The net generation are not big users of Web 2.0 technologies: Preliminary findings

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A great deal has been written over the past few years about the characteristics of a new generation of students and the implications for teaching and learning. This generation, which has variously been referred to as the 'Net Generation', 'Digital Natives' and 'Generation Y' are claimed to be very different to their predecessors in their familiarity with technologies and the regularity with which they use them. Additionally, some commentators have claimed that their immersion in technology during their developmental years has changed the way that they learn and perhaps even the physiology of their brains. This paper reports on some preliminary results from a large cross-institutional study of the implications for University teaching of the characteristics of this generation of students. This paper focuses in particular on the results of a survey of the frequency with which 2588 first year students at the University of Melbourne, the University of Wollongong and Charles Sturt University, use 41 different applications of new technologies in their study and personal lives. The results indicate that there is greater diversity in frequency of use of technology than many commentators have suggested. Importantly, the use of collaborative and self-publishing 'Web 2.0' technologies that have often been associated with this generation is quite low. The results of this large survey suggest that to accept the claims of some of the commentators on the changes needed in universities to cater for this generation of students without undertaking further research is likely to be a substantial mistake.

Keywords: net generation, digital natives, y generation, web 2.0, higher education

Introduction

Many current university students belong to the 'Net Generation' – a label used to describe today's young adults along with other terms including 'Digital Natives' (Prensky, 2001) and 'Generation Y' (McCrindle, 2006). This generation, born between 1980 and 1994, is said to have been shaped by their experiences of having grown up surrounded by all the "toys and tools of the digital age" (Prensky, 2001, p.1). Given that digital technologies have been part of the Net Generation's experience since their formative years, a number of assumptions have been made both about their attitudes towards learning generally and their use of new technologies specifically. For instance, it is assumed that they expect "technology will be an important part of their education" (Philip, 2007, p.1). They are also said, to expect immediate answers, fast access to information, and to be assertive information seekers and adept at multitasking, which some see as a sign of a short attention span (Barnes, Marateo & Ferris, 2007; Prensky, 2001). Furthermore, according to Prensky there is a widening gap between today's university students and their teachers, so-called 'Digital Immigrants'. Prensky (2001) has argued, therefore, that lecturers need to tailor their teaching to match the skills, experiences and expectations of their 'digital native' students.

However, as we have argued elsewhere, such generalised assumptions ignore the possibility that current students and teachers might have a more complex mix of skills and experiences with new technologies (Kennedy, Krause, Gray, Judd, Bennett, Maton, et al, 2006). Furthermore, until recently there has been much commentary about the characteristics of the Net Generation, but little empirical research to support the claims that have been made. However, recent studies have begun to examine the Net Generation's use of and attitude towards new technologies (e.g., Kvavik, 2005; Kvavik & Caruso, 2005; Kennedy et al, 2006; Oliver & Goerke, 2007). The research reported in this paper is part of an ongoing project that aims to further understand characteristics of the Net Generation, particularly with regard to their use of 'Web 2.0' technologies and their preferences for the use of new technologies as learning tools.

What is Web 2.0?

The term Web 2.0 refers to a loose collection of 'second generation' web-based technologies and services, many of which are designed to facilitate collaboration and sharing between users (O'Reilly, 2005). Although their use now covers a wide range of technologies and contexts, and has been criticised for being a largely artificial construct (e.g. Anderson, 2006), it is now firmly entrenched within the Internet lexicon.

While providing a comprehensive list of Web 2.0 technologies is beyond the scope of this paper there are a number of 'core' technologies and services that most students and many teaching staff will be familiar with or at least aware of.

- Podcasting – describes the distribution of digital media files (typically audio but often video) using syndicated internet feeds. Users 'subscribe' to individual feeds by providing the feed address (a special type of url) to a software application called an aggregator. Apple's iTunes is perhaps the most readily recognised aggregator and RSS (Really Simple Syndication) and Atom are the two most widely used feed formats. Whenever new content becomes available, the aggregator automatically downloads the podcast and stores it alongside other media files originating from the same feed. The downloaded podcasts can then be listened to or watched on the user's computer or transferred to a portable media player for later playback.

