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DEVICES, DISTRACTIONS AND DIGITAL LITERACY: 'BRING YOUR OWN DEVICE' TO POLYTECH

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Abstract

The purpose of this study is to investigate the ways polytechnic students use personal mobile devices to support their learning. This study used purposive sampling and mixed methods to generate data about student ownership and use of mobile digital devices within a single institution. Findings reveal patterns of device ownership, insights into how students use devices in class, and a comparison between student and tutor perceptions, including both conflicting assumptions and shared concerns. Implications are suggested for managing devices and distractions, enhancing digital literacy for both students and teachers, and pedagogical development.

Keywords

BYOD; mobile learning; polytechnic; higher education; digital literacy

Introduction

The impetus for this study is the recognition that students possess technologies that enable access to information and to wider collaborative networks anywhere and at any time. The purpose of this study was to ascertain polytechnic students' use of personal mobile devices to support their learning, responding to the learning environment they are participating in. What can we learn from how students use their personal devices for learning, and how might tutors build upon student use and enhance student experience?

With the proliferation of mobile technology across our everyday lives and a plethora of informal learning opportunities, formal learning institutions, such as universities and polytechnics, have been compelled to take note of technological drivers. The New Zealand government's Tertiary Education Strategy 2014–2019 highlighted this impact, stating "technology-driven changes will require New Zealand's tertiary education sector to advance its thinking quickly on new delivery models" (Ministry of Education, 2014, p. 4). The implication is that tertiary educators should respond by harnessing the potential of the tools for learning. While tertiary institutions and individual educators are at various stages with the integration of technology, this study reasons that a starting point could be to understand how students use their own personal devices to support their learning, which could in turn afford educators an opportunity to build upon student use and enhance student experience.

As with any emergent change, there are a number of terms and acronyms to clarify, based upon a review of recent literature. First and foremost, in terms of mobile technology, this study concentrates specifically on Wi-Fi enabled technologies, which includes both handheld devices and laptops. More than a decade ago, Traxler (2005) regarded laptops as peripheral to mobile technology, but more recently, given their reduction in size, this positioning might be reconsidered. Chromebooks, netbooks and notebooks are similar to laptops. A case in point, the Chromebook's popularity in education is rapidly increasing due to relative low cost, portability, simplicity, speed and long battery life. Tablet PCs combine a traditional laptop with a touch-sensitive screen, while ultramobile PCs (UMPCs) are small and lightweight. These recent evolutions of the laptop allow it to share characteristics of mobile devices. Our focus is on any device with sufficient portability to carry to campus and use in class.

Devices aside, we concur with learning-centred definitions of mobile learning (m-learning), such as Traxler's (2005) emphasis on an *active* learning environment mediated by a mobile device, and Vavoula and Karagiannidis's (2005) view of learner centred mobility. Fundamentally, "it is not the mobility of the technology that is important in mobile learning, but the mobility and flexibility of the user" (Belshaw, 2010, p. 8).

Melhuish and Falloon (2010) emphasise that m-learning occurs when learners use their own device in a situated context, either alone or collaboratively, to locate meaning for themselves. In these ways, m-learning is closely associated with the user-owned underpinnings of the BYOD movement, and the constructivist and collaborative leanings of Web 2.0. While it is generally accepted that original Web 1.0 users surfed the web to retrieve/receive information, the development of Web 2.0 tools and applications created a shift from passive consumption to more active and participative user involvement, contributing to knowledge, collaborating with others and creating content. Alongside the potential for all citizens to create content is a challenge for education and educators as the traditional guardians of content. There seems little point in delivering content to students who can retrieve a wider range of information on the mobile devices they bring to class.

BYOD: Ownership of mobile technology

BYOD is an acronym for Bring Your Own Device, where people carry and use their own mobile devices in spheres such as education and work. Similar concepts are Bring Your Own Technology or BYOT (Lee, 2013) and Bring your own Browser, known as BYOB (Pollard, 2012).

