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Case study 8.
Enabling flexibility where and when learning occurs: learners becoming mobile

Summary

This case study describes how mobile technologies might be used to enhance learning. Eligible first year students were given an iPad to assist their studies whilst completing a business degree. Mobile technologies offer a number of advantages for students including:

- Inexpensive and portable devices: students can use their own or a university-supplied iPad for learning. Mobile devices are easy to carry around and contain students' learning materials as well as useful learning apps.
- Flexibility of learning: The use of mobile devices in learning gives students a greater level of flexibility over *where* and *when* they learn.
- Multimodal learning: A mobile technology such as the iPad caters for multiple learning styles through its ability to use visual, sound and touch screen attributes.
- Implementation of a flexible learning strategy: iPads can be used flexibly by lecturers and students for learning activities.
- Support for trial: A project team, including the Dean (Learning and Teaching), the Program Director, blended learning staff, information services staff, and lecturers supported the trial.

Keywords

Mobile learning; mobile devices; tablet learning; real time learning; co-creating knowledge; iPad for learning

What worked?

Technology has increasingly transformed the way we work, live, learn and play, offering new opportunities, better tailoring to educational choices, and unprecedented access to services and resources. With access to social media, online games, multimedia and cloud computing, mobile technologies have become a pervasive part of everyday life.

Pegrum, Oakley and Faulkner (2013) suggest that mobile learning is one of the fastest growth areas in the study of ICT in education as more students are using their mobile technologies for educational purposes. Data from the 2014 Technology Outlook: Australian Tertiary Education 2013-2018 report supports this claim and suggests that,

> *"Smartphones and tablets have redefined what we mean by mobile computing, and in the past four to five years, apps have become a hotbed of development, resulting in a plethora of learning and productivity apps". (Johnson, Adams Becker, Cummins, Freeman, Ifenthaler & Vardaxis, 2013, p.7)*

Mobile learning, also known as *mLearning*, in which the learner is mobile, offers new opportunities for learning. Mobile technologies are much smaller, cheaper, lighter and more flexible than laptops or desktops computers. With the number of educational apps growing daily, mobile technologies are changing how students learn. This case study describes how the Business school at Griffith University has successfully run an iPad trial with a cohort of 80 students from one campus.

Learning in business with iPads

Mobile computing is currently used by lecturers and students within the university but its use is largely ad-hoc and relies on the use of personally owned devices. IPad trolleys are available to enable wider use of mobile devices but reliance is placed on lecturers to book the trolley for use in a lecture or a tutorial. There are several problems with the current model including: too few devices to meet demand; concerns about the management of the devices while on loan (charging, loading of apps etc.) and importantly, a loss of spontaneity in the use of the devices if forward planning is required. In the iPad trial, all students in the Bachelor of Commerce and Bachelor of Business programs were issued a new iPad that later became their property if they remain enrolled after the HECS census date. The iPads were loaded with apps, which were seen as being important for supporting learning in the program's curriculum, and allowed access to eBooks that enabled students to become mobile with their learning.

The Bachelor of Commerce and Bachelor of Business programs were selected for the following reasons:

- Small programs, thus making the pilot project both time and cost manageable;
- Undergraduate level, thus preparing students effectively for future employment;

- The campus programs are well advanced in terms of blended learning and would adapt relatively easily to the new technology;
- Ability to utilise eLearning resources developed for an online program and integrate them into the campus program;
- Expertise in blended learning available from four blended learning advisors, an educational designer, and a curriculum consultant;
- Flexibility for students' access to learning resources required in professional degrees. Students will be able to access resources online and offline when it is suitable for them – for example, listen to the lectures and podcasts; participate in discussion boards, access quizzes and other online resources while commuting or from home;
- Efficiency in learning and teaching costs for the school and the students. Extensive use of e-textbooks and online quizzes may lower costs of printing and will improve the university's sustainability practices;
- Producing technology ready professionals;
- A coherent student experience of the program as a whole;
- Campus students have a low level of access to technology as the campus is located in an economically disadvantaged area; and
- Availability of government funding.

  (Griffith University, 2012)

There were six courses included in the trial (See Table 1) and from the 2013, 108 students received an iPad (MacDonald, Brimble & Manning, 2014).

