Internet use equals computer literacy?

Shirley Gibbs
Lincoln University, New Zealand

This study reports an analysis of IT use by undergraduate university students. The term 'computer literacy' is as widely used now, as it was previously, but the meaning has changed as has how and why computers are used. Thirty years ago computer literacy meant the ability to program in a main frame environment then moved to meaning using computers to manipulate data. Now computer literacy seems to mean a number of things, including being comfortable using on-line tools.The findings of this study indicate that there is little relationship between how a person rates their overall computing ability and how they rate their ability in specific areas. However, a paired samples t-test, between on-line and off-line activities, returned a significant ($p < 0.05$) mean difference between these two activities. This suggests further investigation is warranted.

Keywords: on-line computer literacy; off-line computer literacy; undergraduate; IT use

Introduction

Computers and information technology have greatly changed the world in which we live. Where once the ownership of a personal computer was seen as a luxury, it is now uncommon to find a home without one. Those few young people who do not have computers at home most certainly will have access to them at their schools, both primary and secondary. Owing to this exposure to technology, the assumption is often made that people, who grow up with technology, will have the related skill set to use and understand it in a variety of situations. It can be taken for granted that this skill set will continue to increase as technology changes. The current generation, those born since 1980, has been given several different 'nicknames' to describe their use of technology. Amongst these names they have been labelled the 'digital generation' by Easton & Easton (2004). Seen as a generation who hold very little fear of technological change, they appear to have an innate confidence, which manifests as knowledge and perceived ability. When asked it is likely they will say they have average to above average computing skills. The literature provides information supporting the assumption that the general population, or at least those leaving secondary and higher educational institutions, are a computer literate generation (Lim, 2000; Hoffman & Vance, 2005). This is not necessarily true. In part this view has been exacerbated by people confusing computer use with computer knowledge. When computers were less common in everyday life computer literacy was defined as being able to write computer programmes. The definition then moved toward a more general definition of being able to use computer applications to solve everyday problems (Bartholomew, 2004).

However, it would seem that while today's young people are very comfortable in a digital world, they seem no more prepared than previous generations, when it comes to having the knowledge and skills required to use computer applications at a level suitable for tertiary education or in the workforce. Prensky (2001) with his two-part work "Digital Natives, Digital Immigrants" and "Do they really think differently?" began an expansive debate regarding the generation born into a time of technological change. In this ongoing debate he coined the terms 'digital natives' and 'digital immigrants' to describe, respectively, those born into the current generation surrounded by digital technology and those who have seen it introduced. Prensky's contention is that a generation who have grown up surrounded by the now ubiquitous digital technology think and process information differently to previous generations, who did not grow up with this technology but instead had to learn to use it. Prensky believes that this new generation will not prosper in an education system designed for previous generations. This is a view supported by others, including Hoffman & Vance (2005), who go so far as to identity the tasks this generation is good at as being 'native tasks'. They contend that tasks identified here as on-line applications are learnt informally with the skills likely being passed on to non-natives (e.g. a child showing a parent how to download MP3 files). Easton & Easton (2004) claim that due to an early and continual exposure to technology this current generation is likely to have a 'healthy over perception' of their computing skills.

There is much in the literature to support the view that perceptions of knowledge and ability in computing do not always correspond to the reality (Ballantine, Larres & Oyelere, 2007; Torkzadeh & Lee, 2003; Case, Mackinnon & Dyer, 2004). Although students entering tertiary study are likely to have access to computers at home, the high rate of ownership does not necessarily equate to ability in using computer applications, as noted by Stone, Hoffman, Madigan & Vance (2006, p 4).

> Growing up with an application, however, does not mean having an advanced skill, no more than growing up with the English language means having advanced compositional skills.

As computer ownership has increased the expectation of computing skills increases. These skills are often not rated in any formal manner; instead employers and teachers rely on people to rate themselves. In their study of students entering university, Ballantine, Larres & Oyelere (2007), concluded that the use of a self assessment method as a way of rating computing skills was likely to confirm a leniency bias where students are more likely to rate themselves at a higher level. Their study found that both less and more experienced students were likely to over-rate their computer competence. They did, however, agree that self assessment could provide useful attitudinal data but did not accurately measure competency.

