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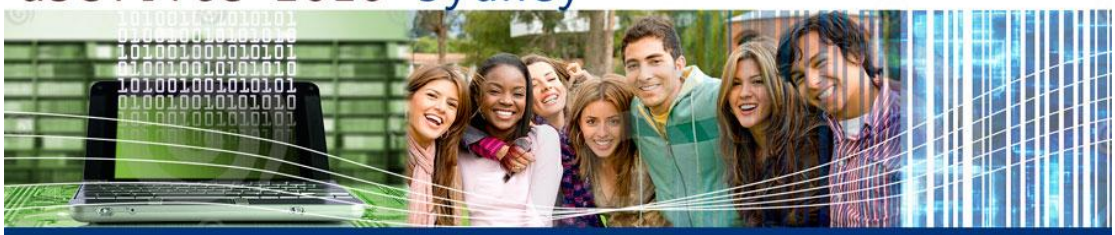

The future may have arrived, but engagement with ICTs is not equal among our diverse "net gen" learners

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William Gibson (1999) once suggested that "The future has already arrived. It's just not evenly distributed yet". This paper explores the diversity of student experiences in the use of current and emerging Information and Communication Technologies (ICTs) and challenges the popular rhetoric, which claims that "net generation" learners entering university are already equipped with skill in the use of a wide range of Web 2.0 applications such as wikis, social networking, blogging, podcasts and 3D gaming. While much has been written about the benefits of these technologies for facilitating learner engagement in activities that foster life long learning skills, much less is known about the diversity of experiences that students have in using such technologies. This paper reports the findings of a study conducted at the University of South Australia (UniSA), which involved surveying undergraduate and graduate students to gain greater insight into students' experiences and engagement using a range of ICTs. Consistent with the findings of Kennedy et al (2007, 2009), our results suggest that that there is much greater diversity in student experiences using these technologies than previously assumed. The findings challenge the assumption that so called "net gen" students are a homogenous group entering universities with pre-existing skills in the use of ICTs and raise important considerations for academics as they adapt their curricula and approaches using current and emerging technologies to engage a student population increasingly diverse in ICT skills.

Keywords: ICT, web 2.0, generation-y, net generation, digital natives, student diversity

Introduction

Students entering University in recent years have been described as "net gen", "generation Y", (Kennedy et al, 2007, 2009; Tapscott, Lowy & Ticoll, 1998); "millenials" (Oblinger & Oblinger, 2005); "digital natives" (Prensky, 2001) and "homo zappiens" (Veen, 2005). These terms describe a population of young people who have grown up with digital technologies and are said to display particular characteristics including the ability to multi-task, a desire for immediacy, preference for multi-modal learning, a need to be socially connected through networked activities, respond best to experiential activities and are interested in "things that matter" (Oblinger, 2008). It is also argued that "net gen" learners are entering university already equipped with skill in the use of a wide range of Web 2.0 applications such as wikis, social networking, blogging, podcasts and 3D gaming.

Despite the potential, evidence is also mounting of the challenges in adapting these technologies to the teaching and learning curriculum (Carlson, 2005; Kennedy et al, 2007, 2009; Mason and Rennie, 2008; Mulholland, 2008; Oblinger, 2008). As Hayes (2006) reminds us, leveraging the benefits of these technologies involves more than providing students with access to the tools and as Mason and Rennie (2008) caution, we cannot assume the transition from the social application of Web 2.0 to education will be straightforward; there will be challenges in convincing students that their favourite social tools are legitimate learning tools. Moreover, as Australian universities work towards achieving the Australian Government's target of 40 per cent of all young people aged between 25-34 years attaining a higher education qualification by 2025, and those from low socio-economic backgrounds comprising 20 per cent of enrolments by 2020 (Gillard, 2009), there is an even greater need for a more nuanced approached to understanding the differences between learners' experiences, their levels of engagement and their attitudes to these technologies.

Recognising the potential of new and emerging technologies, and also mindful of these possible "unforeseen challenges", a research team at the University of South Australia undertook a university wide survey of students with the objective of assessing their readiness to use these technologies and to inform our understanding of the particular information literacies they require to fully participate in courses utilising current and emerging technologies such as Web 2.0 and 3D virtual learning environments. The approach taken, the findings from the survey and the implications for further research are reported in the following sections.

