Digital Literacy Expectations in Higher Education

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Despite the widespread use of the term digital literacy, there is no common understanding of what it means or what skills and capabilities should be captured within it. The impact for higher education is that the term is misunderstood and significant assumptions are made regarding students' digital literacy capabilities. The study reported in this paper explores the mismatch between academic expectations and perceptions of students' digital literacy capabilities. Data was collected via a survey distributed to all Australian higher education institutions. Outcomes indicate that academics expectations are far higher than what they observe of students' digital literacy capabilities and that digital literacy skills are not being adequately scaffolded and extended through the curriculum. Improving digital literacy outcomes will not occur until responsibility for teaching these capabilities is explicitly expressed and actioned in the context of disciplines and that opportunities are included throughout students' educational experiences to scaffold digital literacy learning.

Keywords: digital literacy, higher education, digital curriculum

Introduction

Students are entering higher education (HE) institutions with a range of skills and expertise gained through previous education, work and life experiences. When minimum standards are expected to enable satisfactory progression through their university studies these are often articulated in terms of prior education. For example, completion of year 12 or equivalent is required to pursue undergraduate studies, or tertiary qualifications for postgraduate studies. English language is the main competency for which we have specific standards including minimum level of achievement at year 12 for domestic students, or The International English Language Testing System (IELTS) for international students for example. These provide the benchmark for students to understand what is expected of them on entry into university and are the basis from which their tertiary education will be developed. Similarly, academics and course designers can anticipate that students will have achieved the benchmark when they commence their studies and can design curricula and learning activities with this in mind. There are other competencies expected of students, which would normally be articulated as entry requirements, for example minimum standards of mathematics for engineering degrees.

One skill that is expected, but usually not articulated to students well, is digital literacy (Coldwell-Neilson, 2017). Students require this skill to enable them to negotiate online enrolments, course selections, timetable selections and the digitally enhanced learning environments that most universities in Australia now utilize. Many learning activities are facilitated through digital technology regardless of whether a student is studying on-campus or at a distance, ranging from accessing resources through a learning management system, communicating and collaborating through online discussion boards, to creating content in wikis and blogs. Further, graduates are expected to have the skills required to negotiate a digitally enhanced workplace.

Academics often assume that incoming students have the skills needed to negotiate these digitally enhanced learning environments. After all they are digital natives who use digital technologies all the time, aren't they? Due to the pervasive nature of digital technology in everyday life, students from the digital generation are assumed to be sufficiently savvy to improve their digital literacy skills and learn new skills on the fly, with little or no intervention through the curriculum. Reinforcing the perception that our students are digitally literate is the fact that they do manage to negotiate the digital systems to enrol in courses and make class selections. It is acknowledged, however, that the types of skills required in this situation may be different from those required to negotiate learning activities. But are assumptions of students' digital capabilities well founded?

The project being reported in this paper is part of a multi-stage program, aiming to develop a digital literacy benchmark for students entering and graduating from Australian HE, which will provide the foundation to extend and enhance digital competencies within the context of a discipline, align graduate capabilities with

government recommendations, and improve student employability. An understanding of the required elements of a digital literacy framework to support development through the curriculum is currently being developed, but needs to be informed by the current expectations of HE institutions in general, and by the expectations of teaching academics in particular. Creating a framework which underpins an understanding of digital literacy, and which identifies the core digital literacy skills and competencies that institutions and academics expect students to have when they commence their studies, will allow institutions to articulate to students what digital skills and capabilities they need when they start their studies. This will provide a foundation from which digital capabilities can be developed and scaffolded through the curriculum allowing graduates to be better prepared for a digitally enhanced workplace. A working understanding of digital literacy has been derived from the JISC (2014) definition and captures the key elements of the 8 elements of digital literacies (Belshaw, 2011). It states that:

> … digital literacy is the ability to identify and use technology confidently, creatively and critically to effectively meet the demands and challenges of living, learning and working in a digital society.

Unlike the JISC and Belshaw's definitions, this working understanding refers to digital literacy in the singular. This concept will be underpinned by a framework which identifies the essential elements of digital literacy in the 21st century which can be contextualized to specific settings such as higher education or a discipline for example. The framework, which is currently under construction, will capture the pluralistic nature of the skills and capabilities underlying digital literacy.