- Blogs – are customisable personal websites that allow the user to contribute regular or irregular entries that are displayed on the site in reverse chronological order. Depending on the blogging software or service used, entries may include video and other rich media. Visitors to a personal blog can typically post comments to specific entries and can also elect to be automatically notified whenever a new entry has been posted by subscribing to a blog's feed. Blogs may be used in isolation or integrated with other Web 2.0 technologies and services (e.g. most social networking sites include blogging tools). A wide range of commercial, community and open source blogging sites and tools is available.

- Wikis – are collaborative websites that can be edited by anyone with access to them. Wikis can accommodate large numbers of pages (Wikipedia currently contains almost 1.9 million entries on its English language site), which because of the underlying paradigm, are typically created and organised in an ad-hoc manner. As a result, effective navigation within a wiki usually depends on the extensive use of hyperlinks and robust search routines. MediaWiki, which powers Wikipedia and many other high-profile wikis, is the best know and most widely used wiki software.

- Social networking services – allow users to create and customise a personal website (aggregated within a larger website) that presents a profile of the user to other users. Users can readily locate other users with similar interests and by linking to them as 'friends', establish and explore new (and often complex) social networks. Depending on the service used, a user's pages may include other Web 2.0 technologies such as blogs and image and video sharing. MySpace and Facebook, two extremely popular social networking sites, are the first and second most visited sites on the web, reportedly attracting more than 100 million and 30 million users respectively.

- Social bookmarking services – provide a way for users to store, categorize, and share their internet bookmarks. Bookmarks can be either public or private (usually public by default) and users are encouraged to 'tag' them with keywords, of their choosing, to facilitate their cataloguing and retrieval by themselves other users. Collectively, such tags are referred to as folksonomies. Social bookmarking services often include the ability to allow users to subscribe to feeds linked to particular tags and/or users, in much the same way as you subscribe to podcasts or blogs. Popular social bookmarking sites include del.icio.us, reddit and Digg.

- File sharing – describes the process of making files available to other users over a network. While clearly a broad term covering many applications, in the Web 2.0 context it is most often used to refer to P2P (peer-to-peer) networks that connect and mediate direct transfers of files between individual users (e.g. mp3 sharing services such as FastTrack and Gnutella) and centralised web services such as Flickr (photo sharing), that have more in common with social bookmarking services.

The 'Web 2.0 page' in Wikipedia is an excellent starting point for those seeking more detailed information of these technologies and services and everything else Web 2.0. For an educational technology perspective on Web 2.0, see Alexander (2006) or Bryant (2007).

The Net Generation are regarded by some commentators as quintessential Web 2.0 technology users (Cairncross, 2007; Lorenzo, Oblinger & Dziuban, 2007; Towers, Smith & Bruns, 2005). This has captured the attention and imagination of some educators because with Web 2.0, the Net Generation are not consigned to consuming web-based information, rather they are creating and producing content and then using and sharing it around, leading some to label them 'prosumers' (Chang, 2006) or 'produmers' (Towers, Smith & Bruns, 2005). The confluence of Web 2.0 technologies and the Net Generation is well captured by Lorenzo et. al's (2007) description of the habits and attitudes of Net Generation learners:

> Constantly connected to information and each other, students don't just consume information. They create—and re-create—it. With a do-it-yourself, open source approach to material, students often take existing material, add their own touches, and republish it. Bypassing traditional authority channels, self-publishing—in print, image, video, or audio—is common. (p. 2).

About this project

This project critically appraises the technological skills and preferences of the incoming 'Net Generation' of university students and their teachers. It is being undertaken at the University of Melbourne, the University of Wollongong and Charles Sturt University and is funded by the Carrick Institute for Learning and Teaching in Higher Education. An overarching aim of the project is to employ an evidence-based approach to the design, development and implementation of emerging technologies for learning and teaching in higher education. The emerging technologies of particular interest lie in three areas: communicating, publishing and file sharing.

The project is being conducted in three phases: (1) an investigation stage in which the technology access, use and preferences of first year University students and their teachers across disciplines have been studied; (2) an implementation stage in which eight projects integrating technology-supported communication, publishing and file-sharing will be evaluated, and (3) a dissemination stage during which the findings of the project will be shared with university educators, designers and policy-makers. The first phase of the project (Investigation) has been completed at the three participating universities and planning for the second phase (Implementation) is well under way.