What is clear from the literature is the need to define what computer literacy means in today's digital world. Is there one clear definition? Does it depend on who you are and what you use the digital technology for? While these questions are important this study sought to concentrate on the idea that the current generation view and use digital technology differently than past generations. This contention supports the hypothesis that in this time of increased computer ownership and perceived higher overall ability undergraduate students' use of computers is predominately on-line. To test this assertion a survey of undergraduate Lincoln University students was carried out.

Method

Forty undergraduate Lincoln University students were surveyed using an instrument adapted from one used by Kennedy, Krause, Judd, Churchward & Gray (2006). The questionnaire was essentially a two part instrument: the first part collecting demographic information; the second part was concerned specifically with computer application use and skill. The demographic information collected included the age and sex of each of the participants. Participants were also asked how long they had been using computers, how long they had been using the Internet, if they had taken any formal computing as part of their study and how they rated their own overall computing ability. The computer skills questions focused on the use of various computer applications. Participants were asked to indicate how often they used a particular computer application and also to rank their skill level in each of the computing applications mentioned. The rankings were based on a 7 point scale for the frequency questions ranging from 1 for several times a day to 7 for once or twice a year and a 5 point Likert type scale for the perception of skill questions (1 being little skill to 5 being very skilled). There was a 'never use' option for each application. Of the twenty one application type questions, nine could be classed as off-line use with the remaining questions classified as on-line (or Internet based) use. The off-line use included all the standard Office applications as well as activities such as writing computer code or manipulating images as well as playing games. The on-line use included such activities as email, chat, Internet searching, shopping, banking and social networking.

The participants of this study were all undergraduate students at Lincoln University, Canterbury, New Zealand. Lincoln University is a small university in rural Canterbury and began as an agricultural college more than 125 years ago. In 2008 Lincoln, while still being strong in agricultural and life sciences has developed in to a university with a reputation for producing practically minded students from across a range of disciplines. For the purposes of this study 40 undergraduates from a range of disciplines were surveyed, with the only exclusions being Information Technology students.

Data analysis and results

The data collected from the questionnaire were analysed using the SPSS data analysis tools. Mixed results were found. Selected results are discussed below.

Participants were asked how long they had been using computers and how long they had been using the Internet. These data are shown in Tables 1 and 2 respectively. Somewhat surprising, given the mean age of participants of 22.3 years, was that the mean time using computers was just 11 years and the time using the Internet was just 8 years. There is a substantial amount of literature which would suggest that people

of that age group would have been having a much longer association with this type of technology (Prensky, 2001a; Prensky, 2001b; Easton et al, 2004).

Table 1: Years participants have been using computers (N = 38)

Mean	11.2
Std Deviation	3.5
Missing	2

Table 2: Years participants have been using the Internet (N = 38)

Mean	8.5
Std Deviation	2.5
Missing	2

Another question asked participants if they had studied computing formally since beginning their university study. Of the sample 60% said that they had. This figure was surprising in so far as computing is only compulsory at Lincoln for commerce students and those taking information technology degrees. It should be noted, however, that this question did not separate formal computing classes from computing components taught within different courses. Students may have regarded small components of computer tuition as having had formal computing classes. The mean computer skill ratings for both groups (those having taken formal computing and those who did not) were compared. The difference was not significant. This is interesting as it would appear from the data collected that those who had taken formal computing did not generally rate their ability any higher than their colleagues who had not. This information is shown in Table 3.

Table 3: Means of computing skills for those having computing classes and those not

	N	%
Number who took formal computing classes	24	60%
Mean skill level for all participants	2	
Mean skill level for those with no formal computing	1.8	
Mean skill level for those having formal computing	2.1	

Participants were asked to rate their overall computing ability and were also asked to rate their ability for specific computing applications. This was used to determine if there was any relationship between how a participant perceived their overall computer ability and their ability to use specific applications. These data were analysed using a correlation analysis of each specific task compared to the overall skill. In none of the cases was the result significant for $P <= 0.05$. There is little or no relationship between how a person self rates their overall ability compared with how they see their skills in specific areas. This would indicate that knowing the overall rating a person gives themselves in no way predicts the rating the same person will give himself for any of the individual applications.