The aim of this project is to explore academics digital capabilities and their expectations and observations of students' skills. This paper focuses on the latter aim, exploring academics perceptions of students' skills.

Background

There is a general understanding that students are digitally literate since they use technology extensively; this is not unreasonable given the widespread use of smartphones, tablets and other devices in our communities. But is this sufficient to prepare students for the demands of a university education and graduate employment? Although some universities provide prospective students with information regarding minimum requirements for *access* to computer technology there are limited statements regarding ability to *use* the technology (Coldwell-Neilson, 2017). Further, there is an assumption that because those born or brought up during the digital technology age, nominally from 1980 (identified as digital natives, a concept developed by Prensky in 2001), and use technology extensively, they are digitally literate. This is not the case (Ng, 2012; Denial, 2017). There is growing recognition that technology use does not necessarily equate to technology proficiency and may not contribute to transferable digital literacy expertise (Burton, Summers, Lawrence, Noble and Gibbings, 2015).

The 2014 National Assessment Program (NAP) ICT literacy report reinforces the fact that our young people *do* lack digital literacy skills. This test assesses "student ICT knowledge, understanding and skills, as well as students' ability to use ICT creatively, critically and responsibly" at school years 6 and 10. The report shows a significant decline in the mean performance of students in the 2014 test compared to previous assessments (ACARA, 2015). There is little indication that digital literacy skills grow beyond Year 10 of secondary school (King, 2018), which does not bode well for university entrants' digital literacy capabilities. A study conducted in Europe (ECDL, 2014) indicates that most people over-estimate their digital skills capabilities significantly. One example cited was of the respondents in the 15-29 age group who claimed they had 'good' or 'very good' knowledge of the internet, half of them scored at least 'bad' in a practical test.

There is growing recognition that graduates need to develop sound digital literacy skills – transferable skills which transcend disciplinary boundaries – allowing them to thrive and lead in a digitally enhanced work environment (Ferrari, 2013, Australian Government, 2015). Prospective employers have expectations of the capabilities of graduates, which have been the subject of many investigations and are routinely reported, for example, by the annual Graduate Outlook report (GCA, 2014). University curricula are normally informed by university-level statements of graduate outcomes in conjunction with requirements of specific professions through accreditation bodies and advice provided by industry advisory boards. Despite the plethora of information, the evidence is of a mismatch between employer perceptions of graduate outcomes and HE expectations of graduate employability (for example Prinsley and Baranyai, 2015). This gap extends to foundation literacies such as digital literacy which are not well-defined. Graduates need to be able to tailor their skills to meet the competency expectations of prospective employers but to do so, these must be defined and articulated.

'Australia's future workforce?' published by the Committee for Economic Development of Australia (CEDA, 2015) presents a very strong case for an increased focus on digital literacy skills. The contributors critically reviewed the requirements of today's workforce and predict future requirements, resulting in recommendations for policy, employment and education. The report suggests that "there are significant shortages in digital skills, which will become a new basic skillset in the way reading and writing are today" (p.12) and that "digital competency will be a basic competency for all workers" (p.15). The report further suggests that

> digital literacy needs to be included as a core component of school education … [and] … must continue into tertiary education and be a core component of ongoing workplace skills development (p.162).

It is estimated that over half of Australian workers will need to be able to use, configure or build digital systems in the next 2-3 years (FYA, 2015). CEDA further suggests that "[c]hanging demands … means that … qualifications and degrees need to deliver more general and also specific digital capabilities" (p.163) and that

> … technology-enabled HE requires a mindset change for which universities must focus more strongly on what their students want and what employers are looking for in graduates (Gallagher and Garrett as cited in CEDA p. 229).

The Australian Government's National Innovation and Science Agenda strongly supports improvement of digital literacy skills amongst others, which is reflected in the substantial investment in programs to boost digital literacy and STEM amongst young Australians. In parallel, the Higher Education Standards Framework requires explicit definition of course learning outcomes as well as effective scaffolding and support for student learning. In particular TEQSA's commentary on admissions clearly states that students need to be "equipped to succeed in their chosen course of study" which includes academic preparation as well as language and learning skills.