Expected outcomes for learning from the trial were: flexibility in learning; personalised learning; portability and options for constant connectivity; catalyst for classroom participation; collaboration; versatility of applications; ease of use; and integrated learning experience (Griffith University, 2012). By providing iPads for students, the university could move some way towards making learning equitable for all students. Moreover, the iPad offers students with disabilities assistive technology (for example, voiceover apps for students with vision impairment).

This project was intended to "provide the flexibility of access to learning resources, lectures and tutorials via online means on a mobile device for students from degrees that combine work and study" (Griffith University, 2012, p. 8). Using the learning technologies available at the university, the aim was to utilise the tools provided by the LMS including *Blackboard Mobile*, lecture capture, *Collaborate* (a virtual classroom), e-textbooks and other course specific tools, such as financial calculators and financial news for courses in finance. To be able to use the iPad successfully, the students needed to sign up for an iTunes account and agree to purchase any apps suggested by the lecturers. The students needed to manage their iPad but support was available to help them for example, downloading and using apps.

Most of the students that participated in the trial owned single or multiple devices including a desktop (70%), laptop (80%), light mobile device such as an iPad, Netbook or Kindle (30%) and an internet-enabled mobile phone (90%) (Griffith University, 2013). Once the study commenced, the students reported that their usage of their laptop or desktop declined as more of their computing tasks could be completed more easily on the iPad. When students were asked what they were using their iPad for they responded:

- Accessing lecture notes
- Checking emails
- Writing study notes
- Accessing the university website
- Playing music
- Playing games
- Accessing social media
- Accessing cloud storage (Dropbox)
- Reading e-books
- Accessing app MyAccountingLab
- Presentation app (Prezi)
- Accessing marketing quiz

The students reported that they did not extensively use their iPad for learning for all of their courses as there were students in their classes that were not eligible to receive an iPad because they were second year students. One student commented on the distribution of iPads in their classes,

> *The lecturers would ask, 'How many of you students have iPads and how many don't?', and it was seriously half, half in the class. (Student)*

To aid in classes where there were ineligible students, a pool of ten iPads were made available for staff to checkout for classes. In many cases though, these iPads were not used, as it was difficult to arrange access to the pool, sometimes the iPads had been customised for a particular class and did not load or function as expected. Therefore, those students without an iPad tended to use their own devices, including pen and paper to complete the tasks that were intended to be completed on an iPad.

The students were very critical of the eBooks as, on purchasing them, they found that they had to resort to the paper based version because the eBooks were difficult to operate (highlighting and making notes), the publisher had a time release period on access (i.e. a

year) or there were economic reasons (for example reselling the book to recoup the cost or changing courses, the e-book was unused and unable to be refunded).

A second major issue raised by students in the trial was where they could print while on campus (Griffith University, 2013). Students were not able to print directly from their iPads using the WiFi printing network offered at the university. If they wanted to print they had to use other multi-tasked approaches to be able to print, for example, loading the iPad document to Dropbox, opening it on a university desktop, and then printing.

Students explained that they used their iPads to check student email more frequently both on and off campus. The iPad was useful for referring to course materials during lectures and for accessing the LMS on a regular basis. Though students highlighted that the iPad was distracting in lectures because students were using them to play games in lectures and "would forget to turn off the sound" (Griffith University, 2013, p. 7). Students were also distracted when using the iPad to access social media,

> *"If you sit in a lecture at the back of the row, and look forward and see what everyone is on, it's Facebook." (Student)*

Most lecturers involved in the trial were given their iPads up to five months before their teaching with iPads commenced and this is a significant contributing factor in the success of the trial. Staff identified differing approaches to integrate the iPad into their courses including: course specific apps; online quizzes; and use of an iPad for assessment. Staff identified a major problem in that not all students in their classes would have the university-supplied iPad. This caused a rethink in the integration approach especially for assessment purposes.

Staff also noted the problem with eBooks as publishers did not have student friendly pricing schedules that encouraged students to purchase learning materials. It was also difficult in using textbooks for assessment, as there were students that did not purchase the textbook in either form - digital or paper based. This also meant that students who did not purchase eBooks/textbook were more than likely not going to purchase apps unless they were free.