According to a United States study (Violino, 2012), 98 percent of all college students who own a mobile device have used it for education and the majority are using three different devices daily. Closer to home, ownership of multiple devices is affirmed by Research New Zealand (2014), who report 90 percent of respondents either own or have access to at least four mobile devices. Cochrane (2014) noted the focus of mobile Web 2.0 projects has moved from providing students with institutionally loaned wireless mobile devices to appropriating the affordances of student-owned devices. This study seeks to understand the level of ownership of mobile devices among students at a provincial polytechnic. The ideal of mobile learning is that learning can occur across a number of contexts at will and on the go (Dahlstrom, Walker, & Dziuban, 2013), creating opportunities to engage in learning more personalised to the student (Keppell, 2014). Mobile learning can be active, adaptive and timely, as the devices are always at hand. The literature abounds with optimistic responses to mobile device affordances. Portability, social interactivity, just-in time learning opportunities, connectivity and individuality are all processes that may occur when using a mobile device for learning purposes (Dahlstrom et al., 2013; Keppell, 2014).

The combination of student-owned mobile devices and Web 2.0 affords engagement and online collaboration. Powell (2014) found that student groups can build a collaborative workspace very quickly, utilising personal devices to "carry their university in their pockets" (para. 13). Despite this potential, however, there is little research into how higher education students actually use mobile devices to support learning. A noteworthy exception is the work of Cochrane (2014) focusing on connectivity, communication and content creation with mobile devices.

Shifting assumptions

As educators we may observe on a daily basis technologically proficient students entering our classrooms. Prensky (2001) termed such students digital natives, young people who have grown up with technology and have intuitive responses to it. The digital native concept asserted that students entering higher education today had been raised in a world surrounded by digital technology. The premise was that current students had a passion for technology, were comfortable with the language of technology and familiar with how to operate it.

In response to this apparent capability, many educators elected to leave the students to their own devices. However, over time, studies have emerged to challenge the myth of the digital native. A study of South African first year university students (Thinyane, 2010) found participants were not interested in using Web 2.0 based technologies for study purposes, despite a 98.1 percent access to mobile phones. An Australian study by Kennedy, Judd, Churchward, Gray, and Krause (2008)

identified diversity in university students' access, use and preference for technologies. Frielick and Sciascia (2014) identified gaps in current knowledge about higher education learners and mobile devices, raising doubts about whether 'net-generation' learners instinctively utilise the functionality of their mobile devices to achieve deep learning outcomes.

The research discovered that while some students did behave like digital natives, this was not a unanimous situation. The realisation that students cannot be stereotyped in such a way has led to reconceptualisation of digital natives in more fluid ways. For example, in terms of the digital visitor and resident representation (White & Le Cornu, 2011), acknowledging that people interact with technology in different ways, not because of age but driven by purpose. Educators have an important role in ensuring this purpose is learning. Meanwhile, Prensky (2011) himself has proposed a more contemporary notion termed digital wisdom, a movement towards savvy use of technology regardless of the user's generation.

A study by Johnson, Cowie, and Khoo (2011) found that not all university students enjoy using technology because the technology challenges the students to develop different ways of learning. Indeed, some students find technology a distraction from a focus on course content and a potential source of stress. For example, Sana, Weston, and Cepeda, (2013) concluded that laptop use in classes can enable student users to become distracted as they tend to multitask, and, furthermore, the use of laptops can also be a distraction for peers seated close by. The potential for distraction was also a finding in an Australian study by Alsaggaf, Hamilton, and Harland (2012), surveying 170 computer science students, as well as in Tossell, Kortum, Shepard, Rahmati, and Zhong (2014) in relation to smartphones. The literature indicates that students are apparently aware of the potential for distraction associated with mobile technologies, a matter which may need to be addressed as part of self/class management.

BYOD and student learning in a polytechnic context

This study used a cross-sectional approach involving purposive sampling to generate data about student ownership and use of mobile digital devices within a single institution. In total, 71 students and 10 tutors participated in the study. All students were studying programmes taught face-to-face, incorporating the use of technology to varying degrees.

The intent of the study has been to explore the experiences and perceptions of participants within an interpretivist framework, incorporating mixed methods in the form of a questionnaire and semi-structured interviews. The questionnaire incorporated both open and closed questions in addition to Likert scales designed to explore the strengths of participants' attitudes and feelings. After piloting, the first researcher administered the questionnaire in hard copy form to students in class, across a range of programmes, to encourage a greater response rate than electronic return may have done. Questions focused on access to and ownership of mobile devices, student use of mobile devices for study purposes, perceptions and attitudes towards the use of mobile technologies in teaching and learning, social media use and perceptions of challenges to a BYOD environment.

Semi-structured interviews were used as a follow up with two tutors and two students in order to probe initial findings. In both phases participants gave informed consent and were assured of the value of their honest perspectives as well as the anonymity of the questionnaires and confidentiality of all procedures. The project gained ethical approval from the polytechnic involved and from the university supervising the study (as the first author's Master's thesis).