But what digital literacy skills are students expected to bring to their studies and is digital literacy being developed through the curriculum? In order to gain an understanding of what academics expect of students as far as digital literacy skills are concerned the following research questions are posed:

RQ1: How do staff perceive their digital literacy capacity?
RQ2: How do staff perceive their preparedness to teach in a technology enhanced environment? and
RQ3: What are staff perceptions of students' preparedness to learn in a technology enhanced environment?

The focus of this paper is on research question RQ3: staff perceptions of students' preparedness to learn in a technology enhanced environment.

Method

An online survey was developed using Qualtrics. Prior to deployment, the survey was validated by experts in digital literacy and survey design within the author's university. The survey was deployed for a period of 4 weeks, in the latter part of 2017, with the intention of reaching all Australian universities. Academics who are involved in teaching students (undergraduate or postgraduate) were invited to participate by completing the survey. A snowball sampling technique was used by requesting academics who received the invitation to distribute the survey amongst their own networks. The aim was to disseminate the survey as widely as possible so that the data gathered was representative, both institutionally and disciplinarily, of the Australian HE environment. The invitation to participate was sent to academics: who were known to the researcher: via networks that the researcher belonged to, such as the Australian Learning and Teaching Fellows network, HERDSA etc.; and via various Councils of Deans including Information and Communication Technology, Information Systems, Education, Science, and Business and other discipline-based forums.

Beetham and Sharpe's (2011) framework was used as the theoretical foundation of the survey. The framework is in the form of a pyramid consisting of 4 levels, commencing with access and awareness ("I have …"), followed by skills ("I can…"), practices ("I do …"), and culminating in identity ("I am …"). The survey was organized into 4 sections: respondents' self-assessment of their digital literacy skills, respondents' perceptions of students' skills, their institution's approach to digital literacy, and demographics and discipline information. All questions in the survey were optional.

A total of 471 responses were received. Of these, 55 respondents did not respond to any questions, and a further 99 respondents only answered questions in the first section. This left 317 usable responses in the section relating

to staff perceptions of students' skills which is the focus of this paper. This data have been analyzed using descriptive statistics, which was deemed the most appropriate given the relatively low response rate and the number of respondents who did not answer all questions.

Results

The respondents consisted of 91 males and 194 females with 32 preferring not to indicate their gender. The age distribution of respondents is shown in table 1. Approximately 65% of respondents are 50 and under and the remaining 45% are over 51 covering a wide range of generational experience.

Table 1 – Age range of respondents

Age range	No. of respondents	%
21-25	4	1.3
26-30	14	4.4
31-40	67	21.1
41-50	84	26.5
51-60	94	29.7
61+	46	14.5
Did not indicate	8	2.5
Total	**317**	**100.0**

Table 2 shows the number of respondents within each Faculty. Respondents were from 29 Australian universities from a wide range of backgrounds and disciplines.

Respondents were asked a number of questions relating to their expectations and perceptions of their students' digital literacy skills and capabilities. Respondents were requested to answer the questions in the context of a particular unit or subject that they taught and indicate if the unit/subject they were thinking of was likely to be undertaken by students in their first semester/trimester of study at their institution; 148 respondents indicated that this was the case. Respondents were asked to respond to the statements "In week 1 of my unit/subject … I expect my students to be able to …" undertake a range of activities listed in table 3 (ie their expectations of students) and "in week 1 of my unit/subject all/some/none of my students can …" undertake these activities (ie their perceptions of students' capabilities).

Table 2 – Disciplines of respondents

Faculty	No. of respondents	%
Arts	29	9.2
Built Environment	5	1.6
Business, Economics, and related	33	10.4
Did not indicate	8	2.5
Education	71	22.4
Engineering	12	3.8
Fine Arts	2	0.6
Health and Health related	74	23.3
Humanities	2	0.6
IT and IT related	28	8.8
Law	2	0.6
Other	16	5.1
Science	27	8.5
Social Sciences	8	2.5
Total	**317**	**99.9**

Tables 3 and 4 show the number of respondents who expect students to be able to complete these activities as well as their perceptions of the capabilities of their students (categorized as all/some/none).
Table 3 refers to those respondents who indicated that their subject/unit was likely to be taken by students in their first trimester of study (referred to as junior students here) and table 4 to those respondents who indicated that their subject/unit was likely to be taken by returning students (referred as senior students here).

