

Owning ICT: Student Use and Ownership of Technology

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Abstract

Mid-way through the second decade of the twenty-first century, young people are still being touted as digital natives in a world where technology is increasingly ubiquitous in nature. Technology appears in all levels of society, from the grocery store self-serve, Internet banking and shopping, to the classroom. This paper reports on the initial findings of a much larger study conducted in a Thai university that explores how students use technology for learning. The paper also discusses ownership of technology and examines the myth of the digital native. The research is based on an earlier PhD study conducted across 2 universities in Western Australia. Findings from the current research indicate that attitudes to technology and cultures of technology use amongst young people have changed little since the original study's data collection 7 years ago. However, there are subtle differences in how Thai university students use technology for learning.

Keywords: E-learning, educational technology, ICT ownership, online learning, cultures of technology use, digital natives

Introduction

Our world today is characterized by change across all areas of society, and this change is mainly due to developments in the field of Information Technology. Changes in society became so profound that, by the end of the 1990s, social commentators began referring to society as *wired*, and as being part of the Information Age [1] as distinct from the Industrial Age. Current technologies are becoming more advanced and are a ubiquitous part of all aspects of society, including the personal lives of individuals. Technology allows people to communicate easily, one-to-one and one-to-many, and individuals can conduct their personal and professional lives wholly online. Students can also complete educational programs wholly online or via blended learning programs (face-to-face and online).

Technology has continued to develop rapidly across multiple platforms and devices. Personal technology is now smaller, mobile, convergent, and available 24/7, and use is no longer limited by storage. Multifunctional cell phones allow the user to access information from anywhere, and at any time, via the Internet, unlimited storage is available in *the cloud*, and users have the ability to connect and communicate with specific family and friends by private email, and with many other users via an ever increasing variety of social media (Web 2.0, 3.0) platforms, and applications. The ubiquitous nature of technology has become so apparent and, at times, invasive for individuals that France has recently passed a labor law which encourages organizations to implement policies to limit the spillover from work caused by constant emails and messaging sent outside work hours [2]. Convenience, mobility, and connectivity for the user has made technology a necessity for daily life. As the information landscape continues to evolve, how users interact with it also drives technological change and how we use it, and vice versa [3].

The potential for information technology and a range of media tools to create enhanced educational opportunities has also been recognized widely. Technology in the classroom is now becoming an important part of establishing a balanced education that will make for effective participation in the modern world. Integrating technology into education is essential to retrieve information and to communicate quickly in a world that relies on technology more than ever before. Improved hardware and advancement in the development of software enables teachers to provide valuable learning opportunities and develop skills that will enable each student to use multiple information tools and resources more efficiently and effectively. However, a major question for this research is how students use technology for learning, and whether their personal culture of use and ownership match the attributes often ascribed to them as *digital natives* [4]. Technology used in an integrated approach to learning can only have a positive effect on student achievement if the students are using it for learning. Teachers cannot make assumptions about students' ability to use technology in this context if their culture of use is based on prior experiences dominated by leisure and entertainment [5]. To meet the needs of the learner and learning, university instructors need to understand how their students use technology in educational settings [6,7]. Thus, this research surveyed the use of information technology by Nakhon Phanom University students, by examining the technologies they use in personal and educational settings, their culture of technology use, and how they apply technology to studying. Understanding students' culture of technology use will provide valuable insights for university administrators, subject coordinators, and lecturers when designing and tailoring learning experiences and resources to meet student preferences and needs and, thus, deliver greater student engagement and satisfaction.

Background

Since 2000, a range of rigorous research studies, as distinct from social commentary, have found that students and young people do not use technology as was theorized by the first observers in the early days of the Internet [8-15]. Even though the term *digital natives* [16], and the attributes ascribed to them [17], were first coined long before the appearance of Google, Facebook, Web 2.0 and 3.0, social media, multifunctional cell phones, and apps (applications), they still have resonance with the public, politicians and educators. The term *digital native*, and the characteristics and attitudes ascribed to young people by public commentary and some dubious research [11,12,18], has meant that students come to schools and universities with a culture of technology use based on play, leisure, and entertainment. Schools do not teach students how to use technology for learning, as it is assumed that they already know how to use it, and that using technology for leisure is the same as using it for learning. This idea is questionable, as learning online is a different teaching and learning paradigm [6]. Online learning is not better or worse than face-to-face, but different.