Participants were also asked how often they used particular computer applications. They were given choices ranging from several times a day to one or twice a year. A high use variable was formed by grouping the ‘once a day’ and the ‘several times a day’ usage categories. Participants were also asked how skilled they felt they were using the particular applications. They were asked to rate these on a Likert type scale where 1 equalled little skill to 5 being highly skilled. The data from those who gave themselves either a 4 or a 5 skill rating were graphed together with the results of the frequency question. The results of this can be seen in Figure 1 and show that generally it appears there is a relationship between frequency of use and perceived ability, especially for on-line activities.

To determine if there was any significant difference between what could be termed on-line use and off-line use the tasks were separated into to these two distinct areas. Two super variables were created and named On-line and Off-line skills. The means of these skills were then compared using a paired sample t-test. This test returned a result showing a difference in the means between the on-line and off-line skills, with on-line skills having a higher mean and a significant p-value of less than .05. Participants clearly rate their on-line ability higher than they do their off-line ability.

Discussion

The results of this study suggest that while undergraduate university students have confidence in their computing ability they do not distinguish between on-line and off -line computer use. When pressed students are likely to concede that most of their ‘computing’ time is spent partaking in a variety of on-line activities such as web surfing as opposed to more ‘traditional’ computing activities like word processing. This results aligns well with a theme common in computer education literature which suggests that while social or recreational use of computers is high the more ‘academic’ use is seen as boring and only undertaken when really necessary Ballantine et al. (2007).

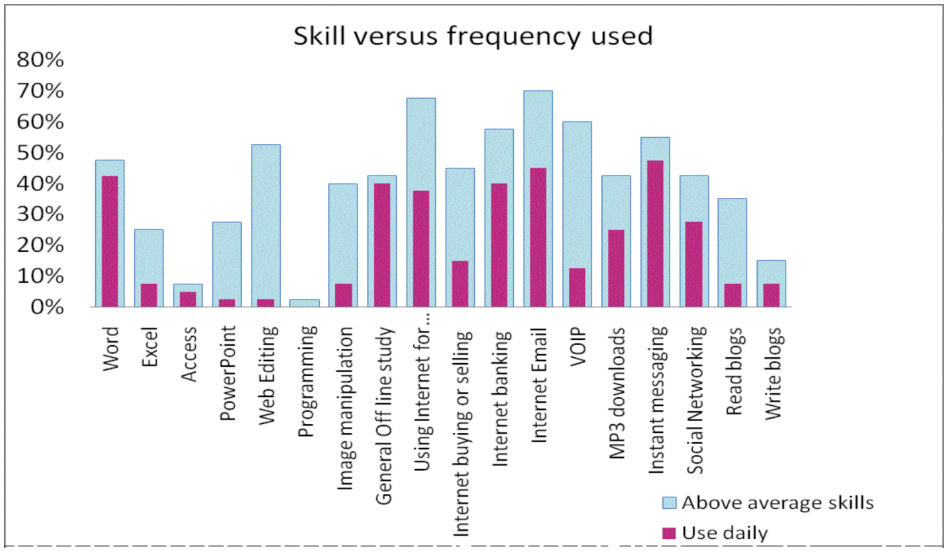

Figure 1: Graph showing the relationship between frequency of use and skill perception.

Ideally to measure a person's actual computing skills it is necessary for them to undergo some kind of testing. However for this study this was not feasible. Therefore the perceptions the students surveyed had of their abilities were measured. Not surprisingly the results show that none of the students rated themselves as having no experience, rather they were more likely to say they were average or above average. Only one student in the study claimed to have excellent skills. This is consistent with Ballantine et al. (2007), when they say that it is likely that people will be lenient in their personal ratings, and lean toward the middle ground. Previous studies have indeed found that scores from actual tests are usually lower than a person will predict (Wallace, 2005).

Another result which confirmed findings from past studies was the lack of relationship between how a person rated their own ability and whether or not they had received any formal computer training. Often it is found that those who have a lower level of knowledge are the ones who are most likely to give themselves a higher rating (Caputo and Dunning, 2004; Ballantine et al., 2007). Results from the study confirmed no direct relationship between how a person rated their overall computing and how they perceived their ability to use various computing applications[SG1][SG2]. Future study could explore this area further by testing participants in an attempt to help gauge their actual ability. However, a strong relationship existed between frequency of use and how they perceived their skill using a particular application. Simply put, the more someone uses software, the better they perceive they are at using it. This relationship was more prominent overall for the on-line applications. This result would agree with previous studies that have concluded that the current generation does spend most of their computer time on-line rather than doing more traditional computing. These results prove the hypothesis that undergraduates consider their use of computers makes them computer literate. Considering that this use is mainly on-line, rather than more traditional computer use, this adds more confusion to the already gray area of what computer literacy is. In an ideal world it would be good if the term 'computer literacy and its variants had consistent meanings. Currently it is a term that is commonly used in many different contexts. To avoid confusion more specific definitions are required. For example if an employer advertised for someone who is computer literate this may well mean something completely different to a secretary than to an on-line gamer.