Table 3 – Perceived capabilities of JUNIOR students by respondents (N=148)

	I expect my students to be able to … (expectation)	… of my students can … (observation)		
		All	some	none
	# (%)	# (%)	# (%)	# (%)
Send me an email	143 (96)	130 (88)	15 (10)	3 (2)
Attach a document to an email	140 (94)	116 (78)	27 (18)	5 (3)
Locate unit resources online	131 (89)	53 (35)	90 (61)	5 (3)
Submit an assignment online	92 (62)	60 (40)	77 (52)	11 (7)
Manage their online storage	105 (71)	43 (29)	93 (63)	12 (8)
Word-process a document	141 (95)	115 (78)	31 (21)	2 (1)
Understand file types	115 (78)	54 (36)	87 (59)	7 (5)
Locate resources online in the library	107 (72)	31 (21)	110 (74)	7 (5)
Use search engines effectively	117 (79)	45 (30)	96 (65)	7 (5)
Understand data privacy and security	99 (67)	24 (16)	117 (79)	7 (5)
Understand digital copyright	85 (57)	24 (16)	96 (65)	28 (19)
Be able to use a discussion board	117 (79)	49 (33)	92 (62)	7 (5)
Manage their online identity	119 (80)	38 (26)	106 (72)	4 (3)
Have proficient keyboarding skills	117 (79)	59 (40)	86 (58)	3 (2)
Use social media to support their learning	74 (50)	40 (27)	93 (63)	15 (10)

Overall, respondents have very high expectations of their junior students with at least half the respondents expecting students to be able to undertake all of the activities listed. However, the only activities where respondents' expectations are almost met (i.e. where the perceived "All" is close to the expected) are "send me an email", "attach a document to an email" and "word process a document". The discrepancy between expectations and perceptions for the majority of activities is at least 60%, with some expectations hardly being met at all, most notably understanding data privacy and security and understanding digital copyright.

Bearing in mind that almost half of the respondents (n=148) indicated that the students they were thinking about were likely to be new to the institution, we need to determine if the mismatch in expected and perceived skills may have been influenced by lack of experience of the digital infrastructure in that institution. The data in table 4 shows the expectations and observations by respondents (n=169) who taught returning, or senior, students.

Table 4 – Perceived capabilities of SENIOR students by respondents (N=169)

	I expect my students to be able to … (expectation)	… of my students can … (observation)		
		All	some	none
	# (%)	# (%)	# (%)	# (%)
Send me an email	161 (95)	152 (90)	16 (9)	1 (1)
Attach a document to an email	157 (93)	143 (85)	23 (14)	3 (2)
Locate unit resources online	169 (100)	95 (56)	74 (44)	0 (0)
Submit an assignment online	149 (88)	127 (75)	36 (21)	6 (4)
Manage their online storage	136 (80)	63 (37)	101 (60)	5 (3)
Word-process a document	164 (97)	146 (86)	23 (14)	0 (0)
Understand file types	152 (90)	76 (45)	91 (54)	2 (1)

Locate resources online in the library	156 (92)	58 (34)	108 (64)	3 (2)
Use search engines effectively	158 (93)	57 (34)	110 (65)	2 (1)
Understand data privacy and security	137 (81)	31 (18)	131 (78)	7 (4)
Understand digital copyright	124 (73)	21 (12)	133 (79)	15 (9)
Be able to use a discussion board	154 (91)	86 (51)	79 (47)	4 (2)
Manage their online identity	137 (81)	51 (30)	115 (68)	3 (2)
Have proficient keyboarding skills	139 (82)	71 (42)	95 (56)	3 (2)
Use social media to support their learning	86 (51)	55 (33)	107 (63)	7 (4)

It seems that academics expectations of senior students is also very high across all categories except for using social media to support learning. Of the remaining learning activities, understanding digital copyright is the least expected with 73% of academics expecting students to be able to understand this concept. Again, the only activities where academics expectations were almost met are sending an email, attaching a document to an email and word-processing a document. Surprisingly, only 75% of academics observed that their senior students could submit an assignment online.