Findings

The findings presented here include brief disclosure of the ownership of mobile devices by both students and tutors, followed by reporting on the ways students use their devices. Tutor perceptions are considered briefly, with a view to reporting on shared concerns and areas of divergence. Finally, two key themes arising from the data reported here are the centrality of digital literacy and the potential distraction generated by mobile devices in class. Each of these findings is briefly reported in turn.

Patterns of ownership

Ninety-four percent of the student respondents and 90 percent of the tutors reported they owned or had access to mobile devices with Wi-Fi capability. Eight students (12 percent) stated that they own four devices. The tutor participants indicate multiple ownership also, with four tutors (40 percent) owning two devices. A small number of participants did not own a Wi-Fi enabled device.

Table 1:   Mobile Device Ownership Comparisons

Number of Mobile Devices Owned (or student access to)						
Participants	0	1	2	3	4	5
Tutors	10%	40%	40%	10%	0%	0%
Students	6%	43%	33%	7%	12%	1%

Delving further, 49 percent of students said they own or have personal access to an iPhone. More than half (57 percent) own or have access to android smartphones. Very low ownership was reported for e-Readers, iPad minis and Chromebooks (see Figure 1).
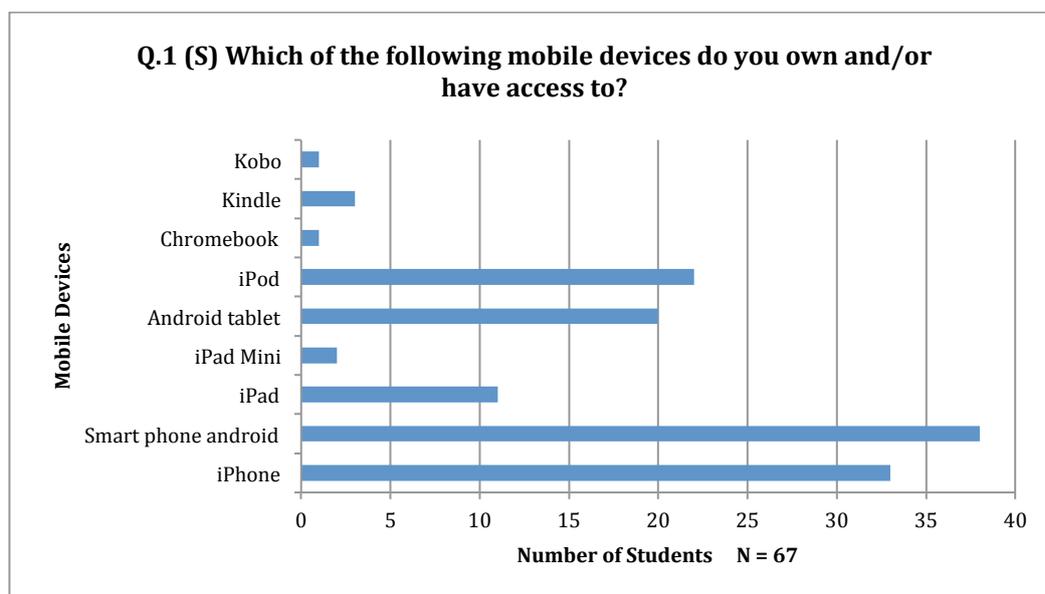
Figure 1:   Mobile device ownership types (students).

The majority of students (91 percent) brought their mobile devices to campus every day. Seven percent indicated they brought their devices most days and the remaining one percent indicated they infrequently carried them.

Student participants indicated 76 percent ownership or access to a laptop with a windows operating system and 15 percent ownership or access to a laptop with an Apple Macintosh operating system. Of the students surveyed, the extent to which they currently bring their laptops to polytechnic is reported to be predominately infrequent, less than once a fortnight, at 67 percent. As one student explained, "I only bring my laptop if it is needed and our tutor recommends us to bring it or says we will be using laptops then I like to use my own laptop" (S071).

Student use

The students who indicated they brought their laptops to polytechnic at least once a fortnight were invited to give their reasons for doing so. Examples included: "To work on assignments when I have free hours. I prefer to take notes in lectures by hand" (S047).

Familiarity with the device and easy access to their own files was important for a few students. One student noted this was "easier than using tech computers and it's familiar to you, just for convenience" (S065).

