2.0 Background Literature

2.1 The Net Generation in Higher Education: Technology Use and Skills

In recent years there has been widespread interest in the notion of a Net Generation of young people, who are characterised by their familiarity with and reliance upon information and communication technologies (ICTs). Born roughly between 1980 and 1994 (McCrindle, 2006), members of the Net Generation have grown up in an era of pervasive technology use and are said to have a greater interest in and aptitude for using ICTs than previous generations (Oblinger & Oblinger, 2005b). According to several commentators, Net Generation students' familiarity with digital technologies has affected their preferences and skills in keys areas related to education. For example, they are said to: prefer receiving information quickly; process information rapidly; prefer multi-tasking and non-linear access to information; have a low tolerance for lectures; prefer active rather than passive learning; rely heavily on communications technologies to access information and to conduct social and professional interactions; and expect technology to be an integral part of their education (Barnes, Marateo & Ferris, 2007; Frand, 2000; Gros, 2003; Oblinger, 2003; Oblinger & Oblinger, 2005a; Philip, 2007; Prensky, 2001a, 2001b).

Much of the debate about the educational needs of today's young people has been stimulated by Marc Prensky's (2001a, 2001b) commentaries on 'digital natives' and 'digital immigrants'. According to Prensky, current university students can be described as digital natives who have "spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age" (Prensky, 2001a, p. 1). Prensky claimed that the digital culture and environment in which these 'natives' had grown up had changed the way they think: "It is now clear that as a result of this ubiquitous environment and the sheer volume of their interaction with it, today's students think and process information fundamentally differently from their predecessors" (p. 1). Prensky made a further claim that the skills and preferences of digital native students can be contrasted markedly with those of their digital immigrant teachers, suggesting that there is a fundamental mismatch between the language and culture of today's students and their teachers. According to Prensky, the disparity between the ICT experiences of current students and the sophistication and degree to which these technologies are employed by teaching staff is the "biggest single problem facing education today" (p. 2). However, empirical research comparing students' and lecturers' use of ICT is virtually non-existent, with the exception of the project reported here (Kennedy, Dalgarno, Bennett, Judd, Gray & Chang, 2008).

Given the potential significance of the claims made by Prensky and others, there is a clear imperative for educational researchers to take a critical stance and investigate these assumptions further. However, many of the arguments about the technological skills and educational preferences of Net Generation students have been based on conjecture and anecdotal accounts (see Bennett, Maton & Kervin, 2008). Despite intense interest in the notion of a Net Generation – it has been the subject of much commentary both in academic circles and in the broader press (e.g. Ferrari, 2007; Head, 2007; Leech, 2006; Pesce, 2007) – until recently there has been very little empirical research into the ICT skills and experiences of its membership. This is beginning to change, however, with the recent publication of large-scale surveys of students' access to and use of current technologies as well as smaller qualitative inquiries into students' expectations and preferences for technology use in higher education.

According to the published findings, young people are high users of established technologies, such as computers, the Internet, email, and mobile phones. However, most of this evidence comes from the United States, with little information available about how Australian teenagers and young adults use technologies today. The most recent data from the Australian Bureau of Statistics (2007) gives information about general household use of information technology, reporting that in 2006-2007 64% of households in Australia had Internet access and 73% had access to a computer.

In the context of higher education, Krause, Hartley, James and McInnes (2005) reported that first-year students were spending 4.2 hours per week on the web for study and research and only 3% said they never used the web for study purposes. More recently, Oliver and Goerke (2007) published findings from research that surveyed first-year students at an Australian university in both 2005 and 2007. They found that high proportions of students in both cohorts said they had access (or would have access) to the Internet outside university (over 90%); and most said they frequently used online resources for study purposes (93% and 87%). Just under half the students in each cohort owned laptops, whereas only a small percentage owned handheld computers. The vast majority of students owned mobile phones – ownership of iPods or MP3 players was also high (up from 40% in

2005 to 70% in 2007). The survey also asked whether students used instant messaging, blogs and podcasts: most used instant messaging (82%; 88%), many used blogs (21%; 30%) and some used podcasts (7%; 22%), with use of the blogs and podcasts increasing substantially between 2005 and 2007.