Respondents expectations of new students' capabilities are generally a little lower than for senior students, particularly where the activity is most likely to be facilitated through institutional infrastructure, for example submitting an assignment or using a discussion board. However, expectations are still quite high with more than 75% of respondents expecting students to be able to do nearly all these learning activities. It is concerning that senior students also do not meet respondents' expectations, with the disjoint almost mirroring that of junior students, the only exceptions being locating unit resources and submitting assignments online, both of which show substantial growth. Understanding digital copyright on the other hand has gone backwards (12% for seniors compared to 16% for juniors)! A possible explanation of this could be that respondents' expectations of senior students are higher and stricter.

A further question asked of respondents was to indicate whether or not they thought that their students entered their studies with the digital skills required to be successful learners in a digital environment. Surprisingly (or perhaps not given the expectations detailed in tables 3 and 4) 187 (59%) indicated that their students did have the necessary skills and the remaining 130 (41%) indicated that they did not.

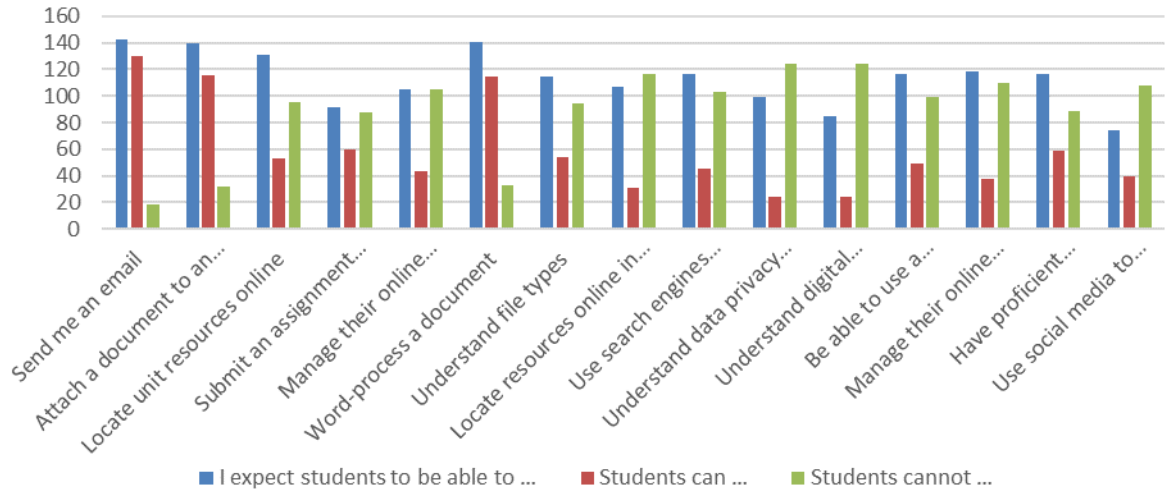

Figure 2: Expectations vs observations of SENIOR students' capabilities

Figures 1 and 2 show the data collated in tables 3 and 4 respectively as bar charts. The blue bar is the number of respondents who expect their students to be able to …, the green bar is the number of respondents who consider that their students can do …, and the red bar is the number of respondents who consider that either some or none of their students can do …. Figure 1 relates to expectations of junior students and figure 2 to expectations of senior students. These figures are a very graphic representation of the mismatch between expectations and perceptions. Implications of these results are discussed in the following section.