Students commonly reported use of Google, followed by YouTube, as well as unspecified apps for trigonometry, calculations and dictionary functions. Sixty-four percent of the student respondents used Facebook daily; however, six percent did not use Facebook at all. The students were asked to indicate if their programme had a dedicated Facebook page. The use of Facebook in programmes of study is limited.

The polytech utilises Moodle as its learning management system. The use of mobile devices to access Moodle sits at just over half of the surveyed students (61 percent, N= 69). Of those who use their mobile device to access Moodle, the most common reasons were ease and efficiency of gaining access to information such as resources, assignments and grades; for example, "relevant info is readily available instantly for me. No matter where I am. Is very convenient and I do it often" (S062).

Those who did not access Moodle via mobile devices explained that this was due to impaired connections and the readability of the LMS via mobile: "I'd rather use a computer, bigger screen" (S032).

Thirty-eight percent of the students reported that tutors specifically asked them to use their mobile device to complete a learning activity or assignment.

Tutor perceptions

The tutors indicated a variety of attitudes about mobile devices and students' use of personal mobile devices in class. All tutors in the study believed their students use personal devices for learning purposes, regarding this as common practice for students. As one tutor explained,

> All of us tutors grew up in a different era. These cohorts of students are the digital age. We are way behind them in terms of ways with technology … they are used to having a vast amount of information available to them at their fingertips. (T003)

Searching the Internet and assignment completion were the predominate uses cited. The tutors were asked if they actively encouraged students to use mobile devices for learning purposes. One tutor responded affirmatively. When asked for reasons for not promoting students' use of personal devices in class, tutors expressed doubt as to whether students all have the technology, alongside concerns about knowledge of how to constructively use the technology, and the potential for distraction (Figure 2). Results show the majority of tutors (60 percent) are somewhat uncomfortable with mobile technology. Tutors also report low use of Web 2.0 activities within their teaching and a lack of confidence overall: "These (Web 2.0) tools were never introduced to me. I don't really know them. Teachers need to build these into course so we know which ones are easy to access and know" (T071). "As a tutor I am way behind, I don't know to work all this stuff … The students are way more qualified in it than I am" (T003).

Tutors shared the students' concerns about the reliability of Wi-Fi access across the polytechnic campus. The unreliability of Wi-Fi is a disincentive to using technology during class time. One tutor described setting up a research task for a tutorial then being unable to get online, leading to frustration for the tutor and the students.
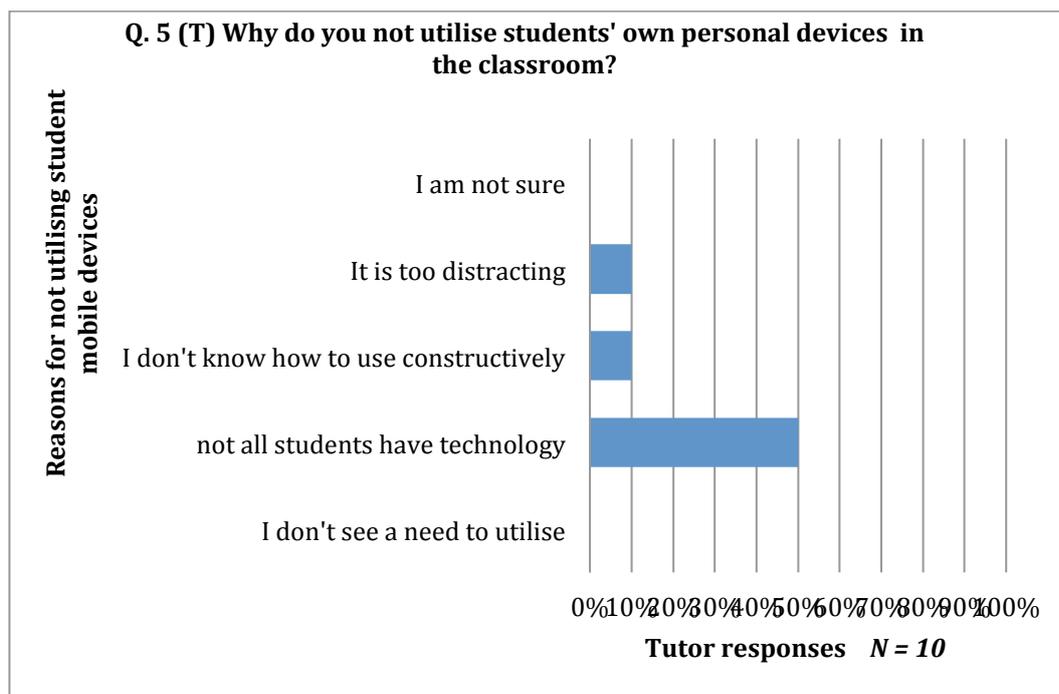
Q. 5 (T) Why do you not utilise students' own personal devices in the classroom?