As technologies are integrated into educational settings, how they are used by teachers and students presents some interesting questions. Technology is often perceived as a solution to the problems of student disengagement and falling literacy and numeracy levels [19,20] by politicians and the general public. However, research tells us that technology only works if it is embedded into learning programs and if students are taught how to use it for learning purposes. Technology in education is not compensatory, but complementary. When technology is embedded into educational programs, particularly in higher education settings, research indicates that there can be an increase in learner engagement, and that students can have access to resources and programs that offer global and diverse perspectives [21]. The advanced use of software tools to produce relevant and better quality resources for use in the classroom has also been determined to have positive learning outcomes [21]. When students use Web 2.0 utilities for interactive classroom engagement in higher education, their perceptions of their learning experiences, levels of satisfaction, and engagement can be more positive [22].

However, technology can also be a distracting influence for students who bring a culture of technology use with them when using technology for learning [5]. A common behavior observed in classrooms is referred to by students as *snacking*, or when they disengage from what is happening in the classroom to browse/surf the Internet, use social media, or play games during class [23-26]. Young peoples' use of technology, and how they use it in educational settings, has been heavily researched for a

number of years [5,13,27-32]. Findings indicate that young people do not exhibit the attributes of the so-called *digital native*. Most young people are superficial users, who have a basic knowledge of presentation and social communication technologies (social media). After studying the technology use of a group of pre-service teachers, Lei concluded:

... their technology proficiency is limited by both the narrow scope and the lack of depth of their technology activities. Systemic technology preparation is needed to help them learn more advanced technologies, classroom technologies, and assistive technologies, and more important, to help them make the connections between technology and teaching and to help them make the transition from digital-native students to digital native teachers [31].

Other researchers have described this superficial use of technology as power browsing, but this type of behavior is not limited to young people. 'Everyone exhibits a bouncing/flicking behaviour, which sees them searching horizontally rather than vertically. Power browsing and viewing is the norm for all' [11]. Recent studies using eye tracker software [33] confirm earlier studies [5,33] which found that students engage with information on screen differently to printed text. These studies confirm a growing body of research which indicates that reading from the screen requires different skills and explains why the uptake of eBooks and the use of digital textbooks has stagnated [34,35].

How students really use technology for learning is very important for schools and universities, as technology is being rapidly incorporated into educational settings. How teachers and lecturers also use technology is an important topic for research. Previous studies indicate that we all use technology in similar ways, no matter the age of the user. How people first learn to use technology (teaching ourselves), what they use it for (leisure and entertainment), and how technology is used every day for personal reasons, also has a strong influence on an individual's culture of technology use. Hence, students tend to transfer personal use strategies to the learning environment. Therefore, the flicking and bouncing and power browsing behavior observed by Nicholas, Rowlands & Huntington (2008), and the scanning behaviour in recent eye tracker studies [33], support the notion that everyone brings an established culture of technology use to teaching and learning settings [5]. This research investigates how Thai students utilize a range of technologies during their courses, and how personal technology use is being incorporated into the classroom. The research explores how technologies are being used by students and teachers in higher education settings, the technologies owned by the students, and how they use them for learning and in their daily lives.