Method

This paper reports on a sub-set of the results from the initial investigation. These results are drawn from a comprehensive questionnaire of first year students' use of emerging technologies and technology-based tools in their everyday lives and in their formal education. A copy of the questionnaire can be obtained by email from the authors. The questionnaire was based on an earlier survey that was piloted at the University of Melbourne with over 2000 students (Kennedy, Krause, Judd, Churchward & Gray, 2006). This questionnaire asked students about the degree to which they accessed and used technology-based tools, how they currently used technology to create and exchange information and knowledge, their skill levels with different technologies, and their perceptions of how technologies could be used in their studies. This paper summarises the results of the questions relating to students' frequency of use of technology-based tools.

The survey was distributed through classes of first year students in a range of disciplines representing the Arts and Humanities, the Sciences and the Professions across the three participating institutions. Data collection was carried out in accordance with the human ethics requirements of each institution, and participation was voluntary and confidential. Questionnaire responses were received from 2588 students. The vast majority of students surveyed were under 25 years of age (80.0%) and 65.6% of students were between 17 and 20 years of age. More students from the University of Melbourne completed the survey (45.4%) than from the two other institutions (Wollongong: 27.5% ; Charles Sturt: 27.0%) and more

females than males responded (Females: 68.9%; Males 31.0%). Students were also recruited from this sample to participate in focus group and individual interviews that enabled the researchers to obtain more detailed explanatory responses across the range of questions posed in the survey. This also provided students with the opportunity to express their ideas in their own words and to raise issues not covered in the survey. A total of 46 students participated in the interviews and focus group sessions.

As with all empirical research, this study has limitations and these must be considered when interpreting the results. The respondents to the survey represent only first year students, and as such will not reveal any differences that arise from the stage of study, such as those found by Kvavik, Caruso & Morgan (2004). The three institutions from which the sample has been drawn were intentionally chosen to reflect very different histories, research and teaching profiles and student demographics. Nevertheless they may not be completely representative of the full diversity of the Australian student body. In addition, while students were sampled from a wide range of disciplines, it was not possible to include students from every discipline and no attempt was made to ensure that the proportion of students from each discipline was representative of the Australian university population as a whole. Nevertheless, the size and diversity of the sample should allow the results of this study to be a very good starting point towards establishing a benchmark of technology use by students within the Australian university sector.

Results

Table 1 summarises the results of responses to questions about the regularity of use of technology-tools for working with media and playing games. The table shows the percentage of students who indicated that they used technology in the way described (eg. to manage or manipulate digital photos) with the specified regularity (eg. several times per day). The mean score has been calculated by allocating a numeric value to each of the specified regularities (as shown in the table) and averaging across the sample. The results suggest that the majority of students use a computer at least once per month to manage or manipulate digital photos and to play digital audio files. More sophisticated media manipulation such as audio and video editing or manipulation of images using a tool like Photoshop is much less common. Use of computer games was surprisingly low with only half of the students playing games on a computer more than once per month and an even smaller proportion regularly playing games using a games console or over the Internet.

Table 2 summarises the responses to questions relating to the use of mobile devices. As expected, the vast majority of students use a mobile phone more than once per day to make calls and to send text messages. Most students use a mobile phone at least once per month to take photos. However, very few students use their mobile phones or other mobile devices for other applications such as email, video phone calls, video messaging, accessing information services or as a personal organiser.

Table 3 summarises responses relating to traditional, non-collaborative, web technologies. The results suggest that most students use the Internet for email and for looking up information related to their study and other lifestyle activities at least several times per week. Their use of the Internet to listen to sound recordings and for instant messaging is slightly less frequent though still very common. Commercial uses of the Internet, such as for banking or for purchasing is less common, although most students still do this at least once every few months. Creation of web pages is very uncommon with the majority of students never having done so.

