

Student Teachers' Confidence and Competence for Finding Information on the Internet

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Abstract: There is popular belief that current university students, who belong to the age group labelled as Generation Y or the Millennials, are more skilled than previous generations with computers by virtue of having grown up with them. Occasionally contrary voices suggest that, despite their obvious confidence with technology, the so-called digital natives are not necessarily more skilled. This study confirmed that first year university students report high levels of confidence in their ability to find information on the Internet but do not necessarily manifest matching levels of competence. If teacher graduates are to have the information literacy skills they need for their own lifelong learning and the capability to teach those skills in their own classrooms then changes to university information literacy teaching may be needed.

Information literacy is well recognised as an imperative at all levels of education in Australia. A national school education plan for the information economy included among its goal that “all students will leave school with the employment-related skills needed in the information economy” and noted that “information and technological literacy are now essential pre-requisites to work in almost any career” (EdNA, 2000, p. 5). Universities also include information literacy in statements of graduate attributes, referring, for example, to “the information literacy and independent learning skills required for them to pursue personal and professional development throughout their lives” (USQ, 2005). Moreover, they are developing associated strategies to ensure that graduates have opportunities to develop the relevant skills (USQ, 2006).

Teacher education programs need to ensure that graduates develop not only the information literacy they will require for their own ongoing development but also the knowledge and skills they will need to develop information literacy among the learners in their own classes. It is true to say that information literacy, in the sense of being able to locate and deal appropriately with information, has been an essential element of teacher education for generations. However, it is also true that, as the volume of available information is expanding rapidly, our understanding of the relationship between information and knowledge and how we deal with it is also evolving.

Before the invention and popularisation of the World Wide Web, the principal information challenge in most school classrooms was access. Information was mostly available from books and other printed materials, less often from CD-ROM and broadcast or recorded media. Mostly information moved in physical form and the way to ensure access when it was needed was to commit what was considered essential to memory or some other form of personal record. Now, in the age of the WWW, school classrooms can have instantaneous access to more information than can be readily used and the challenge is one of selection rather than access. As connected devices such as mobile phones and PDAs become increasingly commonly available, there is less need to commit information to memory or other local records in order to have continuing access. Moreover, the rate at which new information is becoming available is accelerating and memory or other records are challenged by both volume and currency.

Where the prevailing educational paradigm in the final decades of the previous century may have been constructivism (Jonassen, 1991), there is now growing discussion of alternative paradigms such as connectivism (Siemens, 2005). In this view, instead of learning being viewed as the construction of meaning from personal and shared experience, it can be seen as “primarily a network forming process” (Siemens, 2006, p. 15). When a person is connected to a network then they have access to the aggregated knowledge of the network and it is possible for the network as a whole to possess knowledge that no individual knows. As Downes (2006) has noted, no single person knows how to build a jet aircraft and fly it from one continent to another and yet international travel is a common feature of our lives. Such knowledge can exist only because of the connections among the members of a network.

Given the fundamental importance of information and the increasing likelihood that it will be found on the network rather than in memory or local records, facility with locating information on the network becomes a critical element of education, both as a tool for learning and as an outcome within the matrix of understandings and abilities that constitutes information literacy (University of Southern Queensland, 2006). In the context of teacher education it is important that graduates not only possess the relevant abilities but also be equipped to engender them in learners within their own classrooms. Competence and confidence for accessing information on the network are clearly important outcomes for teacher education programs.

Students who are now entering university directly from school belong to a group frequently identified as Generation Y or the Millennials. Among the characteristics they are said to share are diversity, focus on performance, preference for group activity and fascination with new technologies (Howe & Strauss, 2000). Because they have grown up with technology in a world which is highly connected they are described as “digitally literate”, “connected” and “always on” (Oblinger & Oblinger, 2005). They are accustomed to things happening quickly, to random access rather than linear thinking, and to being constantly connected (Prensky, 1998). They have been described as “digital natives”, having been born into a digital and connected world where their parents and teachers are mostly “digital immigrants”, and it has been suggested that they think differently as a consequence of their brains having been wired differently by environmental influences (Prensky, 2001b). Some writers are challenging the extent of the differences, arguing that often what is in evidence is not necessarily greater competence with computers so much as greater confidence born of familiarity and that, contrary to claims that they learn differently, the processes of learning remain fundamentally the same but the tools are different (Wall, 2006).