Participants

In brief, Nakhon Phanom University (NPU) was established in 2005 by combining existing tertiary institutions, Rajabhat University, a Technical College, the College of Agriculture and Technology, 3 Community Education Colleges, and the College of Nursing. NPU differs from other new universities in Thailand in that it continues the existing functions of the combined institutions and provides academic training at the vocational, higher vocational, undergraduate, and graduate levels [36]. The university is located in Northeastern Thailand, and was selected for this research for several reasons. NPU is a public university, where the level of commitment to participate in a research study was high. The university also encourages the inclusion of technology use in learning environments, and continues to make a concerted effort to keep pace with technology and how it can be used effectively in teaching and learning practices and programs. The university is also attempting to embed technology use in curriculum programs and to make more student resources available online. Therefore, participants in this research consisted of a range of students who were enrolled across all faculties in the university. The total number of participants was 418, of which 293 were female (70 %) and 125 were male (30 %). Fifty percent of the participants were in their first year at university, and 37 % in their second year, while the rest were in their third year. Participants were studying in a range of courses, including the Faculty of Liberal Arts (Education, Media and Communications, 163 students, 39 %), the Faculty of Management Science (136 students, 33 %) and the Faculty of Industrial Technology (57 students, 14 %). Ninety-three percent of the participants were aged between 18 - 22 years.

Research questions

This research seeks to determine how students use technology for learning. To answer this question, the research examined:

- Student ownership of technology;
- Types of technologies commonly used; and
- How students use technology, for personal and study purposes

Method

The research used both quantitative and qualitative methods to provide a more holistic picture of how young people use technology for learning [37-41]. Using both types of approaches allows for the triangulation of findings, while using more than one method ensures a more complete description or picture of human behaviour [3,42,43]. The quantitative method in this research used web-based questionnaires. Using the Web is cost effective and time efficient, enables the researcher to gain a snapshot of the current state of affairs, allows for a fast turn-around for data collection [44], and has been shown to be a reliable alternative to telephone surveys [45]. Web questionnaires also afford participants with anonymity, and allows them to answer the questions in a non-threatening and often familiar environment. In addition, in the light of the technology focus of the study, conducting the student survey online via the Internet was deemed appropriate. The research also used a qualitative research method in the form of in-depth student interviews, which used a structured format in order to achieve consistency and quality assurance [38,41,46]. However, in this paper, only the findings from the questionnaire will be discussed.

Questions for the questionnaire were developed using *Qualtrics* software, which is an online research survey tool that can be used for a range of data gathering purposes applicable to higher degree research. The questionnaire and the interview instruments were designed to obtain information about participants' technology use and attitudes and used a 5 point Likert scale. The in-depth interviews were conducted after the survey had taken place with 39 participants (11 males; 28 females), and explored the themes in the questionnaire in more depth. A prepaid card was offered as a prize to a random student who completed the survey. It is acknowledged that this method of recruiting students for the questionnaire may have skewed the sample towards the more ICT proficient students; however, it could also be argued that university students are more likely to be proficient users of technology. This aspect is certainly part of the research investigation. It is also reasonable to assume that the sample may represent the middle to upper end of students in terms of ICT capability. The data was analysed using SPSS, and the data sets discussed here include the descriptive statistical analysis only.

Findings

Technology use- mobile phones and laptops

Most students (75 %) who participated in the research use their mobile phone every day. Similarly, 85 % of the students reported that their mobile phones are extremely, or very, important in their daily lives. Only 15 % of students said their mobile phones were somewhat important, and no one in the participant group felt they were unimportant. These results indicate that mobile phones are not only popular with higher education students, but considered necessary items to own. Most of the students in this participant group, however, were not using new technology or buying new technology for the sake of having the latest technology (**Figure 1**).