Table 4 summarises responses relating to the use of Web 2.0 technologies. The use of such technologies by first year University students would be consistent with predictions of commentators who suggest that many members of the Net Generation are not happy to just consume information from traditional media sources but want to be active participants in the information and knowledge creation process (see Cairncross, 2007; Lorenzo, Oblinger & Dziuban, 2007). Contrary to these predictions the results suggest that most students are very infrequent users of these technologies. For example more than 80% of students surveyed had never produced a Podcast and had never contributed to a Wiki. More then 70% had never kept their own Blog. More than 50% had never used a social networking site, read someone else's Blog or downloaded a Podcast. Nevertheless there is a sizable minority of students who are very frequent users of Web 2.0 technologies. For example, 16% of students indicated that they use social networking software once per day or several times per day, and nearly 18% of students comment on blogs at least once per week. Similarly, 15% of students produce and contribute to their own blog on a daily or weekly basis. There is a significant subset of students who are downloading and/or sharing MP3 files on a daily or weekly basis (43.2%) and sharing photographs or other digital files (24.3%).

Table 1: Tools for working with media and playing games

Ways in which technology can be used	Several times per day (7)	Once per day (6)	Several times per week (5)	Once per week (4)	Once per month (3)	Every few months (2)	Once per year (1)	Missing/not used (0)	Mean
Media and Games									
Use a computer to manage or manipulate digital photos (e.g. using iPhoto, Dig. Image)	3.9	3.4	11.9	12.8	25.3	19.8	12.9	9.9	2.9
Use a computer to create or manipulate digital images (e.g. using Photoshop)	2.1	1.9	6.8	8.4	19.1	20.6	17.0	24.1	2.1
Use a computer for creating presentations (e.g. PowerPoint)	1.5	1.4	5.0	6.3	26.1	26.4	22.2	11.2	2.2
Use a computer for creating or editing audio and video (e.g. iMovie, Movie Maker)	1.4	0.8	2.8	3.7	7.7	12.2	24.0	47.4	1.1
Use a computer to play digital music files (e.g. iTunes) without accessing the internet	35.8	13.3	16.4	8.6	6.2	3.2	2.7	13.8	4.7
Use a computer to play games	8.0	6.5	11.6	9.9	14.3	12.7	13.1	23.9	2.7
Use a games console to play games	4.1	2.6	6.5	7.0	12.2	12.9	15.5	39.2	1.8
Use the internet/web or a LAN to play networked games	3.8	1.8	3.8	4.4	6.6	9.0	13.8	3.8	1.3

Table 2: Use of mobile devices

Ways in which technology can be used	Several times per day (7)	Once per day (6)	Several times per week (5)	Once per week (4)	Once per month (3)	Every few months (2)	Once per year (1)	Missing/not used (0)	Mean
Use of Mobile Devices									
Use a mobile phone to call people	54.6	15.2	14.9	5.8	2.5	1.2	0.5	5.4	5.8
Use a mobile phone to text / SMS people	67.0	10.5	10.3	3.2	1.9	0.9	0.5	5.6	6.0
Use a mobile phone to take digital photos or movies	15.0	5.9	14.2	14.6	14.2	4.7	3.5	27.9	3.3
Use a mobile phone to send pictures or movies to other people	7.8	3.7	8.0	9.3	12.9	8.5	5.1	44.7	2.1
Use a mobile phone to make video calls	3.1	1.0	2.3	2.8	3.7	3.9	5.4	77.9	0.7
Use a mobile phone as an MP3 player	7.1	2.5	5.2	5.5	4.6	3.7	4.4	66.9	1.4
Use a mobile phone as a personal organiser (e.g. diary, address book)	13.0	8.5	11.7	8.9	8.3	4.0	3.3	42.2	2.7
Use a mobile phone to access information / services on the web	3.2	1.9	3.1	4.2	4.5	5.1	6.7	71.4	1.0
Use a mobile phone to send or receive email	2.7	0.7	1.5	2.0	2.3	2.8	5.8	82.2	0.7
Use a handheld computer (e.g. a PDA) as a personal organiser (e.g. diary, address book)	3.1	1.5	2.6	2.0	2.9	3.6	10.5	73.8	0.8