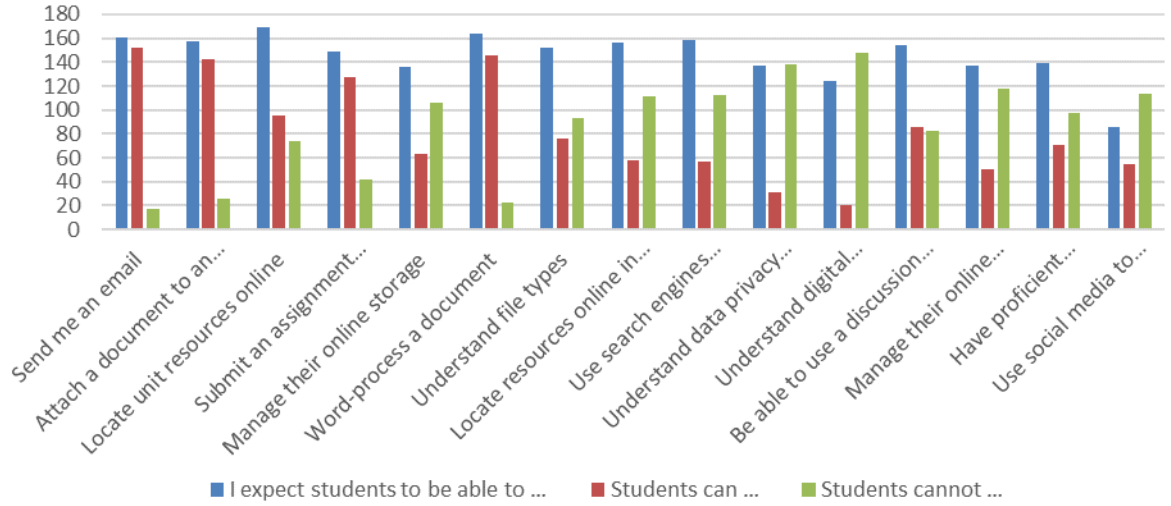

Figure 1: Expectations vs observations of JUNIOR students' capabilities

Discussion

It is clear from both figure 1 and 2 that academics perceptions of students' digital literacy capabilities are generally not meeting their expectations. Of particular concern is the ongoing lack of development that the mismatch of senior students' capabilities suggests. It seems academics expectations far outstrip what is observed in their students and it seems that digital literacy skills are not perceived to develop adequately from entry to senior years! Exploration of academics' commentary provided with the questions analysed here suggests that most academics are confident that their students pick-up the necessary digital skills required for their course throughout its duration, noting that they see improvements in their students as they progress (even if at varying paces). This confidence does seem misplaced given the strong evidence to the contrary, as indicated by Burton et al (2015) for example. However, some academics did express that they based their assumptions on the fact that they did not receive complaints or queries from students if they are having trouble. Some also noted that students who lacked in digital literacy also lacked in general literacy suggesting that they would fail the unit and hence were not of concerned. The guidelines articulated by TEQSA would suggest that this is probably not a sustainable approach to deal with lack of any literacy!

Respondents who teach at the undergraduate level commented that they expect their students to have acquired digital literacy skills through their secondary education, or expect students to self-identify weaknesses and learn in their own time. Again, this is not supported in reality given the outcomes reported by ACARA (2015) and King (2018). Those teaching at the postgraduate level had very high confidence in their students' digital literacy skills. They also expressed that they expected their students to have the specialized digital skills required from the day they commenced their postgraduate studies which they would have gained during undergraduate studies. As one respondent commented, "I generally expect that most people embarking on study at tertiary level now have proficiency in computer skills".

A number of themes appeared regularly throughout the commentary related to concerns regarding students' lack of digital literacy skills. These included:

- Ethical concerns regarding student plagiarism and not understanding copyright law.
- Students not using technology responsibly,
- Students not being able to assess the quality of information they source from the internet.
- Students do not know how to use their university's learning management system.
- Lack of time and/or space in the curriculum to teach digital literacy skills.
- Difficulty engaging and motivating students with digital literacy as students think they already know enough and do not value these skills as requirements necessary for joining the workforce.

Respondents' perceptions of students' levels of digital literacy skills on commencement of their studies yielded thoughtful and interesting comments. The main themes are summarized below:

- There is too big a gap between high school and university expectations of digital skills.
- Students have learned how to operate computers and smart devices, but not cultural/critical literacies or

to use digital tools and devices in an academic context.
- Students have learned digital skills through trial and error which does not necessarily equate to being good at learning digital skills that are beneficial in an academic environment.
- There is too much content online, and students do not have the skills to find or discriminate valuable resources.
- Students need to be taught the digital skills that apply to the learning environment to ensure they have the skills for employment
- Students (and teachers) need to be thoroughly taught how to use learning and teaching digital infrastructure, and some respondents expressed that their learning management system needs to be much simpler or of better quality.