Staff appreciated the level of support available for the trial and the support from the blended learning advisor, who was project managing the project, was critical to ensure the success of the project. Staff were hesitant to suggest that the iPads were having an impact on outcomes except in saying that they suited the demographics and that students were able to use mobile technologies.

Staff agreed with the student concern over the number of iPads in the class and that some students felt disappointed because they were not eligible for the trial. Staff realised there were loan iPads but did not find these helpful as they had to be returned after each use and they could not be customised for that course. Some of the ineligible students that were in the class included 'critical ones' who had failed the course in their previous attempt.

> *These students, in the convenor's opinion, were already struggling with the material (having already failed) and upon re-enrolling, were then excluded from something, which the University was saying would be beneficial. (Griffith University, 2013)*

Staff also agreed with students in that the iPad were distracting students from learning as they were not using them for university-related activities during lectures and tutorials and this was distracting them and other students around them. A lecturer suggested that maybe the students could have an induction where the appropriate use of the iPads was explained. Another staff member suggested that some students were not aware of how to set up and iTunes account and so the induction should take them through the process when they receive their iPad. Support was given for students to explain how to set-up and use the iPad but not many students participated and therefore reliance was placed on the lecturer staff to lead the students through this process.

Staff found that some of the apps they recommended were unreliable for students and they did not have the time to demonstrate apps in lectures or tutorials. As the students were unwilling to buy apps the staff felt they were limited in the apps and the functionality they provided to get the greatest benefits from using iPads. Staff felt that the time needed to familiarise themselves with the iPad was not excessive but encouraging or endorsing technology use did not help in their career progression. One staff member highlighted a change in their teaching approach as they were able to move more around the room whilst teaching. Staff saw students using their iPad constructively for assessment during tutorials.

For one course (Money, Banking and Finance) the lecturer developed an interactive iBook with a range of teaching and learning resources (lecture slides, tutorial questions, videos, images and web links). Students were able to access the iBook on the iPad, which meant they were using their iPads more than other students. Student feedback reflected that the students were using the iPads on a regular basis (4/5) and they believed they were useful in learning (4.3/5). Only two students in this course did not have an iPad (their own or university supplied). Student evaluation feedback from this course included the following comments from students,

> *The way the lecturer set out all the lectures and tutorials. The structure of learning.*
>
> *The iStudy was very helpful and easy to understand iStudies were really helpful, also the relevant news Clips each lecture. Content was also often related to real life which made it interesting. (Student Evaluation Course feedback)*

Table 1: Student course evaluation data from 2011 to 2013

	2011	2012	2013
Course	**Overall I am satisfied with the quality of this course**		
Accounting Principles	**4.5**	**3.9**	**4.3**
Intro to Financial Planning	**3.4**	**4.4**	**3.2**
Money, Banking & Finance	**4.5**	**4.3**	**4.2**
Economics for Decision Making	**3.6**	**4.3**	**4.1**
Introduction to Marketing	**-**	**3.9**	**4.3**
Management Concepts	**-**	**3.5**	**3.5**

For the other courses there was no mention of the iPad trial in the student evaluation feedback. In looking at the evaluation data for all of the courses, as displayed in Table 1, from the response assessing overall student satisfaction with the course, there is no significant difference to highlight an improvement because of using iPads. This highlights that introducing technology does not necessarily improve the student experience, even when students perceive that technology to be of benefit to their studies. In the Money, Banking and Finance course, the students indicated that they were using the iPads and this was beneficial, but the overall satisfaction decreased over the three-year duration, although it remained high in comparison to the other business courses participating in the iPad trial. Other factors that could contribute to the scores include changes in lecturers, the use of sessional staff, and that the students were first year and therefore not familiar with the usual (non-iPad) approach to teaching.

In terms of student enrolment and performance, Table 2 shows the class size, mean mark and percentage of students who passed, failed or other (which represents students who did not sit supplementary, deferred exams or failed). The results show increases and decreases in student enrolment over the three-year period. Only four of the subjects are mandatory – *Introduction to Financial Planning, Introduction to Marketing, Accounting Principles, and Management Concepts* – and, for these subjects, there was a strong growth in enrolments by 2013. The mean mark decreased over the three-year duration for all subjects but for most subjects there was an increase in the middle year. A number of the courses had no change in convenor and/or assessment approach and, for these courses; the overall change in mean had noticeably decreased. All subjects showed a large number of students that were on pass or below with no significant change that could be attributed to the iPad trial. From this data for these students it may be suggested that:

- The inclusion of the iPad into the subject may not have increased the number of students that enrolled in the subject.
- The iPad may not have caused a change in the mean mark for the students.
- The iPad may not have had an impacted of the number of students that passed or failed the subject.