The use of technologies by students in the United Kingdom has been investigated through a series of studies funded by the Joint Information Systems Committee (JISC). These studies, conducted as part of the "Learner Experiences of E-Learning" project, mostly involved qualitative methods aimed at gaining an in-depth understanding of how students in different learning settings used and viewed technologies as learning tools. An online survey was also conducted in which respondents identified the following tools as those they used most frequently to support their studies: email, the Internet, computer, word processing, and instant messaging (Conole, de Laat, Dillon & Darby, 2006).

While the JISC studies focussed on technologies as learning tools, several large American surveys have provided a wealth of information about American teenagers' and college students' more general use of ICTs. This information largely derives from the PEW Internet and American Life Project (e.g. Lenhart & Madden, 2007), and annual surveys conducted by the Educause Centre for Applied Research (ECAR). The latest ECAR report (Salaway, Caruso & Nelson, 2008) was based on a survey of 27,317 students from 98 colleges and universities, as well as focus group discussions. The report notes that more than 80% of respondents own laptops and 54% own desktop computers. The ownership of Internet-capable mobile phones was said to be on the rise with 61% of respondents reporting ownership of those devices, although most respondents did not use their mobile phones to access the Internet. Both the 2008 ECAR report and a 2007 PEW report (Lenhart, Madden, MacGill, & Smith, 2007) suggest there are very high levels of use of social networking sites (e.g. *MySpace, Facebook*) among young people. In the case of the ECAR report, 85% of respondents said they used social networking sites, with most stating that they used them primarily to stay in touch with friends. The ECAR study also reported very high levels of a range of other technologies including: university library websites (93%), presentation software (92%), spreadsheets (86%), text messaging (84%), and course management systems (83%). Most students also reported that they were "fairly skilled" to "very skilled" in using a range of core learning technologies.

2.2 Living and Learning in the Digital Age

While the surveys outlined above show high levels of access to and use of core technologies by young people, other research findings reveal a more complex picture regarding how students feel about technologies as learning tools. The latest ECAR study (Salaway *et al,* 2008) found that a small majority of respondents preferred only a "moderate" amount of IT in their courses, which is in line with previous ECAR findings, while the 2007 report (Salaway, Caruso & Nelson, 2007) revealed a degree of hesitation and ambiguity in students' attitudes towards technology. For instance, while more than 80% of respondents said they used instant messaging and social networking, they said they did not want to use these tools in educational contexts. Students said they preferred that "IM and social networking remain within the scope of their private lives". Furthermore, in educational settings students did not want "technology to eclipse valuable face-to-face interaction with instructors" (Salaway *et al,* 2007, p. 13).

The JISC project examining British high school students' use of and attitudes towards new technologies, and their expectations about technology use at university, produced similar findings (Ipsos MORI, 2007). The project report highlighted that students did not like using technology for technology's sake: they wanted to see clear educational or social value in using it. The students involved in this project also seemed to conceptualise learning and teaching as a didactic process, and their understanding of education had an impact on how they viewed information technologies in a learning context: "it seems that our audience of young people automatically think of ICT improving their learning through giving them more access to data and research resources, rather than imagining totally new methods of teaching, learning, or interacting with peers and lecturers" (p. 25). Similarly, a small ethnographic study by Lohnes and Kinzer (2007), found that the students observed seemed to hold a fairly traditional view of teaching and learning, believing it to be something that goes on inside the classroom, where the "professor's expertise" is the primary source of learning. While all of the students reported using particular technologies in dorm settings, they were often resistant to their use in the classroom. One student used a laptop in class and other students saw this as antisocial – "a barrier to creating and maintaining the classroom community" (p. 3). The student who used the laptop appeared to hold views that more closely aligned with common assumptions about the Net Generation. The authors suggested that their findings "question the notion that

being part of the Net Gen means that college students seek to integrate technology into all aspects of their college experience" (p. 4).