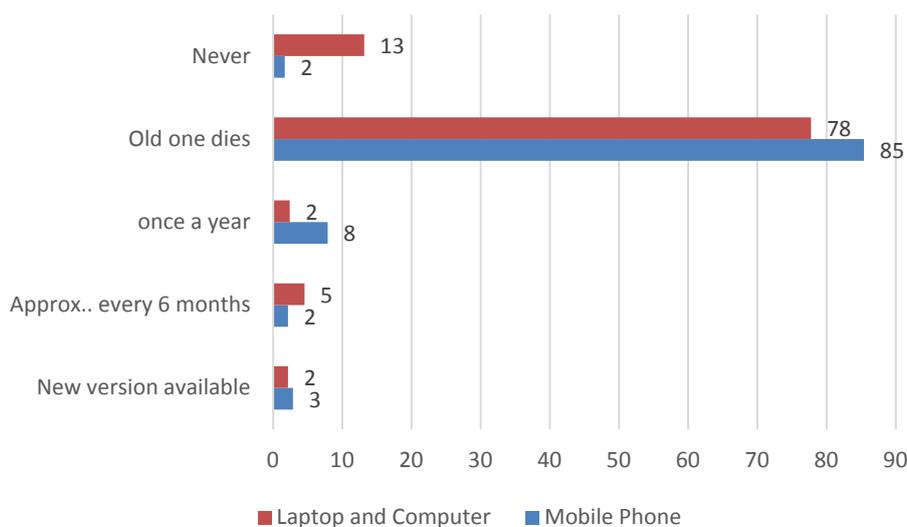


Figure 1 Purchasing patterns, mobile phone and laptop/computer.

Students also reported using their mobile phones to call and connect with family members (92 % extremely important or very important), indicating a selective use of the phone for immediate communication. However, only 64 % were using the phone to call their friends. When communicating with friends, participants chose to use *Facebook* or *Line* (a free app, similar to messaging in Facebook and Skype). Most participants (94 %) were using their phones to take photos, and considered this an extremely important or very important facility. Using mobile phones to take photos of everyday activities such as eating food (*food porn*), people and places appears to be a common behavior amongst young people, especially in Asian countries [47,48]. Ego publishing and using social media sites such as Facebook is also very common amongst young people in Thailand. Young people use Facebook to diarize and create visual logs of their lives [49]. However, using social media for ego publishing is not necessarily the same as using it to communicate directly with specific groups of people such as friends.

In this research, most participants (91 %) reported using their phones to search for information on the Internet, and 75 % said they used it daily for study purposes. Further clarification about their use of the phone as a search device for personal reasons, over using it to search for information for study purposes, was clarified in the in-depth interviews. **Figure 2**, below, presents a summary of technology use questions in the questionnaire, and indicates subtle differences between laptop and mobile phone use. These differences may be due to where the student is located when they need information, the particular task at hand, or an established culture of mobile phone use, i.e., they can use it anywhere, and at any time.

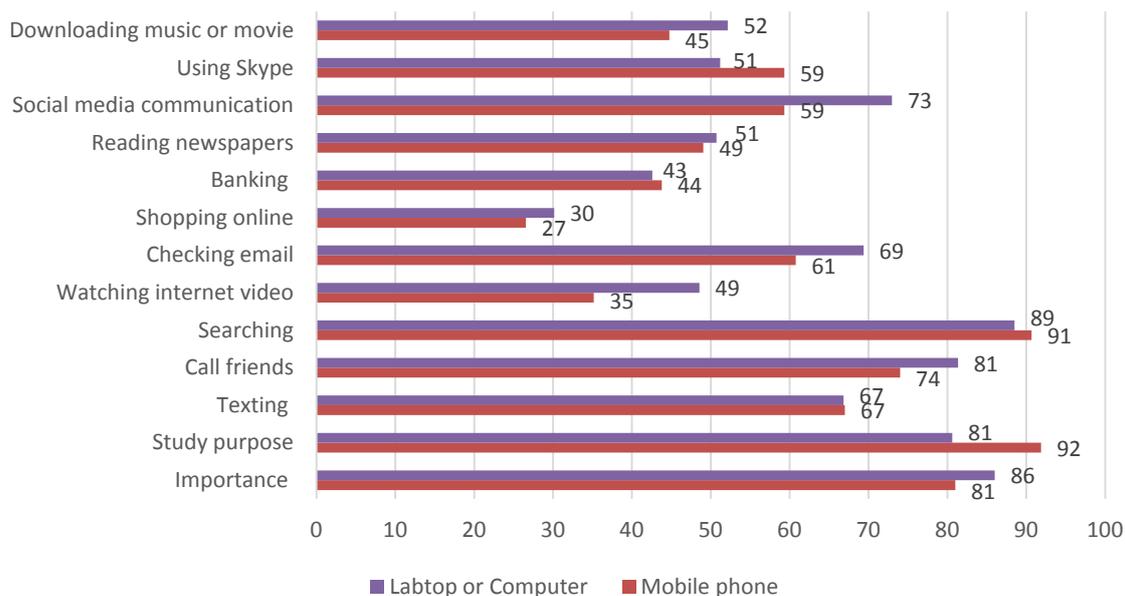


Figure 2 Comparison- mobile phone and laptop/computer use.