Whatever the truth of the claims and counterclaims about the Millennials, it is true that we are living in an increasingly connected world where the volume of information is also constantly increasing. The second of six core standards proposed in an information literacy framework for Australia relates to finding “needed information effectively and efficiently” (Bundy, 2004). That standard follows recognising the need for information and precedes critical evaluation. In a networked world where much of the knowledge we may need at any moment may be distributed across the network (Siemens, 2006), competence and confidence in searching the network are critical attributes. Hence investigating the Internet search capabilities of prospective teachers is an important first step to ensuring that they graduate with the competence and confidence needed both to meet their own information needs and to support development of those attributes in their own classrooms.

This paper presents some preliminary results from a study that investigated the confidence of beginning university students for conducting searches on the WWW using a self-report questionnaire and also conducted observations of a small sample of participants as they performed searches on which the questionnaire was based. The research questions that guided the study were as follows:

1. What perceptions do Generation Y students commencing university have of their abilities to use Internet search tools?
2. How do Generation Y students’ perceptions of their abilities with Internet search tools compare with their demonstrated abilities in practical tasks?

Methodology

The primary group of participants in this study comprised students enrolled in an introductory professional communications course (FOE1000) that forms part of the first year program for all undergraduate teacher education students at a provincial Australian university. Total enrolment in the course was 569. Additional data is drawn from students undertaking a foundation computing course (CIS1000) with the Faculty of Business at the same university. Enrolment in that course totalled 126.

Early in the semester FOE1000 included a lecture given by the Faculty Liaison Librarian in which he presented some key ideas relevant to developing information literacy, including search strategies that could be applied to the library catalogue and academic databases as well as on the WWW. Tutorials in the week following the lecture included working with sample output from database searches conducted using keywords relevant to the major assignment in the course. Students had opportunity to practice interpreting the database output and identifying relevant sources that might be investigated as they developed their assignment. Students were also provided with a

worksheet that they could complete by accessing the library catalogue, online databases and the WWW. Performance on the worksheet tasks counted toward the semester grade and was assessed using an online quiz administered through WebCT Vista.

Towards the end of the semester students in FOE1000 were invited to complete a questionnaire comprising a small number of questions about searching on the WWW together with some simple demographic items. The questionnaire was administered in WebCT Vista. Students in CIS1000 had previously been invited to complete a printed version of the same questionnaire during class. In both cases students who completed the questionnaire were invited to volunteer to participate in a laboratory session during which they would be observed while searching the WWW. Demographic items on the questionnaire covered gender, faculty of enrolment, age (in ranges), enrolment status (full-time or part-time), and highest prior qualification. The remaining questions included two general questions about confidence with Internet research and the use of search engines, and five about confidence for completing specific Internet search tasks. These items were presented using a four-point Likert scale (strongly disagree to strongly agree) with an option to not use a search engine on the specific tasks. There was a further question about preferred Internet search engine.

Results

Of the 569 students enrolled in FOE1000, 516 submitted responses to the quiz derived from the information literacy worksheet. As might be expected when students are given a week to gather answers using whatever resources they can access, most submitted correct answers to a majority of the questions. The mean number of correct answers on the 10 item quiz was 8.2 with a standard deviation of 1.8. Most items attracted from 97.5% to 80% correct responses but three items with correct response rates of 70.5%, 63.6% and 56.8% revealed what appear to be significant gaps in students' understanding and skill.

The first item on the worksheet and associated quiz asked students to record the Dewey call number for a book, *ICT, pedagogy, and the curriculum*, from the university library online catalogue. The catalogue shows the call number as "371.334 Ict" but, because the web catalogue uses a sans-serif font, as many as 25% of students apparently misread the final part of the call number as "lct" suggesting that they do not understand how the call number is formed and might be misled in searching for an item on the shelves.

The second item with a high error rate provided students with a URL for a blog and then asked them for information linked from the blog that would verify the name and academic credentials of one of the blog authors. Answering the question required students to follow a trail of links to personal web site with a CV. About 35% of students failed to provide a correct answer suggesting either a lack of persistence or inability to identify the series of relevant links required to locate the answer.