Table 3: Use of traditional web technologies

Ways in which technology can be used	Several times per day (7)	Once per day (6)	Several times per week (5)	Once per week (4)	Once per month (3)	Every few months (2)	Once per year (1)	Missing/not used (0)	Mean
Use of Traditional Web Technologies									
Use the web to access a portal, 'Course or Learning Management System'	14.2	17.9	19.8	7.7	4.1	2.3	3.7	30.3	3.6
Use the web to look up reference information for study purposes (e.g. online dictionaries)	14.4	13.3	32.8	18.4	11.3	3.6	1.3	4.9	4.6
Use the web to browse for general information (e.g. news, holidaying, event timetables)	23.0	20.2	27.7	12.8	8.7	2.7	1.2	3.9	5.0
Use the web to listen to sound recordings (e.g. via streaming audio or iTunes)	10.8	8.3	16.7	13.1	12.9	7.6	4.2	26.3	3.2
Use the web for other pastimes (i.e. for leisure activities)	22.3	15.6	19.7	12.7	8.4	4.1	2.4	14.8	4.3
Use the web to buy or sell things (e.g. eBay, Amazon, air tickets.)	2.9	2.7	5.4	7.4	16.0	17.4	12.8	35.4	1.9
Use the web for other services (e.g. banking, paying bills)	4.1	5.8	13.4	14.2	16.9	6.8	5.8	32.9	2.6
Use the web/internet to send or receive email (e.g. Hotmail, Yahoo, Outlook)	38.0	26.9	20.6	7.2	2.4	1.1	0.4	3.4	5.7
Use the web/internet for instant messaging / chat (e.g. MSN, Yahoo, ICQ)	26.8	12.7	14.4	8.8	6.6	4.2	3.7	22.8	4.0
Use the web to build and maintain a website	3.1	2.6	3.2	3.7	4.0	4.4	9.9	69.0	1.0

Discussion

What do Net Generation students have in common, and what sets them apart from other generations of learners in higher education? By definition, they have grown up during a time that has seen the rapid emergence and extensive influence of digital technologies and tools such as personal computing, networks, mobile devices and the Web. But findings from this study suggest that first year University students at three Australian universities are nowhere near as frequent users of new technologies as some commentators have been suggesting. Established applications of technologies, such as searching for information on the web, email, mobile telephony and SMS messaging are used very frequently by a large majority of students. However newer technologies, such as Blogs and Wikis that allow students to collaborate and to produce and publish material online are used by a relatively small proportion of students. While there was evidence that social networking and digital file sharing was popular among a small minority of students, few students were regularly using social bookmaking or creating and publishing podcasts.

There is clearly a greater diversity in the patterns of technology use within members of this group than the existing literature proclaims and importantly no widespread use of some of the flagship technologies of Web 2.0. In fact, during the interviews and focus group sessions a number of students indicated that they were unsure what some of these tools actually were. For example, when one student was asked how a blog could usefully support her studies, she responded by saying: "What's a blog? I don't know what it is". Similarly, in focus group discussions about podcasting, two students from separate focus groups reported being unfamiliar with any such technology or service.

These research results indicate that we must be wary of overgeneralising the distinctive features of this generation, as individuals or as a group, their lifestyles or their learning styles based on assumptions about technology use or preferences. When commentators such as Barnes et al. (2007) say that blogs have "long [been] a staple of the Net Geners' lives", there is a real danger that such commentary will create a vague but pervasive feeling among tertiary educators that every student who enters the higher education system is a blogger. The evidence from this study indicates that the majority of first year students in 2006 had never read a blog (55%) let alone created one of their own (73% have not). As a consequence, we