In a previous PhD research study [5], similar findings for students across 2 Western Australian universities were obtained. A comparison of these results is available in **Table 1**, below. While the Thai study differentiated between mobile phone and laptop/computer use, the Western Australian study did not. However, despite this difference in detail, many of the results for technology use are strikingly similar; for example, the importance of technology, particularly the mobile phone, participants’ use of banking facilities, watching videos and movies online, searching for information, and using the Internet for study purposes.

Table 1 Technology use- comparative study, using the Internet; Thai study- data collection 2015/16; Western Australia (WA) study- data collection 2007/08.

No.	Technology use extremely, very important	Thailand % participants N = 418	Western Australia % participants N = 533
1	Importance of mobile phone, laptop or computer	81 (ph), 86 (comp)	86(ph), 84.5 (comp)
2	Using Skype	59 (ph), 51 (comp)	11
3	Social media	59 (ph), 73 (comp)	24.5
4	Reading newspapers	49 (ph), 51 (comp)	8
5	Banking	44 (ph), 43 (comp)	44
6	Shopping online	27 (ph), 30 (comp)	10
7	Checking email	61 (ph), 69 (comp)	89
8	Watching videos and movies online	35 (ph), 49 (comp)	46
9	Searching the Internet for information	91 (ph), 89 (comp)	90
10	Contacting friends	74 (ph), 81 (comp)	66
11	Texting/messaging	67 (ph), 67 (comp)	50
12	Using the Internet for study	92 (ph), 81 (comp)	84

It is not surprising that there are differences in the use of certain technologies, such as Internet telephony (Skype), which was relatively new in 2007/08, and online shopping, which has since become more popular and more acceptable. Social media use in the Thai study was also different to the WA findings. Again, this may be due to the prevalence of social media applications now available and the fact that the number of young people now engaging in social media has grown. This appears to be a worldwide trend [50]. The use of email is also lower in the Thai study than in the WA study, where students differentiated between their use of technology, i.e., email was for formal communications, especially with the university and work, while contact with friends was limited to social media. Another aspect of use in the Thai study that may also be an influence on these findings is how social media is being used by staff at the university. Some staff in the Thai study use social media, notably Facebook, to contact their students and provide timely feedback, due to issues with the learning management system at the university [49]. Email use is still relatively high in the Thai study, probably due to the fact that the university uses email for the submission of assignment work and as a formal information channel about university news.

Many participants in the Thai research were not using their phones or computers/laptops for online facilities such as shopping and banking. Less than a third of participants were shopping online. While attitudes to shopping online appear to be changing, research into patterns of behavior is required in this area, because shopping, especially for women, is a social activity. Similar results were reported for online banking across the 2 groups. Online banking services began in 2002 in Thailand [51], but reports indicate that not many people are using it. Jantori (2011) found that Internet or online banking is expanding in many Asian countries, and while Thai banks are following this trend, the number of users of online banking is slightly behind other Asian countries [52]. Major barriers to online banking in Thailand are security of information and of the systems used by the banks, the distrust of service providers, and concerns about the reliability of Internet services. The lack of specific laws for Internet banking tends to discourage bank customers from using Internet banking.

Reading newspapers has become a popular activity in Thailand, while in the WA study the number of participants using the Internet for this purpose was low, probably due to the fact that online newspapers were just becoming available and popular in 2007/08. Hantrakul (2016) found that Thai people get their news from various media; however, TV and radio are still the most popular. As more people become connected to the Internet, using the computer to read the news electronically is becoming more popular in Thailand [53].