New and emerging technologies

While the use of traditional virtual learning environments has been shown to enhance learning through the provision of flexible, just-in-time information and the exchange of knowledge (Wichert, 2002), it is evident that mere access to teaching materials is unlikely to engage our "digital native" learners who respond best to multi-modal forms of delivery (Oblinger & Oblinger, 2005; Prensky, 2001). Furthermore, these environments are not sufficient to facilitate the development of students' deeper knowledge and skills (Rouvrais & Gilliot, 2004) and are limited in their ability to capture the social dimension that characterises learning in the real world (Lombardi & McCahill, 2004). On the other hand, as Mason and Rennie (2008) argue, Web 2.0 represents a more participative and potentially paradigm-changing environment enabling learners to construct and share knowledge together. Van Eck (2006) describes the development of effective ways of using digital games-based learning without confusing the "medium with the message". Bruns (2008) proposes a new term "Generation C" to define the core capacities required of Web 2.0 learners; the capacity to be creative, collaborative, critical, combinatory, and communicative. The benefits of engaging students in such collaborative, connected activities are well documented (Downes, 2005; Franklin, 2007; Mason & Rennie, 2008; Collis, 2008), though as Mason and Rennie (2008) note, much of this evidence is reported through Web 2.0 sites such as blogs, podcasts and wikis rather than peer reviewed published journal papers.

Kennedy et al (2007) caution against making significant changes to the curriculum to accommodate new generations of learners. On the basis of the findings of their survey of first-year undergraduates' use of new technologies, Kennedy et al assert that there is greater diversity in frequency of use of technology than previously assumed and further, that the use of Web 2.0 technologies is much lower than we might expect of the so-called "digital native" population. Oblinger (2008) cautions that while "digital native" learners show no fear of technology we should not assume that they are technologically proficient. Prensky (2009), who is attributed to having coined the term "digital native" in 2001, also

acknowledges that as we move further into the 21st century the distinction between "digital natives" and "digital immigrants" will become less relevant as more of our population have grown up with digital technologies. Prensky (2009) has adopted a new term, "digital wisdom", to better reflect the potential that new and emerging technologies offer in enhancing students' analytical powers and ability to be critical thinkers. However, Prensky's (2009) adoption of the term "digital wisdom" is predicated on the assumption that our "net gen" learners have similar experiences in engaging with technologies and fails to distinguish between the differences in technologies with which our "net gen" learners from diverse backgrounds are comfortable. Castells (2007) asserts that communication and interaction in the 21st century is increasingly being conducted within an online, almost ubiquitous and exponentially growing network. The popular rhetoric has it that "net gen" learners actively seek ways to increase their participation in such networked activities. However, our findings from previous studies suggest that "net gen" learners aren't all as comfortable with new and emerging technologies as we might prima facie think (Wood & Hopkins, 2008).

This project therefore aimed to assess the readiness of students to make effective use of technologies. We were particularly interested to know how the uptake and engagement with ICTs varies among students, and whether previously held assumptions that "net gen" learners are more pre-disposed to the use of ICTs than other groups of students holds true with our student population. We were also interested in exploring the extent to which other demographic factors may play a role in students' engagement and acceptance of current and emerging technologies.

Methodology

The overall aims of this study were to: 1) demonstrate the pedagogical benefits arising from the innovative use of virtual learning technologies that support a flexible, collaborative, "connectivist" (Siemens, 2005) approach within the undergraduate and graduate curriculum; 2) develop a better understanding about the experiences and needs of our diverse student population; and 3) informed by these findings, develop strategies that can ease the transition for students who are not as comfortable with ICTs to ensure that they are better equipped with the skills required to harness the benefits of new and emerging technologies. The study reported in this paper addresses the second aim and represents the first stage of two related projects which aim to explore: 1) the potential of using virtual learning environments to enhance student engagement and life long learning skills, while enhancing their employability through the innovative use of Web 2.0 and 3D virtual technologies within the curriculum; and 2) students' use of social technologies for informal academic purposes, with a focus on social networking sites. Subsequent stages of this project will involve an investigation of these concepts using qualitative methods to provide greater insight in the findings reported from the quantitative data presented in this paper.

As the first stage to this study, the research team undertook a university-wide anonymous online survey to assess the readiness of students for the use of these technologies and to inform our understanding of the particular information literacies they require to fully participate in courses utilising a Web 2.0 approach. Ethics approval was obtained prior to commencing the study. The survey was constructed to include a mix of check box responses as well as qualitative open ended text fields and was designed to elicit basic demographic information as well as data relating to student use of ICTs, how they use these technologies, their perception of the effectiveness of these tools at work and at university, and the learning outcomes students stated resulted from them using such technologies at university. The format and questions included in the survey were based on the "experience using technology" questionnaire used by Kennedy et al (2007, 2009) in their study of first-year learners at the University of Melbourne.

All UniSA undergraduate (30,170) and graduate students (8,086) were invited to participate via the UniSA student portal and received information about the study via the careers services newsletter. Students who participated in the survey went into a draw for a $100 book voucher sponsored by the Careers Services Department. Of the 38,256 students invited to participate, 812 completed the online survey. The findings from the survey, which add to the Kennedy et al (2009) findings, are reported in this next section.