The courses in this case study are offered on a campus in a low socio-economic location with many of the students from the local area and this may reflect a limited background in commerce subjects for the students prior to starting university however, it could be suggested that the iPad trial may have helped the students in their learning as the overall failure and dropout rate has decreased. As shown in Table 2, most classes have increased in size from 2011 to 2013, the mean mark has remained the same and the percentage of students that are "pass" or "lower level" has fluctuated over the years 2011 to 2013.

Table 2: Class size, class mean and percentage of students pass, fail or other 2011 -2013

Course	Class size by year			Mean mark by year			Total % Pass, Fail or Other by year		
	2011	2012	2013	2011	2012	2013	2011	2012	2013
Accounting Principles	61	64	97	64	61	62	43	59	56
Intro to Financial Planning	54	44	36	64	56	62	56	72	43
Money, Banking and Finance	51	50	41	61	63	56	53	55	71
Economics for Decision Making	60	80	91	59	59	56	63	60	63
Introduction to Marketing	20	45	65	64	60	56	46	65	57
Management Concepts	55	59	74	58	65	52	61	35	73

It is planned that the iPad trial will continue into the future where there will be an effort to encourage more students and staff to participate in the evaluation activities with the goal of collecting more data to be able to better evaluate the trial. More work is needed to assist staff in incorporating the iPad into the curriculum because an "ad-hoc approach to the integration of technology still exists with some courses lacking any real integration of iPads in the curriculum" (Griffith University, 2013, p. 18). To overcome the printing issues, more work will be done to investigate *AirPrint* capabilities for the campus. Lecturers will be asked to review eTextbook/eBook versions to determine suitability for students and will be asked to approach publishers with feedback to improve the functionality with eBooks.

Why it worked

Enablers

There are a variety of factors that enabled mobile learning in this case. This section attempts to highlight important factors that have emerged from the data or have been observed by the researchers in compiling this case. The following factors are intended to provide guidance for other higher education institutions to assist in enabling TEL.

> **University supplied technology devices**: The iPad caters for visual, sound and touch screen attributes which cater for multiple learning styles. The iPad is portable – it is able to store all learning materials with many apps to assist in learning; has a longer battery life than laptops and is physically light and easily carried around on and off

campus. Eligible students were supplied the device when they enrolled in the two Business bachelors programs.

Student motivation: As ownership of the iPad was transferred to the student after the census date, students were motivated to care for the iPads. Additionally, students can save on printing or purchasing learning materials or textbooks.

Applications: The iPad's built-in App Store provides students with a wide array of free and inexpensive educational applications that can supplement learning materials. Some were preloaded and discussed with students while others were recommended. Students were free to explore, purchase, and download any new apps that could be used to assist in their learning.

Enthusiastic staff making changes to the learning and teaching approach: The staff who volunteered to participate were highly motivated to use iPads for teaching and learning. For example, a staff member created an interactive iBook to encourage students to use the iPad, while others found apps that could be used for teaching and learning. The iPad trial allowed lecturers to rewrite learning materials to incorporate the use of the iPad. The iPad was used to connect to the LMS to allow students to undertake quizzes to obtain instant feedback.

Project team, training and funding support: Central to the success was the project team support, including leadership such as the Dean (Learning and Teaching) and the Program Director, blended learning staff, information services staff, and lecturers. Important support also included training for staff on using iPads and for use with Apple TV. A project specific website was developed for the iPad trial and was accessible by students and staff. Funding support was needed to allow the purchase of the iPads over multiple years. Funding also enabled the purchase of Apple TV devices and installation into multiple rooms on the campus.

Challenges

There are several challenges in relation to the use of an iPad for mobile learning. This section aims to highlight specific challenges that were reported by participants or observed by the researchers to have a direct implication for the enactment of the TEL and which may be relevant for other institutions to consider in deciding to adopt a mobile learning approach.