Reasons for not utilising student mobile devices

- I am not sure
- It is too distracting
- I don't know how to use constructively
- not all students have technology
- I don't see a need to utilise

0%10%20%30%40%50%60%70%80%90%100%

Tutor responses   *N = 10*

Figure 2:   Reasons why tutors do not utilise student mobile devices.

Digital literacy

The data revealed that students used the standard functions of their devices, such as the camera and video capabilities, yet did not exploit many of the Web 2.0 opportunities. Students use their mobile devices to support their study in a non-interactive way rather than embracing Web 2.0 affordances. As reflected by tutor T006: "They access media via YouTube but don't produce media."

When questioned if students actually knew what information was good information the tutor felt students did not:

> I think they are coming into the tertiary environment with some very dodgy ideas about how to use the Internet. Have they ever been told to question the credibility of the material that they are looking at? Possibly not, from my experience. (T003)

Distraction factors

Students were asked their position on the statement "I would like teaching staff to utilise student mobile devices in my programme of study for learning purpose".

Of the 67 responses, nearly half (46 percent) answered positively.

A key reason given for disagreeing with the statement was a commonly held concern that the use of devices and the Internet during class time can be a distraction from learning activities, and from core purposes of course-related learning. Student comments included, "People might just end up playing games" (S018); "As long as students are not on Facebook" (S025); "I find it distracting when people are using their phones. I can learn more by listening and writing notes then follow up at home on Internet when needed" (S052); and "Only if it adds value as opposed to just adding another dimension and something else to do" (S061).

A similar sentiment surrounds the use of social media for study purposes, focusing on Facebook. The findings of this study indicate that while many of the student respondents used Facebook daily, only a few had a Facebook page set up as a class group and none had a tutor led Facebook page. While students may be familiar with and enjoy aspects of Facebook outside of their study, it would seem students are not necessarily eager to see Facebook translate into formal learning. A student participant

expressed the following: "It depends on the group. Discussing about what they are studying may be helpful but sometimes friends in class post personal things and I am not really liking that" (S070).

The tutors shared student concerns about the potential distraction aspect of mobile device use in class:

> A small proportion of students sit in lectures and tutorials texting and Facebook. Is that up to them? The time I will pull it up in a lecture is when someone has a laptop screen up and has Facebook on it and other students around them can see it. If I were a student in that lecture I would be looking at the person's Facebook page and not listening.

> How do I manage it in terms of getting its usefulness and its enriching potential without it becoming a distraction? (T003)

Discussion

The majority of polytechnic students in this study own or have access to at least one mobile device, and frequently carry them to class. Despite this, many of the tutors working with these students tend to underestimate the degree of access, while simultaneously overestimating the students' proficiency with technology. While students, by and large, have the devices, the campus Wi-Fi system may be insufficiently robust and reliable to support the effective use of the mobile technologies. It is also vital to acknowledge the six percent of students who do not own a mobile device, as a matter of equity for strategic consideration going forward. An additional concern is the students who own a laptop but do not often bring it to class. It follows that there is a trio of accessibility issues around BYOD, in that at least the three following conditions must be met for meaningful access: That is, a student must a) own a device, b) bring it to class, and c) be able to access Wi-Fi in class.

The preferred mobile devices are android smartphones. Evidence from this study suggests low ownership levels of eReaders, iPad minis and Chromebooks. Of particular note is the lack of Chromebook ownership, which is at odds with the overall popularity of Chromebooks in other New Zealand educational contexts. This is an interesting anomaly, worthy of further exploration to ascertain how and why students choose particular devices in various sectors and at different levels of study. For example, in New Zealand primary and secondary schools, Chromebook use appears to be an emergent trend, particularly with the growth of Google Apps for Education in alignment with the Chrome operating system. Potentially attractive characteristics include being cloud-based and offering lower price points compared to Apple options and the ability for institutions to operate a console that manages student accounts. However, it may be that these particular affordances are not suited to polytechnic study, or possibly that the participant students are unaware of the availability and characteristics of Chromebooks.