Results

Of the 812 respondents, 625 (77%) were born after 1980 and thus could be described as "net gen" learners (Kennedy et al, 2009). The most common year of birth was 1991 (15.8%) and the mean year of

birth was 1984. A total of 42.5% respondents were currently enrolled in their first year of studies at the time of the survey. Of those first year students, 35.7% (n=290) were "net gen" learners (ie born after 1980). 27.3% of respondents identified themselves as completing year 12 in 2009 and beginning university in 2010. The majority of respondents were female (76.1%). There were 21.9% students of a NESB background, and 12.8% of students identified themselves as International. 0.6% of students identified themselves as being Aboriginal or Torres Strait Islander and 4.7% students reported having a disability. Respondents were primarily full-time students (83.7%; part-time 14.5%) and most students were currently enrolled internally (82.6%; external 13.7%). A significant proportion of students (66%) were currently undertaking paid employment and working an average of 17.72 hours per week. Full-time, internal students were reportedly working on average 14 hours per week, while full-time external students were working an average of 29 hours per week

Most students stated that they currently have a computer (PC or laptop) that is between 1 to 3 years old (72.2%). Only 1.1% of students reported not owning a computer. Students were asked to report on average how many hours they spend on the internet for study, work or recreation within a week. Unfortunately, the scale for this question was saturated because the response options ranged from 0 to 10, increasing by single numbers, with the final option being greater than 10. The majority (65.6%) of students reported spending over 10 hours per week for study, work or recreation, with 9.1% indicating they used the internet for an average of 10 hours. Students were asked to indicate how often they used a particular Information and Communication Technology (ICT) and how skilled they perceived themselves to be at using that technology A large proportion of students are using computers to play digital music files without accessing the internet on a daily or weekly basis (40.7% daily; 33.5% weekly). A majority of students are reportedly using the internet on a daily or weekly basis for seeking general or study related information, instant messaging or chat, and sharing digital photographs. Students reported that they use computers to manage or manipulate digital images, as well as create audio and video files; these activities were undertaken primarily on a monthly or over monthly basis, rather than on a frequent or daily basis. It was evident that many students are not using the internet to build or maintain a website (70%) or to use social bookmarking software (76.4%).

Uses of the technologies and social networking

Students were asked how often they used and how skilled they were with various technologies involving digital media and the web/internet. The raw weekly mean uptake of various technologies by all students can be seen in column two of Table 1 below. The table also reports mean weekly uptake for various demographic groups. The most frequent uses of technologies (8-9 times per week) were: 1) playing digital music files; 2) using the web for reference for study; 3) using the web for general information and using the internet for instant messaging. The table provides a rich picture student uptake of technologies.

Students were also asked about their use of various social networking technologies and Web 2.0 tools. Table 2 below reports the mean weekly uptake for all students (column 2) and other demographic groups represented in the study. Facebook is clearly the most frequently used social networking site or Web 2.0 technology. UniSA students use Facebook some 14 times per week or twice a day on average. Males tend to manipulate digital media, play music and play games more frequently than females. Males also tend to use the web for general information more than females, in fact nearly three times a week more. In relation to social networking and Web 2.0 technologies, males tend to be more frequent users than females of Friendster, Skype, blogs, and watching YouTube videos. There is no significant gender difference for the use of Facebook.

Table 1: Mean weekly frequencies of using ICTs according to different demographic characteristics

	All	Born after 1980	First Year	First year and born after 1980	Male	Full time	External	Inter national	NESB	Disability	Emplo yed
Use a computer to manage or manipulate digital photos/images (e.g. using Photoshop, iPhoto, Dig.Image, etc.)											
yes	1.4	1.5	1.6	1.7	*2.1	1.5	1.0	^2.7	^2.4	2.4	1.2
no		1.1	1.3	1.3	1.2	0.8	1.4	1.2	1.1	1.4	1.7
Use a computer for creating or editing audio and video (e.g. iMovie, Movie Maker)											
yes	0.4	0.4	0.3	0.3	^1.0	0.4	0.6	^1.5	0.7	0.5	^0.2
no		0.2	0.4	0.4	0.2	0.2	0.3	0.2	0.3	0.4	0.8