University cost, infrastructure and interoperability: There is continuing cost to purchase devices; maintain applications; ensure the professional development of staff. In terms of interoperability there is the consideration of compatibility with the LMS, compatibility with a variety of devices and lecture/tutorial room systems. In terms of infrastructure issues of consideration include WiFi availability and connectivity within lecture theatres/tutorial rooms to cater for increased volume of

students using mobile devices; access to power points to recharge iPads or recharging stations that are easily accessible on campus.

Student experience issues: A student commented that in one of their courses, half the students were ineligible to use the class iPads, as they were in their second year of study; this made delivering the class difficult because the lecturer needed to consider the considerable number of students that did not have an iPad. Students may not have used Apple technology previously and in particular they may not have an iTunes account.

Learning material cost: Although eTextbooks were recommended, students ended up buying paper copies of textbooks as the eTextbook pricing was dependent on timed access or factored as an addition to buying the paper version. eTextbooks aren't able to be resold to recoup some of the initial cost unlike paper versions. It is difficult or impossible to transfer purchased content between devices.

Staff motivation to redesign approaches: Staff may resist changing existing practices with the increase in workload to set up the course for mobile learning. The curriculum must be redesigned to incorporate the use of the mobile technology. Face-to-face and online materials needs to be redesigned to suit the mobile technology and then tested to ensure compatibility for the students.

What the research literature says

In 2010, the iPad was first released to the market in the USA (Pope & Kerris, 2010) and in a little over six months from introduction, over 250 000 Australians owned an iPad (Colley, 2010). With the size, and more affordable price, the opportunities for learning with mobile technologies within higher educational contexts have never been more attractive. Mobile technologies can be repurposed for education for both teaching and learning (Traxler, 2010). Mobile technologies allow students to learn anywhere and anytime with multimodal interaction, facilitated by visual, sound and touch attributes that cater for any learning style (Klopfer, Squire & Jenkins, 2002). Students are looking for "more efficient and cost effective ways to take notes, create and access textbooks and personalised resources as well as communicate with peers and teachers" (MacDonald, Brimble & Manning, 2014, p.1). They offer new opportunities for teaching and learning as: mobility of teaching and learning in different environments, between topics, disciplines and contexts; portable means that teaching and learning are extended to other informal spaces; and participating where learning is not one-way from lecturer to student but can be constructed together in person and virtually (Wang, Wiesemes & Gibbons, 2012).

Prior to the release of the iPad the research on mobile technologies focused on the use of laptops (Cismaru & Cismaru, 2011; Kay & Lauricella, 2011a, 2011b; Percival & Percival, 2009). Goral (2011) suggested the main advantages of using tablet technologies was "using software applications to enhance creativity and critical thinking, using digital texts and readings which lead to substantial cost savings for students, and encourage greater

interaction among students and faculty (Mang & Wardley, 2012, p.303). Other reported projects include Seton Hill University and long Island University iPad trials (Kaya, 2010) and Stanford University iPad in the School of Medicine (Keller, 2011). Mang et al. (2012) report that the benefits include reduction in paper use and also that students were using eBooks as a cheaper option than the textbook. In contrast to these positive findings, Fischman and Keller (2011) reported that trials at Stanford University and at University of Notre Dame had been unsuccessful as the students were not comfortable with the technology and reverted to using their laptops for some of the reasons described by Mang et al. (2012) such as the keyboard for typing, writing or drawing with a finger on the screen.

In Mang and Wardley's (2012) project, 47 iPads were loaned to students for use over the summer semester course. Prior to the course, none of the students had owned an iPad before the trial. To ensure the iPads were used for lecturer purposes, many tasks were designed to be completed on the iPad. The students used the devices for lecture note annotating as lecture notes were prepared in a format to encourage students to use the device to add notes including drawing graphs. To assist students, the lecturers pre-selected the apps that they encouraged students to use and modelled the use in class. They also prepared electronic publication documents (ePub) that allowed a variety of media to be embedded which the students could annotate. Readings were set with PDF versions available for use on the iPad that students could access in class, search on the spot and use quizzes to check for understanding. The lecturers noted that the use of iPads enhanced the face-to-face interaction between students themselves and with their lecturers. Students were able to share their notes (photographed written notes or prepared electronically) with other students via the learning management system. They offered the following suggestions when integrating tablets into the classroom.

