at least once a month by between 15 per cent and 30 per cent of students at both year levels (ACARA, 2018).

In ICILS, both students and teachers were asked about their use of ICT in their learning and teaching. The most frequent uses reported by students were: preparing reports or essays, preparing presentations, working with students from their own school, and completing worksheets or exercises. The most frequent uses of ICT in class reported by teachers were: presenting information through direct instruction in class, reinforcing learning through repetition of examples, providing feedback to students, assessing students learning through tests (Fraillon et al., 2014).

The least frequent uses of ICT for school-related purposes by students were: organising their time or work, writing about their learning, and working with students from other schools. The least frequently reported uses of ICT by teachers were: supporting inquiry learning, collaborating with parents or guardians in supporting students' learning, enabling students to collaborate with other students (within or outside school) and mediating communication between students and experts or external mentors (Fraillon et al., 2014).

In ICILS 2013, we drew the conclusion that 'computers were most commonly being used to access digital textbooks and workbooks rather than provide dynamic, interactive pedagogical tools' (Fraillon et al., 2014, p. 257). At the end of this year we will see whether data from ICILS 2018 suggest a shift to more innovative use of ICT in teaching; however, data from NAP – ICTL 2017 suggest that this is less likely than we might hope for.

Myth 4: Student digital literacy will continue to increase

With the ongoing development of digital technologies, increasing availability and increasing emphasis on the value of developing digital literacy (such as through the establishment of the Australian Curriculum: ICT Capability and more recently the Australian Curriculum: Digital Technologies) it is reasonable to hypothesise that young people's digital literacy would continue to increase. Evidence from NAP – ICTL does not support this.

In Australia, since 2005 there has been very little change in the ICT – Literacy of Year 6 and Year 10 students (Figure 2). At Year 6, on average across Australia, NAP – ICTL scores varied from 400 scale points in 2005 to a high of 435 scale points in 2011 and subsequently returned to 410 scale points in 2017. The 2017 average was not statistically significantly different from that of 2005. At Year 10, on average across Australia, scores ranged from 551 scale points in 2005 to a high of 560 scale points in 2008 and 2011 and have since decreased to 523 scale points in 2017. The 2017 Year 10 average scale score was statistically significantly lower than that of all previous cycles of NAP – ICTL except for 2014.

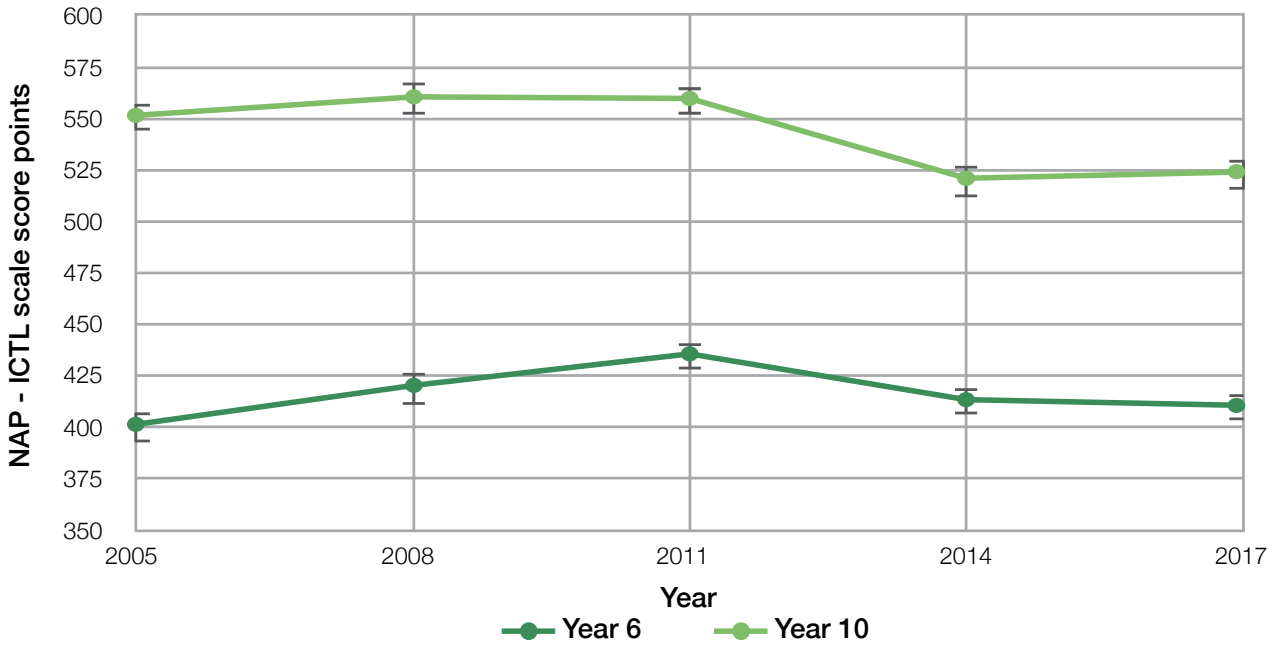

Figure 2 NAP – ICTL Year 6 and Year 10 average national scale scores (2005 to 2017)

Concluding comments – pause for thought?

We live in a time of unprecedented and increasing access to digital technologies and proliferate use of digital technologies by young people in Australia, which often brings with it the assumption that, because the technologies look complex, the act of using them must be sophisticated. This comes with the corollary that young people are innately developing highly sophisticated digital skills.

The research evidence challenges these assumptions by shining a light on the proportions of young people who can only demonstrate the most basic skills and by showing that, somewhat counter-intuitively there has been no increase in students' measured ICT literacy in Australia between 2005 and 2017. Students' access to ICT and digital devices has increased over the same period. Their attitudes towards the importance of working with digital devices have remained positive and their confidence in using digital devices has remained very high (ACARA, 2018). Why has the ICT literacy of Australian students not increased since 2005, in a time of such rapid technological development and positive attitudes towards technologies among students?

While the answers to these questions are beyond the scope of this paper, the simple response is that digital literacies need to be taught. In Australia, the advent of the Australian Curriculum: ICT Capability and, more recently, the Australian Curriculum: Digital Technologies provide educators with curriculum resources that previously were unavailable. The provision of strong curriculum and learning resources for teachers is clearly a step in the right direction. This too should come with professional support for teachers to implement ICT in their teaching. In ICILS, we found that across countries the strongest predictors of teachers' likelihood to emphasise CIL in their teaching were those who were confident using ICT, had positive views about the use of ICT and reported that they were in schools where there was a collaborative approach among the staff to the use of ICT (Fraillon et al., 2014).

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