Use a computer to play digital music files (e.g. iTunes) without accessing the internet											
yes	8.9	#9.9	9.6	^10.2	^10.7	^9.3	*6.9	*10.8	10.9	^4.5	*8.4
no		4.6	8.4	8.2	8.4	6.1	9.2	8.6	8.3	9.1	9.8
Use a computer to play games											
yes	3.2	3.1	3.0	2.8	^4.3	3.1	3.9	*4.6	4.3	1.3	#2.6
no		3.4	3.3	3.4	2.8	3.0	3.1	2.9	2.8	3.3	4.3
Use the web to look up reference information for study purposes (e.g. online dictionaries)											
yes	8.4	8.2	8.6	8.4	8.5	8.6	8.8	#12.5	#11.3	6.9	8.2
no		9.0	8.2	8.3	8.4	7.0	8.4	7.7	7.6	8.5	8.9
Use the web to browse for general information (e.g. news, holidaying, event timetables)											
yes	9.3	9.2	8.5	8.1	#11.5	*9.1	9.5	#12.8	#10.7	8.3	9.2
no		9.7	9.8	9.9	8.6	10.4	9.3	8.8	8.9	9.4	9.6
Use the web to buy/sell things or mange your finances (e.g. eBay, Amazon, air tickets, paying bills, online											
yes	3.4	3.4	*2.8	^2.5	3.7	3.3	4.3	4.5	3.9	3.7	3.5
no		3.3	3.8	3.9	3.3	4.0	3.3	3.3	3.3	3.4	3.3
Use the web/internet for instant messaging / chat (e.g. MS Chat, Yahoo, ICQ, Skype chat, Google chat)											
yes	9.1	^9.7	^9.2	9.5	11.0	^9.7	#7.5	#15	#12.7	8.4	*8.6
no		6.8	9.0	8.9	8.6	5.2	9.4	8.1	8.0	9.2	10.4
Use the web to build and maintain a website											
yes	2.2	2.2	2.2	2.2	2.6	2.3	1.6	3.8	2.1	1.0	1.8
no		1.8	2.2	2.1	1.9	1.7	2.3	1.8	2.2	2.3	3.1
Use social bookmarking software on the web (e.g. delicious)											
yes	3.5	4.0	3.2	3.3	3.8	3.9	2.7	5.5	4.3	1.9	3.3
no		1.8	3.9	3.7	3.5	2.0	3.9	3.1	3.2	3.6	3.7
Use the web to share photographs or other digital material (e.g. using Flickr, Facebook)											
yes	7.0	#7.7	*7.9	^8.1	6.5	#7.4	*5.1	8.5	7.6	*3.8	7.0
no		4.4	6.3	6.4	7.2	4.1	7.2	6.8	6.8	7.1	6.8
Use the web to make phone calls (e.g. VoIP using Skype)											
yes	3.4	3.4	3.3	3.4	*4.4	3.5	3.5	#6.5	#5.7	4.6	2.9
no		3.5	3.4	3.4	2.9	2.7	3.4	2.3	2.3	3.3	4.2
Use the web for web conferencing (e.g. using a webcam with Skype)											
yes	2.9	2.9	3.0	3.1	3.9	3.1	3.8	#5.5	#5.2	1.1	2.5
no		2.8	2.8	2.8	2.5	1.7	2.8	1.8	1.7	3.0	3.5
Use a mobile phone to access information / services on the web											
yes	7.6	7.6	7.4	7.4	7.7	7.4	7.9	7.4	7.1	4.4	^8.2
no		7.2	7.7	7.6	7.5	8.3	7.6	7.7	7.8	7.7	5.8
Use a mobile phone to send or receive email											
yes	7.2	7.4	6.8	7.1	8.1	*6.7	7.7	6.7	7.2	1.4	7.5
no		6.8	7.5	7.4	6.9	10.0	7.2	7.4	7.2	7.4	6.0

The figures in "yes" row are for members of a given demographic, the figures in the "no" row are for students who are not a member of that demographic. The calculations are for users of the technology only.
Significant mean differences are shown with * p<.05, ^ p<.01, #p<.001.

Table 2: Mean weekly frequencies of using social networking and Web 2.0 technologies

	All	Born after 1980	First Year	First year & born after 1980	Male	Full time	External	Inter national	NESB	Disability	Employed
Facebook											
yes	14.2	#15.1	14.8	*15.1	13.1	#14.7	^12.1	15.6	14.1	^9.6	14.4
no		10.8	13.8	13.7	14.6	11.5	14.6	14.1	14.3	14.4	13.8
MySpace											
yes	0.8	0.7	1.0	0.9	1.4	0.7	0.2	#4.5	#2.6	0.2	0.6
no		1.2	0.5	0.7	0.6	1.0	0.8	0.4	0.4	0.8	1.3