1. Know everything about the tablet operating system
2. Decide early on how you would like to use the tablet in your class
3. Ensure that you work closely with you institutions information technology department
4. Make the tablet an integral component of your class
5. Describe the features and benefits on the first day
6. Carefully consider how to distribute the tablets

In an early review of mobile technologies for learning, Naismith, Sharples, Vavoula and Lonsdale (2004) suggested that the implications for learners, teachers and developers cover five key issues: context; mobility; learning over time; informality; and ownership. Unlike student participation in classes, any number of students can participate virtually with their mobile devices in or outside of class. From quizzes to searching the Internet and accessing learning materials through a website, the use of mobile technologies can change the approach for teaching and learning. They suggest that there are *context* concerns in collecting data about the student use of the mobile technology in order to personalise the experience particularly in that there are ethical issues concerning the collection of student

data. *Mobility* suggests that learning can occur anywhere at anytime and implies learning outside of the classroom environment and therefore away from the control of the teacher. On the flip side students are able to use their mobile devices to link to activities outside of the classroom that may not be related to the curriculum. Mobile devices enable students to capture, organise and reflect on learning. As students are *informally* using their mobile devices there is a fear that they may abandon them when use becomes widespread. Finally the authors suggest that *ownership* of the mobile device is a prerequisite for engagement, as students have a sense of belonging and commitment to exploring and using the device.

The Mobile Learning Devices Pilot project at La Trobe University (Riddle, Jelly & Saeed, 2013), where mini iPads were given to 103 students, noted that students had concerns with eBooks and textbooks. One student noted that only one in three of their fellow students owned the textbook and most have never accessed the eBook because the eBook was bundled into the price of buying the textbook. This study highlighted the importance of reviewing eBooks prior to recommending use as textbooks by students.

In another iPad trial at Bond University (Kinash, Brand, Mathew & Kordyban, 2011; Kinash, Brand & Mathew, 2012), 135 students participated in a project where each student was allocated an iPad for two weeks over a semester. The students were free to use the iPad as they pleased with the project team but the iPads were preloaded with an electronic copy of the textbook and an app to access the learning management system. Of these 135 students, 96 percent of them bought a mobile to classes with 73 percent being internet enabled, 48 percent bought a laptop and only 4 percent bought a tablet (some students brought multiple devices). Data was collected from questionnaires; focus groups and the iPads were reviewed to check for downloaded apps. The students reported that they used the iPads for checking the learning management system, browsing the internet, checking emails and reading blogs. For non-learning activities they reported playing games, internet shopping and social networking. In summary they found that students "did not demand mobile learning and were in fact mostly neutral about the experience…they did not perceive a notable improvement to their learning" (Kinash et al., 2012, p.651). They noted that students did not oppose mobile learning but were neutral in providing feedback in its use for learning.

An Australian study of iPad use in Victoria schools in 2011 (DEECD, n.d., p.1) concluded that "quality of teaching, combined with purposeful and effective use of the ICT contributes to improved learning". Jamieson-Proctor, Redmond, Zagami, Albion and Twining (2014), in a study of iPad use at three separate schools, confirmed the issues of working with mobile technologies requiring a comprehensive view including: provision of technology; network options; funding; management; professional development; and pupil and teacher roles (Twining, 2013).

Kinash et al. (2012) suggest that mobile technology-based learning research has focused on the technology and needs to move to a learning focus. Pegrum, Oakley and Faulkner (2013) suggest that technology will be emphasised at the expense of pedagogy and content. This is in line with the more global change on teaching in higher education from the concept of

teaching to that of learning where student analytics drive decision-making (Stiles, Jones & Paradkar, 2011). Stiles et al. (2011) advocate that this is a move from skills, capacities and best practice of teaching to a focus on student learning looking at student performance data or assessing the skills for a successful career (Barrie, Ginns & Prosser, 2005). Biggs and Tang (2007) describe this as a change from the input factor of teaching to the output factor of learning.

Moving forwards

Participant advice

From this case study, the following key 'methods of success' could be considered when thinking of using mobile technologies:

Implement a coherent whole of project approach - the decision to adopt mobile learning should incorporate many factors including: funding model; evaluation and purchase of mobile technology; redevelopment of the curriculum; identification of suitable learning materials; timetabling compatibility; training and support for staff and students; and the collection of evaluation data.