Future work expanding on this study is being undertaken. It is hoped that new terminology will be developed that will assist employers, amongst others, to better specify computing requirements when recruiting. To this end qualitative data is being collected from both employers and students in an attempt to help clarify this situation. Early results suggest there is indeed confusion between what employers want and how this is being interpreted by graduates seeking jobs.

References

Ballantine, J., McCourt Larres, P. & Oyelere, P. (2007). Computer Usage and the Validity of Self-assessed Computer Competence Among First Year Business Students. Computers & Education, 49, 976-990.

Caputo, D. & Dunning, D. (2005). What you don't know: The role played by errors of omission in imperfect self assessments. Journal of Experimental Social Psychology, 4, 488-505.
Case, T., MacKinnon, R. & Dyer, J. (2004). Computer Literacy and the Introductory Student: An Analysis of Perceived and Actual Knowledge of Computers and Computer Applications. Annual Conference of the Southern Association for Information Systems, 278–284.
Dickerson, A. & Green, F. (2004). The growth and valuation of computing and other generic skills. Oxford Economic Papers, 56, 371-406.
Easton, A. & Easton, G. (2004). Trends in self-assessment of computer literacy. Proceedings of the Academy of Educational Leadership 9, 1, New Orleans.
Gupta, K. (2006). Computer literacy: Essential in today's computer centric world. The SIGCSE Bulletin 38 (2), 115-119.
Hoffman, M. & Vance, D. (2005). Computer Literacy: what students know and from whom they learned it. SIGCE'05 Feb 23-27, 2005, St Louis Missouri, USA.
Kennedy, G., Krause K., Judd, T., Churchward, A. & Gray, K. (2006). First Year Students' Experience with Technology: Are they really Digital Natives? Report for the Biomedical Multimedia Unit. The University of Melbourne.
Kline, D. & Strickland, T., (2004). Skill Level Assessment and Multi-Section Standardization for an Introductory Microcomputer Applications Course. Issues in Information Systems V (2) 572-578.
McCourt Larres, P., Ballantine, J. & Whittington, M. (2003). Evaluating the validity of self assessment: Measuring computer literacy among entry level undergraduates with accounting degree programmes at two UK universities. Accounting Education, 12, 97-112.
Prensky, M. (2001a, September/October). Digital natives, digital immigrants. On the Horizon, 9,5, 1-6.
Prensky, M. (2001b, November/December). Digital natives, digital immigrants, part 2: Do they really think differently? On the Horizon, 9,6, 1-6.
Stone, J. & Madigan, E. (2007). Inconsistencies and Disconnects. Communications of ACM 50 (4), 76-79.
Stone, J., Madigan, E., Hoffman M., & Vance D. (2007). Technology skills of Incoming Freshman: Are first year students prepared. Panel Discussion, Consortium for computing Sciences in Colleges.
Torkzadeh, G. & Lee, J. (2003). Measures of Perceived End User Computing Skills. Information and Management, 40, 607-615.
Wallace, T. & Clariana, R.B. (2005). Perception versus Reality – Determining Business Students' Computer Literacy Skills and need for Instruction in Information Concepts and Technology. Journal of Information Technology Education, 4, 141-151.

Author: Shirley Gibbs, Applied Computing Group, Environment, Society and Design Division, Lincoln University, PO Box 84, Lincoln University, Lincoln 7647, New Zealand.
Email: shirley.gibbs@lincoln.ac.nz Web: http://www.lincoln.ac.nz/

Please cite as: Gibbs, S. (2008). Internet use equals computer literacy? *In Hello! Where are you in the landscape of educational technology? Proceedings ascilite Melbourne 2008*
http://www.ascilite.org.au/conferences/melbourne08/procs/gibbs.pdf