Twitter											
yes	5.0	5.2	4.9	4.9	6.9	4.7	8.0	6.1	6.5	4.4	4.0
no		3.3	4.9	4.8	4.2	6.4	4.6	4.8	4.6	4.9	7.2
Bebo											
yes	0.6	0.6	1.0	1.0	1.9	0.6	0.0	3.9	2.8	0.1	0.6
no		0.1	0.2	0.2	0.2	0.0	0.6	0.1	0.1	0.6	0.4
Friendster											
yes	1.8	2.0	*3.9	*4.1	*4.7	2.0	2.7	2.9	1.9	0.1	1.4
no		0.3	0.7	0.7	0.7	0.1	1.7	0.7	1.7	1.9	2.2
Skype											
yes	3.6	3.6	3.4	3.4	#5.5	*3.9	3.8	#7.4	#6.3	3.4	^2.8
no		3.2	3.7	3.6	2.7	1.8	3.6	2.2	2.3	3.6	4.8
LinkedIn											
yes	1.4	1.7	0.9	0.1	2.2	1.1	2.1	2.6	0.9	0.1	1.2
no		1.1	1.7	1.6	0.8	2.2	1.2	1.0	1.6	1.5	1.8
Elgg											
yes	0.2	0.2	0.2	0.2	0.1	0.2	0.0	0.2	0.2	0.0	0.2
no		0.0	0.1	0.1	0.2	0.0	0.2	0.1	0.0	0.2	0.0
Orkut											
yes	8.8	10.7	13.2	14.5	9.4	8.1	0.1	9.6	9.1	0.2	10.0
no		1.1	5.6	5.0	8.0	21.0	9.2	8.2	8.0	9.2	5.8
Flickr											
yes	0.7	0.8	0.9	1.0	1.6	0.8	0.4	1.9	1.2	0.2	0.7
no		0.2	0.5	0.5	0.4	0.1	0.8	0.4	0.5	0.7	0.6
Read blogs											
yes	3.4	^3.8	3.4	3.7	4.3	*3.7	*2	#6.9	#5.5	3.1	3.1
no		2.0	3.4	3.3	3.1	1.8	3.6	2.7	2.7	3.4	4.1
Listen to podcasts											
yes	1.9	*1.5	2.0	1.6	2.5	1.9	2.1	*3.7	#3.2	1.7	1.7
no		2.6	1.8	2.0	1.7	1.7	1.9	1.7	1.5	1.9	2.4
Watch vidblogs/vlogs											
yes	2.8	3.2	3.2	3.5	^4.9	3.0	1.3	#6.2	#4.9	1.4	2.5
no		1.9	2.5	2.5	2.0	1.3	3.2	1.9	1.9	2.9	3.5
Watch YouTube videos											
yes	4.1	#4.5	4.0	4.3	#6.8	^4.3	*2.5	#8.6	#7.7	2.5	^3.5
no		2.5	4.1	4.0	3.2	2.5	4.2	3.4	3.0	4.1	5.2
Leave comments on a blog, podcast, vidblog or YouTube video											
yes	2.7	*3.1	3.0	3.3	3.5	3.0	1.9	^4.9	^4.1	3.1	2.4
no		1.5	2.4	2.4	2.4	1.4	2.8	2.0	2.1	2.7	3.4
Add content to your own blog, podcast, vidblog/vlog or YouTube video											
yes	2.9	3.3	3.1	3.3	2.9	3.1	1.0	4.2	3.4	6.4	3.0
no		1.4	2.7	2.7	3.0	1.7	3.1	2.5	2.7	2.8	2.8

Use of ICTs by International and NESB Students

International students accounted for 12.8% (n=104) of the responses and 21.9% (n=178) of students reported being of NESB. Of the International students, 78.8% (n=82) are of NESB. 59.2% (n=61) of International students are female and 40.8% (n= 42) are male. The majority of International students who responded to the survey were studying in the Division of Health Sciences (35.6%, n=37) and the Division of Business (34.6%, n=36). International students emerge as the biggest users of these technologies of all groups surveyed. Examination of the International column in Table 1 shows that of the 15 technologies used, International students use some nine technologies more than local students. Examination across the "yes" rows for these nine technologies suggests that this group is generally a higher user than any other group in the survey. Higher use of the web for conferencing and phone calls is to be expected for this group, but International students are also using the web for reference and general information some 13 times a week, or 4-5 times a week more often than local students. International students are high users of Facebook and are greater users than other UniSA students of MySpace, Skype, blogs, podcasts, vidblogs and YouTube. Since 78.8% of the students who are International also reported being of NESB, many of the trends and average means for "International"

and “NESB” are similar. When exploring the average means difference between English speaking background (ESB) students and NESB, in most cases NESB students reported a higher average mean when using information technologies than English speaking background students. English speaking background students only reported using the internet to buy or sell things/manage finances slightly more than NESB students. English speaking background students also used Facebook slightly more than NESB students. However, these findings showed no significant differences. When investigating correlations between how often students use certain information technologies and social networking technologies, there were some strong correlations between how often they report using web conferencing technologies and technologies concerned with blogging or watching online blog or YouTube videos.

Many of these these ICTs that International students report using more frequently relate to searching the internet for study purposes or using the internet for communication purposes. It could be suggested that International students are using communication technologies more so that they can communicate with their family and friends at home. International students possibly use the internet more for searching and browsing because they may spend more time than local students using such tools, or because they require the additional support. Exactly why they use these technologies more could be examined in more detail in future research. The NESB column in Table 1 shows that NESB students, as with International students, appear to be using communication technologies or technologies that relate to studying more than the students from an English-speaking background. As Table 3 below shows, International and NESB students report having a significantly older computer or laptop than their counterparts. International and NESB students report spending significantly higher amounts of time on their preferred social networking sites than their counterparts. In all demographical cases, students reported changing their most preferred social networking site status about the same on average, which was about “weekly”.