The third in this set of items provided the title of an article in an online journal, *Digikids: cool dudes and the new writing*, and asked students for the name of the author and the ISSN for the online journal. More than 90% correctly supplied the name of the author but fewer than 60% were able to provide the correct ISSN for which they needed to travel up the URL to the journal site and then hunt forward. It was later revealed that several of them obtained the name of the journal and then sought the ISSN from the library staff who, not having attempted the whole task, provided the ISSN for a different journal with a similar title.

The evidence from this assessment task appears to indicate that students are generally familiar with working online and can complete a variety of simple tasks. However, they are sometimes not aware of the significance of the information they encounter and may lack persistence or flexibility in extracting key information from the sites they locate.

Of 254 students from FOE1000 who chose to respond to the questionnaire, 84% were female and 16% were male. Most (86%) were studying for their first post-school qualification, 13% had a diploma and 1% had previously completed a degree. Ages were distributed as shown in Table 1. Most had only recently completed high school and fell within the age range usually associated with Generation Y or the Millennials.

Age (years)	17 – 20	21 – 25	26 – 30	31 – 35	36 – 40	41 – 45	46 – 50	over 50
%	61	15	9	5	5	3	1	1

Table 1: Percentage distribution of respondents' ages (N = 254)

In response to a question about which Internet search engine they used most, 91% selected Google, 4% selected Yahoo and 3% selected MSN. Table 2 summarises responses to the questions about general and specific confidence for searching on the Internet.

Item	Strongly disagree	Disagree	Agree	Strongly Agree	I would not use a search engine
I am confident about ...					
... researching assignments using the Internet	2.8	8.3	69.3	19.7	
... using a search engine to find information	2.4	9.8	62.2	25.6	
I am confident about searching the Internet using a search engine to find the ...					
... next screening time of a movie at my local cinema	3.1	6.3	22.0	43.7	24.8
... transcript of the speech given by George W Bush in reference to the Indian nuclear pact	6.3	23.3	50.6	15.4	4.3
... exchange rate for the Australian Dollar into US Dollars on 2nd January 2006	3.1	18.1	48.4	22.0	7.9
... cost of a train ticket from Sydney Airport to Circular Quay for a university student	2.0	11.9	46.2	29.2	10.7
... academic research paper written by Fred Davis on the Technology Acceptance Model	3.6	18.7	53.2	20.2	4.4

Table 2: Percentage distribution of responses to Internet search items

Students reported high levels of confidence on the two general items about researching assignments using the Internet (89% agreement) and using a search engine to find information (88%). The items about specific search tasks included a mix of everyday life and more academic examples and offered an additional choice indicating that they would not use a search engine for a particular task. Among those who did not select not to use a search engine confidence that they could find the information was generally high, ranging from 67% to 87% agreement.

Possible differences in responses according to age were explored using ANOVA but no significant differences according to age were found for any of the items.

A parallel study using the same questionnaire with students commencing in business degrees (Genrich, Roberts, & Grist, 2006) found somewhat higher levels of confidence. Table 3 shows comparative levels of agreement for the two sets of respondents.

Item	Education (N = 254)	Business (N = 126)
I am confident about ...		
... researching assignments using the Internet	89	97
... using a search engine to find information	87	98
I am confident about searching the Internet using a search engine to find the ...		
... next screening time of a movie at my local cinema	87	—*
... transcript of the speech given by George W Bush in reference to the Indian nuclear pact	69	82
... exchange rate for the Australian Dollar into US Dollars on 2nd January 2006	77	93
... cost of a train ticket from Sydney Airport to Circular Quay for a university student	85	92
... academic research paper written by Fred Davis on the Technology Acceptance Model	77	83
* not reported because of high proportion selecting not to use a search engine		

Table 3: Percentage agreement about confidence for Internet search tasks

The study conducted with business students (Genrich, Roberts, & Grist, 2006) included a secondary phase in which a small sample of volunteer students attempted the specific search items under laboratory conditions in which they were observed and their activity was recorded, using screen recording software, for subsequent analysis. Participants were not given any specific instructions other than that they were to obtain the information identified in the items as quickly as possible. All participants selected Google as their primary search engine and one tried MSN when Google

did not provide a quick answer. Two students used prior knowledge of specific sites to answer questions. Table 4 summarises some features of the observations.