In summary, the findings from the published empirical research into Net Generation or digital native students show that, while their access to and use of computers and some ICTs may be high, this does not necessarily mean they want to use these technologies constantly and in all the contexts of their lives. It appears, therefore, that there could well be a mismatch between what Net Generation commentators and university staff expect from students – in terms of their digital literacy and preferences for technology use – and students' own capabilities and preferences. Problems may therefore arise if new technologies are introduced in higher education without adequate guidance for students, not only in using the technology, but also with regards to how innovative technological tools could facilitate new forms of learning (Bruns & Humphreys, 2007). Such considerations are particularly relevant given the current interest in the potential use of Web 2.0 technologies in higher education and the assumption that current university students are already tech-savvy Web 2.0 producer/users (Bruns, 2007). The following section discusses the concept of Web 2.0 technologies further and provides a brief review of examples of Web 2.0 technologies that have been used in higher education.

2.3 Using Emerging Technologies in Higher Education

Many emerging Internet technologies can be broadly grouped together under the label 'Web 2.0', an umbrella term used to describe web-based applications, including social software tools, such as blogs, social networks, social bookmarking, podcasts, and wikis (Bryant, 2007). What links many of these tools and defines them as social software, is the central role users play in *creating*, rather than simply *consuming* the content that they contain. Furthermore, socially focussed Web 2.0 tools typically facilitate the development of social networks, or communities of users.

Given these characteristics, many have argued that Web 2.0 technologies have great potential as learning tools generally, and particularly for the Net Generation (Duffy & Bruns, 2006; Alexander, 2006; Bryant, 2006; Evans & Larri, 2006; Richardson, 2006; Sandars & Schroter, 2007). However, as with the commentaries about Net Generation students, it is important that debates about the potential value of new technologies in higher education are grounded in empirical research that shed light on how such tools can be best used to support learning.

Some Web 2.0 technologies, such as blogs, wikis and podcasts, have already been widely used in higher education contexts. Blogging refers to the practice of publishing reflections, articles, and information in chronological order on a web site, where others can read and respond to this information (Duffy & Bruns, 2006). Blogging appears to offer great potential as a reflective learning tool that can promote peer knowledge-sharing. Blogging activities have been trialled in a number of settings where reflective journals could be valuable learning tools, such as in teacher education (e.g. Stiler & Philleo, 2003; West, Wright, Gabbitas, & Graham, 2006), professional development (Instone, 2005), and business and cultural studies (Williams & Jacobs, 2004; Farmer, Yue & Brooks, 2008). However, these evaluations of blogging in education show that implementations of blogging as a learning activity have had varying degrees of success. A common observation has been that students need more guidance on how to make use of blogging as an educational activity in the particular learning contexts in which it is introduced (e.g. Farmer *et al,* 2008; Instone, 2005; West *et al,* 2006).

Like blogs, wikis are beginning to be used more extensively in higher education, again with varying degrees of success (Bower, Woo, Roberts, & Watters 2006; Bruns & Humphreys, 2005, 2007). Wikis are websites that can be edited by multiple users. They can be used as collaborative writing tools and have the potential to facilitate "collaborative knowledge building amongst learners" (Lee, 2005, p. 18). Wikis have been used to support weekly discussion activities (Bower *et al.,* 2006), semester-long group projects (Bower *et al.*, 2006), the development and publication of student essays (Forte & Bruckman, 2006), the development of a class annotated bibliography (Bruns & Humphreys, 2005), and as a way of encouraging informal student interaction on an online course (Augar, Raitman & Zhou, 2004).

While there are numerous examples of the use of wikis in education, and much discussion about their potential as educational tools (e.g. Richardson, 2006), only a small proportion of these include empirical evaluations and these tend to show mixed findings. Bower *et al* (2006) reported a discrepancy between students' and staff perceptions of wikis, with staff more positive than students, particularly with respect to the use of wikis to support group work. In an evaluation of a wiki as an essay writing and publication tool, Forte and Bruckman (2006) reported more positive results, suggesting that the use of the wiki

improved students' writing, with students responding constructively to peer feedback. Other reports on the use of wikis in higher education have primarily relied on anecdotal evidence, rather than formal evaluations, to ascertain the lessons learned from the use of wikis as learning tools (e.g. Bruns & Humphreys, 2005, 2007).