Table 3: Significant differences in age of computer and use of ICTs between International students, local students, students from NESB and students from English speaking backgrounds (ESB)

Question	Mean by Demographic			
	International	Local	NESB	ESB
How old is your own most-used computer in years?	3.26* (yrs) (Sig. .017)*	2.57 (yrs)	3.04 (yrs) (Sig. .015)*	2.55 (yrs)
Approximately how many hours each week do you spend on the internet for study, work, or recreation?	8.51** (hrs) (Sig. .004)**	9.19 (hrs)	8.99 (hrs)	9.14 (hrs)
Indicate how many hours per week you spend participating on your preferred social networking application	13.47*** (hrs) (Sig. .001)***	9.19 (hrs)	12.14 (hrs) (Sig. .002)**	9.08 (hrs)
How often do you change your status in your preferred social networking application? (4=weekly, 3=Couple of times a month)	3.92	3.91	3.8	3.9

* indicates a significant difference of p<.05, **indicates p<.01, ***indicates p<.001

Use of technologies according to student age

It is possible to examine the way various uses of technologies group together. Typically we would expect that uses of technologies for synchronous communication would correlate more with each other than with other uses such as asynchronous communication, practical and multimedia use. This is indeed the case as is demonstrated in Table 4, which shows the results of a factor analysis of all 812 cases in the sample. (Factor analysis used maximum likelihood extraction with Oblimin rotation). As Table 4 illustrates, the 15 “uses” identified in the survey grouped into 4 major factors: synchronous communication, asynchronous communication, practical uses and multimedia uses. Some “uses” actually load into a number of factors e.g. use of "social bookmarking software on the web” loads most strongly to asynchronous communications, but also to synchronous communications and multimedia uses. This reflects various facets of the specific technology and web service offered.

Table 4: Factor table for the technology use questions

	Synchronous communication	Asynchronous communications	Practical uses	Multimedia uses
Use a computer to manage or manipulate digital…				.671
Use a computer for creating or editing audio …				.717
Use a computer to play digital music files (e.g. …			.595	
Use a computer to play games				.457
Use the web to look up reference information for …			.598	
Use the web to browse for general information …			.786	
Use the web to buy/sell things or mange your …		.535		
Use the web/internet for instant messaging / chat …	.405			
Use the web to build and maintain a website				.636
Use social bookmarking software on the web …		.552		
Use the web to share photographs or other digital …			.505	
Use the web to make phone calls (e.g. VoIP using …	.999			
Use the web for web conferencing (e.g. using a …	.772			
Use a mobile phone to access information / …		.788		
Use a mobile phone to send or receive email		.968		

An important question in this research is to ask how student age and "generation" affect uptake of technology. Figure 1 shows asynchronous and practical uses for which there is a statistically significant increase over time. It is apparent that year of birth is a consistent predictor of increase and generational impacts are not evident.

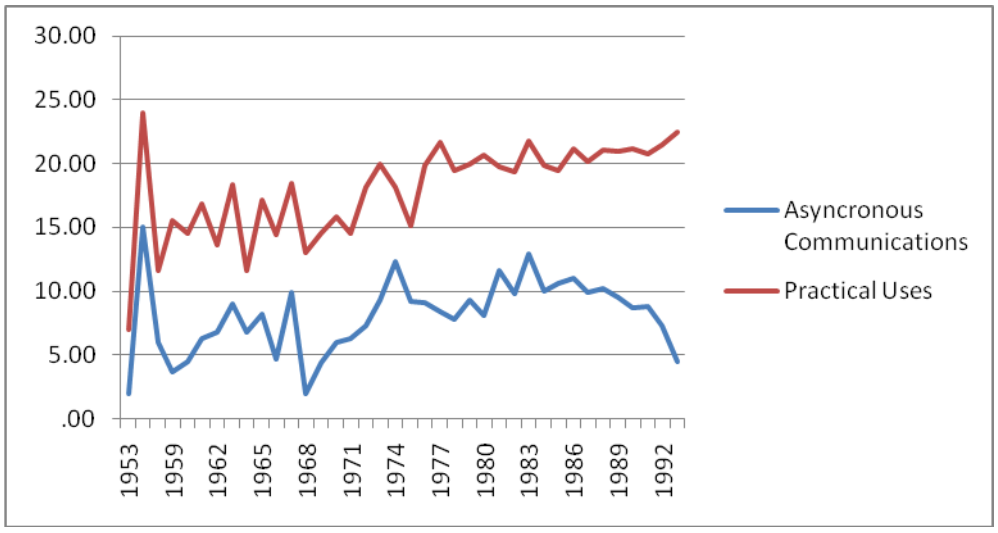

Figure 1: Asynchronous and practical uses of technology according to year of birth

Students with disabilities

Students who identified as having a disability use the internet significantly ($p<0.01$) less for many purposes: including use of Facebook for communicating with friends from secondary school and university. Although students with a disability use technology less for playing digital music, it appears that most of the reduced activity by these students is in relation to the social applications, such as

sharing photographs on the web, organising meetings with other students and changing their Facebook status.