Alongside Chromebooks, the use of iPads is typically highlighted in BYOD environments (Nguyen, Barton, & Nguyen, 2015), but as this study has shown, android ownership and use is greater for participant students. While possession of a mobile device appears high, this does not necessarily translate into the application of the device to support learning. The findings suggest that while students *perceive* they use mobile devices to support their study, they do not fully embrace the affordances in the area of formal education. Rather than Web 2.0 functionality, the focus is typically on searching, viewing and use of basic apps that replicate what could be done with a dictionary or calculator.

Conole and de Freitas (2010) suggested that learners do not have a good understanding "of how technologies can be used for academic purposes" (p. 19). When the purpose is unclear or ill-conceived, this can lead to distraction. Students and tutors are unaware of the potential uses of mobile technologies for learning, such as the creative pedagogies promoted by Cochrane, et al. (2014), who describe mobile movie production, augmented reality, and looking beyond Facebook to publishing via mobile social media. Students look to educators for encouragement and explicit opportunities to harness technologies for learning in class (Dahlstrom et al., 2013). In this study the students reported they were not utilising their devices in class, in some instances because the tutor did not allow or encourage them to.

Results of the study indicate that tutor ownership and personal use of digital devices tends to mirror that of the students, contrary to Prensky's (2001) early notion of digital native versus digital immigrant. In spite of ownership levels, tutors perceive students as members of the digital native

generation whose capabilities with technology far exceed their own. The assumption of student technological proficiency may affect tutor confidence in taking advantage of mobile devices. As with the student participants, tutor ownership of a mobile device cannot lead to an assumption that users know how best to use the devices for learning purposes. The results suggest that the majority of tutors are not utilising their students' personal mobile devices in the classroom. The results indicate that tutors and students alike are concerned with the distraction associated with mobile devices. Potentially students and tutors could negotiate and create a mobile user agreement, establishing guidelines for appropriate and courteous use of devices in class.

This study highlights teacher expectations, assumptions and perceptions about students, in two distinct but related ways. Firstly, the mythology of the digital native persists at the polytechnic as tutors tend to assume that the students are a) more technologically proficient than the tutors, and b) more technologically proficient than the students actually consider themselves to be. As such, there is a pattern of overestimation of student expertise in relation to the use of technologies for learning. On the other hand, however, tutors may underestimate students' self-knowledge as learners. The findings suggest that students know when they are distracted and when this affects their learning in class, and prefer to keep distracting influences to a minimum.

A Horizon Project report (Johnson, Adams, & Cummins, 2011), which focused on the technology outlook for New Zealand tertiary education 2011–2016, identified areas for attention, which included digital literacy for both teachers and students. Tutors cannot guide students if they do not possess the skills to do so themselves, and as findings show, students are looking for direction and support in their own digital journeys. The literature indicates pedagogical considerations are equally as important as technical and digital literacy skills. Some tutors may not recognise a need for pedagogical professional development due to a tendency to focus on upskilling with technology (Newland & Byles, 2014). Kukulska-Hulme (2012) and Cochrane, Antonczak, Keegan, and Narayan (2014) have called for greater support for creative BYOD pedagogies through teachers' role-modelling collaborative practice within a community of peers. In this study, both tutors and students indicated a quest for acquiring greater knowledge in their use of mobile technologies for learning purposes.

Conclusions

Fundamentally, this study serves as a reminder to avoid assuming what students own, do and think in relation to learning. To find out what students know we need to ask them, to personalise rather than generalise responsive teaching approaches. While this study has examined aspects of m-learning in just one institution, with a relatively small sample of students and tutors, the questions and issues raised can be readily applied to wider contexts. For example, one such issue relates to equity of access, given that six percent of students in this study indicated that they do not own a Wi-Fi enabled device. While the means of addressing equity issues could fill another paper, some suggestions are to fund or subsidise devices, or to advise students to consider cheaper Chromebooks. Furthermore, a more complex picture of access goes beyond ownership, to encompass the need to bring laptops to class, to improve Wi-Fi infrastructure, ensure resources are designed for mobile use, and to work to improve digital literacy while maximising task focus. In terms of the use of mobile devices for learning, the key areas to build upon are active learning, where students are involved in collaborating and creating content, in keeping with Web 2.0 capabilities. To extend awareness of the learning possibilities, the polytechnic might look to other successful examples as models, alongside building its own examples of innovative teaching and learning, for sharing in communities of peers.

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