Texting was important for both groups, with the Thai students using both their phones and their computers equally for this purpose. While in the WA study participants were using their mobile phones for texting, in the Thai study students were using their computers as well, probably due to new messaging services now available through social media, for example, Facebook. New technologies such as Facebook Live, where participants can send streaming video, may change these results in the near future. Certainly, young people in both studies continue to use technology to remain connected, and see this as an important aspect of their everyday lives [5,7] with students using their phones and laptops on a daily basis.

Using technology for finding information and study purposes was identified by both groups of participants as important. Gulatee (2016) also found that laptops and computers are the main devices used by Thai university students for study purposes. Students reported that the wide screen and easy-to-type facilities provided by laptops and stand-alone computers were the main reasons for using these devices, especially for completing assignments. Similar findings were reported in research conducted by Nagel (2013) who found that students preferred full-size laptops and computers to do their assignments and research [54].

Technology ownership and use - other devices

Most of the students in the Thai study owned one device (47 %), while 31 % owned 2 devices, and only 10 % owned 3 devices. Nearly half of the group (48 %) owned a printer, 28 % had a scanner, 22 % a digital camera, and 19 % an iPad. These devices were also being used frequently by their owners. These results are presented in **Figure 3**.

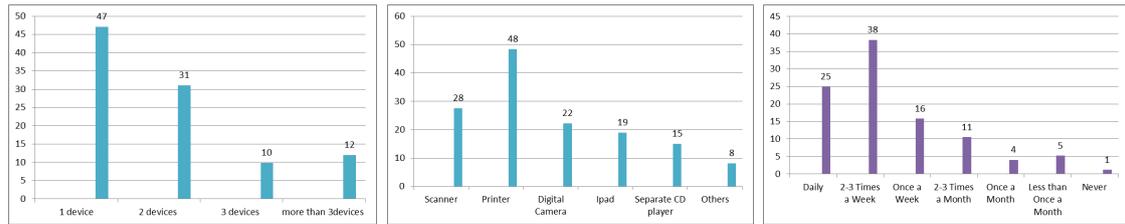


Figure 3 Students' ownership of other devices and frequency of use.

A surprise finding in the WA study was the importance and frequency of use of the printer by students, which suggested that they were printing, instead of engaging with information on screen. In the Thai study, 81 % of participants said the printer was extremely, or very, important, while 85 % of the WA group reported similar. In the Thai study, 81 % of students also reported using the printer very often. These findings indicate that, while there has been a shift to provide resources, study materials, and texts online, students across both groups still print to engage in depth with information. These findings also indicate that engaging with text on screen is problematic, a fact that has been reported in a growing number of research studies [55-64].

Technology use- lecturers

The Thai study also asked students about their lecturers and their use of technology in the classroom. In this university many lecturers were not using technology in the classroom and, therefore, not modelling technology use. These results are displayed in **Figure 4**, below, and indicate that lecturers in higher education are often much slower to use technology [65] in their teaching than students, who are using it for study, information-seeking, and in their daily lives. Students also do not appear to distinguish between work and play, and use technology in the same way for everything. Only 37 % of lecturers at this university were using PowerPoint, 22 % were using extra resources on the web, and 8 % were using mobile phone applications to enhance their teaching in the classroom.

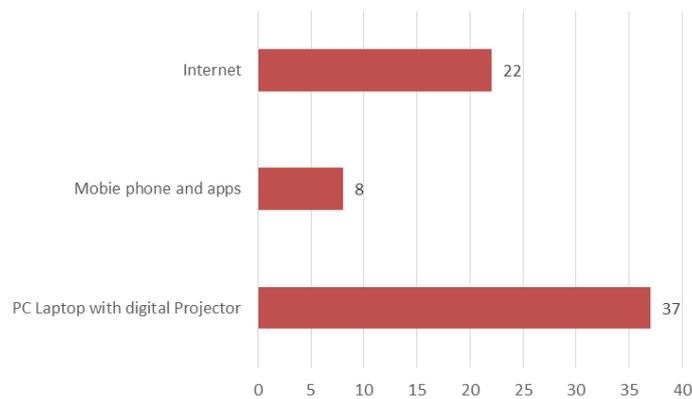


Figure 4 Lecturers' use of technologies in the classroom.