Students with a disability also indicated that they would be more likely to ask a tutor or lecturer for help than students without a disability ($p=0.006$). No other study practices were found to be significantly different between students with and without a disability.

Impact of fraction of study and employment on student use of ICTs

The survey results also permit a discussion of aspects of student life such as employment and study fraction in terms of uptake of these technologies. This is important both in relation to educational uses of technologies as well as work life balance for students.

Some 433 students reported that they were employed and 260 said they were not employed. The employed students use the following technologies less than unemployed students: creating audio and video; playing digital files; playing games; instant messaging (see Table 1). However, students in employment access web services more on mobile phones than those students who are not employed. They also tend to Skype and watch YouTube less. Some 680 students who participated in the survey reported they were studying full-time and 118 were studying part-time. Full-time students play digital music files, instant message, and share photographs more than part-time students. Part-time students use the web for general information and use a mobile phone for email more than full-time students. Full-time students use Facebook and Skype more, and read and watch blogs and YouTube more than part-time students. Part-time students are clearly using Web 2.0 technologies less than full-time students.

Indeed a closer examination of the overlapping categories of study fraction and employment leads to a tentative conclusion that part-time students undertaking some kind of employment are the least users of all these technologies than any other demographic. There are 100 students in the study who are both studying part-time and employed, and analysis suggests they use the following technologies less than other students: creating digital media; playing digital music; playing digital games; instant messaging; using the web for phone calls; Twitter and Skype (t-test, $p<.05$). Such findings are consistent with the finding that students who are both studying part-time and employed are the lowest users of contemporary technologies for communication, multimedia and personal uses. Interestingly the 433 students who work and who are studying full-time appear to use some ICTs such as creating audio and video, playing digital files and instant messaging in a similar way to students in the rest of the sample. These findings suggest that there may be a negative impact on student engagement with ICTs for students who are studying part-time and employed at the same time.

Discussion

The findings from this survey indicate that there is greater diversity in students' experiences of ICTs among "net generation" learners than previously claimed. As the results reported in the previous sections demonstrate, while our younger students are already participating in and using contemporary technologies more than older students, there is considerable variability in the nature of the technologies they use and their level of engagement. Our findings suggest that while age is a factor, the differences in patterns of use cannot be attributed simply to any particular generational group. The findings demonstrate that even within the "net generation" learner population there is considerable diversity in use among International and NESB students compared to our local students. The findings also highlight that while some of our "net gen" learners are making extensive use of various technologies both in their preferences and their uptake, this is not universal. As the findings show, students who reported that they have a disability, and students who reported that they are studying part- time and working are not yet engaging in these technologies at the same level as the rest of the student population. These findings highlight the importance of Oblinger's (2008) warnings that while some "digital native" learners seem to show no fear of technology, we should not assume that they are technologically proficient. The findings from this study are consistent with the findings undertaken by Kennedy et al (2007, 2009) at the University of Melbourne with first year "net generation" learners and resonate with Mulholland's (2008) suggestion there may well be different categories of technology; those that are *"*assumed*"* and those that are *"*student driven*"*.

In interpreting these findings it should be remembered that the data reported in this paper relies on self-reporting by students who participated in the study. It is possible that some students chose not to self-disclose that they were International or NESB, and there are very likely students who have disabilities who chose not to declare this in the survey. Moreover, the findings are also based on student responses about their engagement with different technologies, and it is possible that their responses are not an accurate representation of their actual use of ICTs. This study was also limited to a survey of students enrolled at one university in South Australia, and so the findings are not necessarily generalisable to other contexts. Nevertheless, our findings are consistent with the study undertaken by Kennedy et al (2007, 2009) at the University of Melbourne and contribute to the growing understanding of the diversity of student experiences in the use of ICTs.

Conclusion

The popular rhetoric has it that "net gen" learners are not only comfortable living within a networked world, but that they actively seek ways to increase their participation using new and emerging technologies. However, our findings suggest that the "net gen" learners are not all as comfortable with this new participatory environment as previously assumed. These concerns will become increasingly important in the Australian context as universities work towards achieving the Australian Government's widening participation agenda. Clearly there are advantages for our future graduates if they are prepared to make effective use of current and evolving technologies. However, the findings suggest that if educators are to incorporate new and emerging participatory technologies into the curriculum, the choice of platform(s) used will be crucial if they are to be accepted and of value. The findings also suggest that students need to receive adequate training in the use of these technologies, and the diversity of learners and their prior experiences using ICTs needs to be taken into account when designing the curriculum.

The findings from the survey reported in this paper are consistent with the findings of Kennedy et al (2009) and add to our growing understanding of the diversity of student experiences with new and emerging technologies. Since this study was limited to one institution, it is impossible to generalise the findings to other higher education contexts. It also needs to be acknowledged that the findings are based on student reporting of their experiences using ICTs. However, the outcomes clearly indicate that as Kennedy et al (2007) advised, further research is needed to better understand how we can assist our students to make the transition from so called "assumed" to "student-driven" learning technologies to better prepare them for an unknown future.