Table 4: Use of Web 2.0 technologies

Ways in which technology can be used	Several times per day (7)	Once per day (6)	Several times per week (5)	Once per week (4)	Once per month (3)	Every few months (2)	Once per year (1)	Missing/not used (0)	Mean
Use of Web 2.0 Technologies									
Use social networking software on the web (e.g. Myspace, Trendster)	9.0	7.0	6.9	6.1	5.4	3.8	5.3	56.5	1.9
Use social bookmarking software on the web (e.g. del.icio.us)	1.3	0.9	1.2	2.2	2.8	2.7	7.2	81.7	0.5
Use the web to download podcasts (e.g. using Juice, iTunes)	3.5	4.1	8.9	7.5	8.8	5.8	4.6	56.7	1.7
Use the web to publish podcasts (e.g. using Podifier, Podcaster, PodProducer)	0.7	0.8	1.8	2.2	1.6	2.4	5.2	85.2	0.4
Use the web to download and/or share MP3 files (e.g. music, videos)	9.9	6.0	16.5	10.8	12.2	7.4	3.3	34.0	2.9
Use the web to share photographs or other digital material (e.g. using blinklist, Flickr)	3.7	3.6	8.6	8.4	11.8	6.8	4.4	52.7	1.8
Use the web to make phone calls (e.g. VoIP using Skype)	3.0	1.8	4.3	3.5	4.6	3.4	5.0	74.3	0.9
Use the web for webconferencing (e.g. using a webcam with Skype)	2.3	1.5	2.7	2.4	3.4	2.2	4.8	80.6	0.7
Use the web to read RSS feeds (e.g. news feeds)	2.2	2.5	3.5	3.2	3.1	2.1	4.1	79.3	0.8
Use the web to keep your own blog or vlog	3.2	2.7	4.2	4.9	4.6	3.2	4.5	72.6	1.0
Use the web to read other people's blogs or vlogs	4.9	4.4	7.3	8.1	9.2	6.0	5.1	55.1	1.7
Use the web to comment on blogs or vlogs	3.6	3.3	4.9	5.8	5.7	5.2	4.7	66.8	1.2
Use the web to contribute to the development of a wiki	1.5	1.1	1.4	2.1	1.7	2.2	5.3	84.9	0.5

should be cautious about accepting the claims of commentators who suggest that new technologies and tools in higher education will offer an all-purpose solution to eliminate disengagement or dissatisfaction among this generation of students.

Aside from the hype not quite matching the reality, there may be other explanations for the clear disparity between the proposed and actual technology use of the Net Generation, particularly in the area of Web 2.0. The 2007 Gartner Report on the "Hype Cycle for Higher Education" predicted that wikis were between two and five years away from mainstream adoption in higher education (Zastrocky, Harris, et al., 2007). Thus, it may be that some of these Web 2.0 technologies are poised for widespread use by incoming students and subsequent implementation in higher education. Alternatively, given that much of the previous research about the Net Generation has been conducted in North America, it could be that Australian students are not as enamoured with Web 2.0 technologies as American students. For example, a recent report from the Future Exploration Network noted that Australians blog and use social networking sites considerably less than their counterparts in the United States (Dawson, 2007). Over time it will become clear whether students who are currently using Web 2.0 are the early adopters of technologies that will become pervasive in the future.

It may be useful to consider the implications of the findings presented in this paper in a broader social context. In an era where politicians are rushing to YouTube and MySpace to promote their policies, their vision and their connectedness with the community, it may be worth considering whether this investment justifies the return. While these political strategies almost certainly generate interest – both positive and negative – from a sub-section of the community, the results from this investigation suggest that these strategies may miss more of the targeted Net Generation demographic than they hit. A similar set of considerations would seemingly face educators thinking about applying new technologies 'to reach' students in tertiary institutions.

Individual educators and educational planners and developers will find much useful information about incoming undergraduate students of the Net Generation from the substantial data collected in this study. The findings may in time serve as an Australian benchmark for technology use, against which future surveys of technology use in Australia and overseas may be evaluated. The findings of this investigation may inform improvements in current technology-based teaching and learning activities, as well as highlight areas of potential educational technology development. Future papers coming out of this work will report on the analysis of the responses according to discipline, University and study mode as well as various demographic factors. The results of this analysis have the potential to support decisions to implement technologies more selectively, so that they are better aligned with different student learning contexts, such as the field or mode of study, or with the particular features of the student experience that different universities intend to provide. They may provide evidence which is able to inform the design of orientation or remediation programs for those student groups who are most likely to need formal learning about information and communications technologies and information literacy, or to guide and support innovative work among those student groups who are most likely to be adept.

Finer-grained investigations of many questions are required to move us beyond marketing slogans and personal anecdotes, if we wish to base decisions about pedagogies and educational infrastructure investments on an accurate and detailed understanding of our students. This project is also investigating the companion proposition to that made about the 'digital natives'; that university teaching staff, the 'digital immigrants', are distinctly less technologically able or enamoured than their incoming students. Investigations using the method adopted here are also being undertaken by research centres internationally which will provide comparative data on technology access, use habits, skills and preferences of incoming university students. Further research is needed to provide evidence of whether and how various applications of emergent technologies and tools in higher education actually improve student learning outcomes and under what circumstances.

Acknowledgements

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