The digital native myth equating to being digitally literate was quite persistent in the comments, leading to respondents having high expectations which are not reflected in the reality of students' digital capabilities. For example, "they are digital natives and are online all the time especially their phones" and "most are digital natives and can navigate the digital world fairly easily". One respondent simply stated that "it is expected" and another commented that "they are told they need to be able to do this", the assumption being that students will be able to learn the necessary skills without being taught or guided. Respondents also pointed out that students are unwilling to engage in online learning because they are only interested in digital tools for personal use or that "transferring their digital skills to the more complex independent learning environment of a university can be challenging". The lack of a common understanding of digital literacy was also a limiting factor with students believing that use of mainstream software and social media makes them digitally literate or that the only skill they need is the "ability to point a browser to Google".

Some respondents expressed feeling inadequate in terms of their own digital literacy capabilities when comparing themselves to their so-called digital native students. A lot of "students are better than their teachers" and students are "consumers of technology, not creators – just like me". Respondents were also conscious of limitations in their students' prior digital experiences and other factors which could inhibit their abilities. Mature age students for example, and those of low socio-economic status or students from rural and remote backgrounds may not have had the same opportunities to develop digital literacy skills as school-leavers are expected to have had. International students have the added barrier of being in an environment where English is not their first language.

Although academics appear confident in their students' digital literacy capabilities, the level of confidence is not supported in the data presented here. Of particular concern is the fact that the discrepancy appears to be ongoing throughout students' studies. One would hope that course reviews and similar quality assurance processes would highlight such a discrepancy and action would be taken to resolve it. This does not appear to be happening in the case of digital literacy. The disjoint between expected and observed levels of digital skills suggests that respondents have not revised their expectations based on their observations. Several reasons suggest themselves for this situation. One possibility is that respondents believe that students can acquire digital skills through necessity. It is also possible that respondents are not prepared to acknowledge that students' digital literacy skills are not up to standard as this would require them to address the gaps in knowledge in their teaching. Alternatively, respondents own digital literacy skills (or lack thereof) is a limiting factor in their ability to help students improve or that they believe that university interventions will resolve the issue. It will not be until CEDA's (2015) recommendation that digital literacy is scaffolded throughout students' education experiences are adopted systematically throughout courses will we see significant improvement in graduates' digital capabilities.

Conclusions and future work

Many institutions have varied cohorts of students including school leavers, mature age returning to tertiary studies, mature age undertaking tertiary studies for the first time, international students, and low socio-economic status students for example. Further it is now understood that extensive technology use does not necessarily equate to good digital practices. Unfortunately, it would seem that the digital native myth is still common in academia and there is an assumption that students will just 'pick up' the necessary digital skills in order to survive to the end of their course. Further, academics perceive it as not their role to incorporate digital literacy into the curriculum or that there is no room in the curriculum (teaching period) to include additional learnings.

It seems that we cannot make assumptions regarding prior digital literacy experiences providing appropriate skill levels to support tertiary learning and as one respondent put it

> I guess I have assumed that most of the young students are digitally savvy. In writing this I do wonder however whether I assume far too much.

Course curricula often do not recognize digital skills that are discipline specific or differentiate digital skills that are transferable between disciplines, perpetuating the mismatch between the skills students are expected to have and the reality of their capabilities. Responsibility for teaching digital literacy must be explicitly expressed and actioned in the context of disciplines. Digital literacy needs to be systematically scaffolded and extended throughout the curriculum, as any other skill would be, to provide opportunities for students to develop their digital skills to a level of fluency that will meet the demands of a digitally enhanced work environment. Academics must accept that digital literacy is not a skill that they can assume students have any more than language and literacy skills. Such learning skills have to be nurtured, supported and expanded if they are to grow. Since all evidence suggests that skill levels at entry to HE are not up to standard, universities have to take responsibility for assisting students to meet employer expectations.

Support to scaffold and extend digital capability, as with other skills, goes well beyond the learning skills students require. Academics also need support to extend their skills to levels where they are capable users of the digital technologies in their learning environments at least to a level of confidence to pass on to their students. As one respondent said "I teach university staff it astonishes me how digitally illiterate some of them are".

With a clear understanding of expectations of assumed knowledge and digital competencies that make up the graduate learning standard, disciplines can plan how digital competencies are developed, extended and enhanced through the curriculum – a future extension of the larger project which this study is part of, which has value at a number of levels: by informing student expectations of capability growth; informing staff expectations; advising students with credit for prior learning; identifying where remedial learning may be required; and further informs employer expectations.

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