Reflecting back to William Gibson's (1999) claim that the future has already arrived, but is not evenly distributed, we can report this certainly holds true given the unequal distribution of use of and engagement with ICTs by students from diverse backgrounds in our student population. Firstly, our younger students are already participating in and using contemporary technologies more than older students. Secondly, international students show us a future of more extensive use of various technologies both in their preferences and their uptake. Finally, the past is still with us with various groups, such as those with a disability, and those who are part- time and employed are yet to participate fully in what such technologies can offer.

References

Bruns, A. (2008). *Blogs, Wikipedia, Second Life, and Beyond: From Production to Produsage*. New York: Peter Lang.

Carlson, S. (2005). The net generation goes to college. *The Chronicle of Higher Education*, 52. http://chronicle.com/free/v52/i07/07a03401.htm

Castells, M. (2007). Communication, power and counter-power in the network society. *International Journal of Communication,* 2007(1), 28.

Collis, B. (2008). Web 2.0 tools and processes in higher education: Quality perspectives. *Educational Media International*, 45(2), 93-106. https://doi.org/10.1080/09523980802107179

Downes, S. (2005). E-learning 2.0. *eLearn Magazine*, October 2005(10).

Franklin, T. (2007). *Web 2.0 for content for learning and teaching in higher education*. http://www.jisc.ac.uk/media/documents/programmes/digitalrepositories/web2-content-learning-and-teaching.pdf

Gibson, W. (1999). *The science in science fiction*. NPR Talk of the Nation radio segment, 30 November1999. http://www.npr.org/templates/story/story.php?storyId=1067220

Gillard, J. (2009). Australian Financial Review - Higher Education Conference - 9 March 2009. http://www.deewr.gov.au/Ministers/Gillard/Media/Speeches/Pages/Article_090310_141130.aspx
Hayes, E. (2006). Situated learning in virtual worlds: The learning ecology of Second Life. AERC Conference Proceedings. http://www.adulterc.org/Proceedings/2006/Proceedings/Hayes.pdf
Kennedy, G., Dalgarno, B., Bennett, S., Gray, K., Waycott, J., Judd, T., et al. (2009). *Educating the net generation: A handbook of findings for practice and policy*. Retrieved from http://www.netgen.unimelb.edu.au/downloads/handbook/NetGenHandbookAll.pdf
Kennedy, G., Dalgarno, B., Kathleen Gray, T. J., Jenny Waycott, Bennett, S., Maton, K., Krause, K.-L., et al. (2007). The net generation are not big users of Web 2.0 technologies: Preliminary findings. *Proceedings of ASCILITE 2007*, Singapore.
Lombardi, J., & McCahill, M. P. (2004). Enabling social dimensions of learning through a persistent, unified, massively multi-user, and self-organizing virtual environment. In *Proceedings Creating, Connecting and Collaborating through Computing*, 166-172.
Mason, R., & Rennie, F. (2008). *E-Learning and Social Networking Handbook: Resources for Higher Education.* New York: Routledge.
Mulholland, C. (2008) cited in We must get to grips with the world of our 'digital native' students. (2008, 24 January, 2008). Western Mail, 26.
Oblinger, D. (2008). Growing Up with Google - What it Means to Education. *Emerging technologies for learning, 4*(March 2008).
Oblinger, D., and Oblinger, J. (2005). *Educating the Net Generation.* http://www.educause.edu/books/educatingthenetgen/5989
Prensky, M. (2009). H. Sapiens digital: From digital immigrants and digital natives to digital wisdom. *Innovate Journal of Online Education*, 5(3).
Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon*, 9(5), 1-6.
Rouvrais, S. and Gilliot, J. (2004). A pedagogical canvas for on-line simulation-based lessons. In *Proceedings of the World Conference on Educational Multimedia, Hypermedia and Telecommunications (EDMEDIA) 2004*, Lugano, Switzerland.
Siemens, G. (2005, January, 2005). Connectivism: A learning theory for the digital age. http://www.itdl.org/Journal/Jan_05/article01.htm
Tapscott, D., Lowy, A., & Ticoll, D. (1998). *Blueprint to the Digital Economy: Creating Wealth in the Era of E-Business*: McGraw-Hill Professional.
Van Eck, R. (2006). Digital game-based learning: It's not just the digital natives who are restless. *Educause Review*, 41(2), 16–30.
Veen, W. (2005). Net Generation Learning: Teaching Homo Zappiens. http://www.etwinning.de/aktuelles/veranstaltungen/dokus/Vortrag_Veen_19_09_2005.pdf
Wichert, R. (2002).'A mobile augmented reality Environment for collaborative learning and Training. In Proceedings of the *World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education (ELEARN) 2002*, Montreal, Canada.
Wood, D., & Hopkins, L. (2008). 3D virtual environments: businesses are ready but are our 'digital natives' prepared? *Proceedings of the Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education (ASCILITE)*, Melbourne.

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