Two different operational styles were observed. Most students used a single browser window for all searches, first obtaining a list of hits from Google and then opening selected URLs in the same window in search of the answer. They tended to work on a single task until they succeeded or gave up and proceeded to the next task. Students identified as Group C used multiple browser windows, opening Google search results in new windows and having up to 14 windows open simultaneously, navigating between them using the task bar. One student in this group kept Google open in a window and continued to refine his search, using multiple windows as required. Although this group displayed more familiarity with the interface they were not more successful than the other participants.

	Group A	Group B	Group C
Successfully Answered Questions	Questions 2 & 3	Questions 2 & 3	Questions 2&3
Search Engine Used	Google & MSN	Google	Google
Used prior knowledge	No	Yes – ThinkExist.com	Yes – xe.com
Multiple Windows	Single	Single	Up to 14
Keyword delimiters	No	Incorrectly use of the minus	Correct use of plus and quotes
Went past first results page	No	Once	Yes
Used find on pages	No	No	Yes
Used Google Spell correction	Yes	Yes	Yes
Used browsers features	History, back icon, drop down list in back icon	Back icon	Open Webpage in new window
Used natural language search	No	Yes	No

Table 4: Observational record of student Internet search activity [from (Genrich et al., 2006), used with permission]

Originally it was intended to conduct similar observational studies with students from the Education group. To date these studies have not been conducted but, given the broad similarity in the questionnaire results and the slightly lower confidence levels reported by the Education students, it seems unlikely that their performance on the actual searches would be better than that of the Business students.

Discussion

Students from both faculties, Education and Business, reported generally high levels of confidence for searching out information on the Internet. Business students were almost universally confident (97% and 98% agreement with statements of confidence) of their general search ability and Education students were only slightly less confident (89% and 87%). Both groups were slightly less confident about the specific search tasks, suggesting that their general confidence may be founded on experience of success in searching on familiar topics, rather than any explicit set of strategies that they could apply more generally. The relatively high levels of self-reported confidence are consistent with the familiarity of these students with technologies that have been part of their everyday experience for as long as they can recall. In respect of their comfort with and lack of fear of technology they are digital natives (Prensky, 2001a).

Based on the data from the FOE1000 information literacy task and the observations of the Business students undertaking actual searches, it appears that the reported levels of confidence for Internet searching are not matched by competence, at least beyond the more basic search tasks for which the preferred search engine returns easily identified results. Business students who participated in the laboratory study were not as successful at locating the information required by the tasks as would have been anticipated from their reported confidence levels. They demonstrated competence in using the basic search engine functionality but most did not use more advanced features of either the browser (multiple windows, internal find function) or the search engine (delimiters). In the FOE1000 information literacy task a substantial number of students did not succeed when it was necessary to interpret data on the screen or seek an answer beyond the first page located. The apparent preferences for speed over accuracy and random access over linear progression are consistent with claimed generational characteristics (Prensky, 1998).

The results of this study lend some support to a sceptical view of the digital native. It may be that the confidence or lack of fear of computers and networks is not necessarily marked by greater capability for their use beyond the simple mechanics of operation (Wall, 2006). The search techniques used by students were mostly unsophisticated and they did not always attend to contextual clues in the FOE1000 tasks or the observed searches. That might be symptomatic of limited capability in relation to the third core standard for information literacy, the critical evaluation of information and the information seeking process (Bundy, 2004). Alternatively, it may reflect a lack of motivation for the tasks used in this study and searches for information that is personally meaningful might engender a greater level of commitment to interpreting the screens in front of them and pursuing clues to find the answer. The answer to those questions and others may lie in further work using tasks that are more authentic. In the meantime, if graduating teachers are to be adequately equipped for their own lifelong learning and to develop information literacy in their own classes there is work to be done. Revision of first level courses that address information literacy should address both the issues of explicit search strategies and techniques and the evaluation of information, including that which emerges in the intermediate stages of a search.

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Acknowledgements

The work reported in this paper was supported in part by a grant from the Centre for Research in Transformative Pedagogies.

Peter Byrnes, Debbie Crabb, Rohan Genrich, Shelly Grist, Dave Roberts, and Mark Toleman from the USQ Faculty of Business were co-developers of the questionnaire, and contributed to the collection and analysis of questionnaire and laboratory data from the Business students.