Podcasting has similarly been the subject of many implementations in higher education. While the use of audio and video as instructional media has been widespread for some time, the terms podcasting and vodcasting refer specifically to the distribution of audio or video over the Internet via syndication feeds that users intentionally subscribe to. Many websites routinely offer users audio files (e.g. MP3s) as direct downloads or via streaming but in the absence of syndication feeds (typically in RSS or ATOM format) these are not podcasts. Unlike direct downloads or streaming audio or video, podcast files are automatically downloaded to the users' computer as they become available. Once downloaded, they can then be accessed on the user's computer or transferred to a mobile device (e.g. iPods, MP3 players) for later playback. Podcasting in higher education has typically been used to distribute lectures and other learning content (e.g., Gosper, Green, McNeill, Phillips, Preston, & Woo 2008; Kurtz, Fenwick, & Ellsworth, 2007; Lane, 2006; Malan, 2007). However, there have also been examples of more innovative uses of podcasting such as the creation of audio recordings by students for course assignments, a use that is more closely aligned with the description of Web 2.0 users as "produsers" (Chan, Lee & McLoughlin, 2006; Frydenberg, 2006).

Evaluations of student-generated podcasting activities suggest these have been well-received by students. The studies by Chan *et al* (2006) and Frydenberg (2006) both reported that students valued the experience they gained from creating podcasts; furthermore Chan *et al* (2006) reported that students who listened to the podcasts found them to be educational and useful. Certainly, there appear to be benefits to students in being able to listen to and review recorded lectures. McKenzie (2008) reported findings from a survey of students' beliefs about the educational value of recorded lectures, suggesting that students felt audio-recorded lectures were as effective as face-to-face lectures at meeting learning objectives. Similarly, Gosper and colleagues reported that most students have responded positively to the introduction of web-based recordings of lectures in an Australian university, although staff responses were less positive (Gosper *et al.,* 2008; Phillips, Gosper, McNeill, Woo, Preston, & Green, 2007). However, other evaluations of the use of lecture podcasts have returned mixed findings. For example, students interviewed by Kurtz *et al* (2007) were openly hostile about podcasts, possibly because in their study podcasts were used to replace face-to-face lectures in order to make class time available for group project work. A common finding reported across many published evaluations of podcast lectures is that students listened to podcasts on their computers, rather than portable MP3 players, questioning the assumption that one of the key advantages of podcasting for students is in providing the opportunity for "mobile ubiquitous learning" (Lee & Chan, 2006, p. 95).

Various commentators have highlighted the potential for other Web 2.0 technologies, such as social networking, social bookmarking, and digital file sharing web sites (e.g., *Flickr*) to be used as learning tools (Bryant, 2006; Kamel Boulos & Wheeler, 2007) but few empirical studies have been conducted evaluating their use in higher education.

2.4 Emerging Technologies and the Net Generation in Higher Education

Given the affordances of Web 2.0 technologies, some commentators have argued that members of the Net Generation are – or should be – quintessential Web 2.0 technology users. The notion that by using Web 2.0 technologies students become producers and not just consumers of information, accords with perspectives of the Net Generation such as those articulated by Lorenzo et al (2006):

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).

As mentioned above, while there is certainly evidence that some Web 2.0 tools – such as social networking sites – have become increasingly popular among young people in recent years, the research reviewed above suggests that other tools – such as blogs and podcasts – are not as widely used as assumed. As Bruns and Humphreys (2007) have argued, it cannot be assumed that all students come to higher education already possessing the skills necessary to make effective use of Web 2.0 technologies as learning tools.

2.5 Summary and Project Aims

Given this background, this project sought to further understand the characteristics of the so-called Net Generation of students entering Australian universities. The project team took a critical approach to this issue – moving beyond opinion, rhetoric and anecdote – and sought to contribute to the emerging evidence-base in this area.

The project sought to investigate the technological experiences of Australian first-year university students and examine the proposed technological literacy gap between these students and the staff who teach them. Data were also collected from both students and staff on how useful an array of technologies was perceived to be in university teaching and learning.

Then, using the results of these investigations as a backdrop, the project team considered how emerging Web 2.0 technologies could be effectively employed in learning and teaching contexts in Higher Education. With local support, the members of the project team designed and then implemented a range of technology-based learning activities and collected detailed information about these implementations. Using this approach the project sought to identify the implications educating the Net Generation has for learning and teaching in Australian universities.

This section of the handbook was prepared by Jenny Waycott and Gregor Kennedy

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