Provision of technology and interoperability – it is important to identify the parties who supply the technology and those who own the technology. University-supplied technologies provide an equitable option for all students, but a clear message is that students need to own the technology to create a sense of commitment to using it for learning. There is the complementary need to factor in damage and/or replacement issues. While the LMS is regularly being updated/upgraded with new technologies offered in each new release, access to the LMS has to be possible from any type of mobile device which students might use.

Consider student need and preferences for devices - most students have access to a variety of their own personal mobile technologies and therefore may not need a university-supplied device. For mobile devices, students need an account to be able to purchase and download apps (even if the app is free). Ensure students are aware of the need for an account and explain the process to establish the account.

New staff capabilities - a new set of skills is required to understand how mobile technologies can be used for teaching and learning. It might be preferable to recruit staff who volunteer to participate in the program rather than prescribe change to staff who might be resistant to adopt the mobile devices. Training and support should be offered to assist staff in adopting new practices, and there should be an acknowledgement of an initial increase in workload to set up the course.

Institutions moving forward

- The benefit of university-supplied devices needs to be explored by institutions to determine the best approach for the university, school, subject and their students. If using iPads, then access for Apple technology for printing and presenting needs to be made available for lecturer and student use in any teaching and learning facility.
- Develop potential in staff to teach using mobile technologies. Acknowledge that lecturers may need to attend conferences or other professional development to learn and share how mobile technologies can be successfully implemented in higher education. The university needs to implement a sharing practice, professional development approach where lecturers have the opportunity to share their mobile technology teaching and learning experiences with other staff within their school and across the university. That sharing needs to be captured and presented in multiple forms of knowledge from simple documents to video explanations that can be easily found and viewed on a range of devices. These materials need to be designed in a way to cater for multiple types of users.

Resources for exploring

The following resources are recommended to further explore how iPads have been used in higher education:

Australian examples

- In 2011, hundreds of first-year science students at the University of Adelaide were given a free Apple iPad as its campus became the first in Australia to develop a curriculum based on the tablet devices. Between 650 and 700 students received the electronic tablet when they enrolled as part of a long-term program aimed at enhancing learning and phasing out textbooks. Students were entitled to keep the iPads provided they were still enrolled after the census date.
- In Victoria, the state government announced plans to buy 500 iPads for trials after the iPad launched in late May 2010. Those devices have made their way into seven schools in the state. In 2010 alone the investment of more than $150 million in information communication technology in schools was made by the Victorian government so that students stay up-to-date with the digital age.
- At Macquarie University about 60 students enrolled in a bridging course in music were involved in a study using e-books on the iPad platform, with the primary purpose of providing *assistive technology for students with a disability*.

International examples

- In the US, Reed College conducted an iPad trial in 2010 in a Political Science course, providing ubiquitous access to learning resources and peer interaction. The study reported that students were more engaged in their program and the learning

experience was improved through integrated multimedia content, the use of various applications, and a more efficient use of classroom time. Available here, https://www.reed.edu/cis/about/ipad_pilot/Reed_ipad_report.pdf

- Oklahoma State University began a pilot iPad program in 2010, with students (in certain courses offered by the School of Media and Strategic Communications and the Spears School of Business) receiving iPads to use with those courses. No outcomes have been reported from the trial to date.
- More recently, the Illinois Institute of Technology launched an initiative providing all commencing undergraduates (about 550 students) with an iPad to use as a technological enhancement to the curriculum.
- George Fox University, have given a MacBook to incoming students for several years, they now offer students a choice between a MacBook or an iPad.
- North Carolina State University libraries announced in spring 2010 that it acquired 30 iPads to offer students and faculty for four-hour loans as part of the school's Technology Lending Service. Demand was immediate and widespread.
- Long Island University (a private regional university) has adopted iPads in its curriculum. Its students are looking for a cost-effective education without having to leave home. The Long Island University's immense deployment of 6,000 iPads to students and faculty has made it the leader among universities in the USA.
- Seton Hill University's "An iPad for Everyone" is part of the university's Griffin Technology Advantage Program. Announced just as the first iPads were beginning to ship, all full-time students who commenced their studies in 2010 were supplied with iPads.

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