Technology use - students in the classroom

The Thai study also asked students about their use of technology during lectures and while working in the classroom. These results indicate that students are often disengaged and distracted when they have access to technology in the classroom/lecture, with 72 % of participants admitting to *snacking* during

class, 99 % to browsing the Internet, and 73 % using social media. Of course, these numbers may be much higher, as students may not be willing to admit to such behaviour, even in an anonymous questionnaire. Clearly, students are being distracted when they have ready access to technology during their lectures and classroom sessions (**Figure 5**).

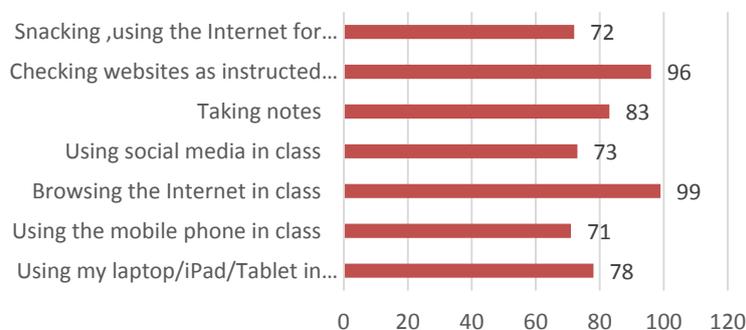


Figure 5 Students' technology use in class.

Technology - student preferences and learning

In the WA study, 20 % of students did not like using technology or the Internet for study purposes, while in the Thai study, only 9 % disliked using technology. This difference may be due to the fact that higher education has developed more online courses, and provided alternatives to face-to-face study, during the intervening years between the 2 research studies. It may also be a reflection of a willingness of people of all ages to take advantage of the affordances of online education programs, i.e., being able to study anywhere, and at any time, even while participating in fulltime work.

An important conclusion of the WA study was the finding that students presented at university with a culture of technology use predicated in how they first learnt to use the Internet [5]. Students first learnt to use the Internet for entertainment and leisure, and brought a play mentality when using it for study and learning. Their culture of technology use tended to be superficial, and failed to employ the full affordances of the technologies they were using. The students in the earlier study also reported that they either taught themselves how to use the Internet (88 %), with 22 % (mostly males) saying they taught themselves using books and magazines, and 35 % saying they learnt from their friends. In the Thai study, 100 % of the participants said they had taught themselves how to use the Internet. These results have important ramifications for educational institutions. Firstly, these results indicate that schools are not teaching students how to use the Internet or technologies in a learning context. Secondly, teachers and lecturers are not modelling best practice technology use for learning and, thirdly, students are developing a culture of technology use based on experiential learning and play. These are powerful learning pedagogies. Conclusions reached in the WA study indicated that participants with such a culture of technology use tended to be superficial users, who had difficulty locating specific information, reading, and making meaning from text on the screen; they were flickers and bouncers, and used technology inefficiently and ineffectively [5].

Discussion

The findings in the Thai study found that students are using technology in their daily lives to communicate with friends and family, engage in social activities, and to find information for study purposes. Mobile phone technologies are particularly important for student engagement, even though the students are not owners of state of the art mobile phones. This aspect is probably due to cost. They use their phones daily, and have adapted their use to suit their needs; for example, they use text and email differently, and for different purposes. They also use other applications to keep in touch with friends, but convergence, and the multifunctional nature of devices, means they may use a range of applications and utilities across a number of interconnected devices. Connectivity is extremely important to this group of students, and it is no wonder this generation are being called the *connected generation* [66,67].

The multifunctional nature of mobile phones means that students can access information for their subjects, communicate with their lecturers and the university, and even upload assignments, from anywhere, and at any time. Students in the Thai study were using their phones daily, although many were also using laptops and computers for the same purpose. In the Western Australian study, the importance of the mobile phone was also a feature of technology use amongst students in this age group, as was the perceived importance of being connected, not just to family and friends, but to the outside world in general. Both studies reported similar findings for the importance of technology, particularly the mobile phone, participants' use of banking facilities, watching videos and movies online, searching for information, and using the Internet for study purposes. Differences between the 2 studies can be explained by the development of technology during the intervening 8 years when data was first collected. Internet telephony, iPhones, Web 2.0 and social media utilities, and phone applications had only just been developed, or were still being developed, at the time of the first study.

A striking similarity between several findings, however, can be observed. The importance of the printer, and the amount of printing students do, was very similar, indicating that students print when they need to engage in depth with information. Research on reading and making meaning from text or multimedia on the screen [55-64] indicates that there are issues associated with this aspect of technology use, especially when using technology in education. The propensity to place all learning materials online and the use of textbooks as a cost saving measure, particularly in higher education, is problematic [68], if students cannot retrieve and make meaning from information presented on the screen.

Another finding from both research studies was the fact that students are teaching themselves how to use technology, and this culture of use is predicated on entertainment and leisure, rather than for learning or serious information seeking. As a result, they bring with them a culture of technology use that is superficial and reminiscent of the behavior described by Nicholas *et al.* (2008) in an earlier study. They tend to be flickers and bouncers, and fail to use the technology to find their way around virtual spaces. The Western Australia study found similar behaviors to those described in the Nicholas study. How students make the shift from using technology for play to using it for serious study is important for all levels of education, especially when the engagement of technology by teachers and lecturers still appears to be minimal [65]. When students teach themselves, their learning is based on personal success and trial and error, i.e., what works best for them. This is a powerful pedagogy which is difficult to change, hence the term culture of technology use, since how they use technology spans all aspects of technology use in their lives.

When schools and universities assume their students know how to use technology learning, how students then use technology is problematic. The Thai study also found that students were continually being distracted in class. The term *snacking* is used by students to describe what they are doing in class when using technology for purposes other than learning, i.e., playing with their phones, iPads, or laptops. These aspects of the students' culture of technology use interferes with learning, and prevents the development of engaging communities of educational practice, especially when, as reported by students in this study, lecturers use technology for teaching and learning in a minimalist manner.

Research in this area is very important for higher education institutions, which have tended to spend a lot of time, effort, and money on technology engagement for their students over the last 10 - 15 years. When integrating technology into educational organizations and curricula, there appears to be little

reference to, or consideration of, the growing body of literature on how students use technology for learning and the issues that arise, including reading from the screen, information-seeking, and using technology in the classroom. It is imperative that research continues to explore how we use technology for learning for 2 reasons. Firstly, the technology and information landscape is continually changing, and how people interact with the landscape affects change and drives development, and vice versa. Secondly, we cannot make assumptions about the skill levels of our students, whose use of a range of technologies appears to be superficial and inefficient. They have yet to make the transition from technology for play to technology as a tool for learning.

Conclusions

Overall, the results indicate that attitudes to technology and the culture of technology use amongst young people has changed little since the original study's data collection 7 years ago. Young people still tend to use technology at a superficial level, prefer to print when reading for in-depth meaning and teach themselves how to use technology. Teaching themselves using an experimental, trial and error method based on success, means that the culture of technology use is very hard to change as it is based on personal success and habit. However, there are subtle differences in how Thai university students use technology for learning. The Thai students tend to use their mobile phones and social media slightly differently, a result of advancements in mobile phone technology. Costs for Internet access in Thailand mean that students still tend to use a tablet or stand-alone computer to access their online course materials. These results were very similar to the earlier study. The results for the Thai students also indicated that they were rarely using technology in class for learning and that 'snacking' and browsing the Internet or connecting via social media are common activities.

The results demonstrate that the technology and information landscape is continually changing, and how people interact with the landscape affects change and drives development, and vice versa. The research results also indicate that universities cannot make assumptions about the skill levels of our students, whose use of a range of technologies appears to be superficial and inefficient. Young people as well as adults have yet to make the transition from technology for play to technology as a tool for learning.

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