Charles Sturt University

# Learn.

## LESSONS FROM THE MLEARN PROJECT

# Learn

## INITIAL FINDINGS

The initial findings are informed and derived from the feedback provided by the staff and students involved in the trials; the Project team providing support for the investigations and development work carried out. They document the combined learning of the Project and are a reflection on the experiences and thoughts of those who participated. They represent real world experiences and express the positive and negative aspects of the Project's journey into mobile learning. It is hoped that they provide insight into the reality of using mobile technology in a learning and teaching environment within the context of CSU; the issues and problems that arise and the potential that the technology offers for innovation.

## THE NEW NORMAL

Over the life of the Project we have seen mobile emerge and blossom as a new standard. It has been a meteoric rise that has come almost out of the blue and without any precedent. Mobile has challenged all predictions, broken all records and transformed the technological landscape. What we are witnessing is the birth of a 'New Normal'.

Mobile can no longer be considered an 'add on' or a 'nice to have'. It is the standard technology that more people around the world have access to than anything before it, including phones, cars, radio and television. It is also worth noting that this is not the death of any other computing devices, and mobile will not replace the laptop or the desktop. **The new normal is a user-centric ecosystem that encompasses multiple devices, and one where increasingly mobile comes to represent the primary device, because it is compact and affordable**.

The statistics right across the world suggest that this is not 5 years down the line, but is happening now. The environment is not changing – it has changed already. *"User behaviour always evolves much faster than companies can keep up*"states User Experience and Content Strategist Karen McGrane, and this is where we find ourselves. The institution is experiencing significant cultural and technological challenges due to the changes in the expectations and choices of our staff and students. **CSU is entering a stage where we need to change how we think about technology, less about single solutions, more about operating in ecosystems**.

**There is no single device, app or service that can provide the solution**. Instead, it is necessary to take on a user-centric model and expand our experience beyond the physical device, ensuring access is available on multiple devices, key information is synced, systems are adaptable and content can take many shapes and forms.

The reality is that we are living, working and learning across multiple devices and mobile represents just the first wave of embedded and contextual technology. The new normal is inclusive rather than exclusive, complex rather than simple, expansive not restrictive.

# DEVICES ARE DESIGNED TO BE PERSONAL

Mobile technology is essentially a personal technology platform, providing a relatively inexpensive computing device that is highly customisable, configurable and supportive of the individual user. While it can be used for rollouts to groups this compromises many of the affordances that a personal device can offer to a student or staff member.

Mobile devices are designed for personal use and 1:1 rollout and are difficult to set up, manage and maintain for group or shared deployments. This is due to a number of reasons:

- most devices need to be attached to a personal account for the purchase of applications, data sharing and backup. These accounts are not designed to be set up en masse or linked to an institution. They are specifically set up for individuals and for these accounts to be managed on a personal level. Specific to Apple devices, are Terms and Conditions that hinder sharing or loaning of devices, because devices are attached to an account for a certain period of time
- most apps are set up with only a single user in mind. Logging into some apps from a device will save details and private information to the device. Therefore, sharing a device means that the user details are exposed and open to be exploited by other users
- infrastructure, such as WiFi is also set up to be linked to a specific user. This has specific implications around data charges, privacy and proper usage

Recent developments such as the Apple launch of a local version of the Volume Purchasing Program do provide better tools to manage app purchases on a large scale. The Apple Configurator tool also creates the option for the rollout of shared class devices. However, this is often at the expense of allowing for any individual control or personalisation, which can often be at the detriment of the user experience.

# DEVICE LIMITATIONS

The physical hardware, operating system and software configuration of mobile devices means that **not everything is better with this new technology**; some tasks are more easily and quickly done using 'old' technology.

Mobile technology provides a new paradigm of interaction through **the touch interface, which eliminates the reliance of additional peripherals such as the mouse end keyboard**. However, this is typically at the loss of the affordances of those tools, i.e., the ability to type quickly and error free or the nuance of a virtual pointing device rather than 'fat fingers'.

The project also found other areas where the devices were limited:

- some students found that the WiFi-only models were limiting their mobility because they lacked access to infrastructure off campus
- the mobile device became a distraction at times because it is always on and always connected
- some core tools at CSU, such as Interact tools, especially Online Meeting (Wimba not Adobe Connect) were not mobile-friendly devices
- typing on the iPad's virtual on-screen keyboard was often raised as an issue but the addition of a physical keyboard (which doubled as a case) was a viable solution to this problem
- lack of like-for-like applications was a common problem. Those familiar with applications like Word and Outlook on the PC were often faced with a lack of suitable replacements and equivalent features available on the mobile device
- this was accentuated by the lack of file type support and the ability to adjust current workflows that leverage 'standard PC' features, most significantly network storage on P and S Drives

Some of these limitations are not actually the fault of the device, but are dependencies on external software companies and the lack of compatible infrastructure at the university. Over time there is an expectation that these shortcomings will be overcome, but from our infrastructure perspective this will require work to be carried out by CSU.

# DEVICE ADVANTAGES

Interestingly the same physical hardware, operating system and software limitations of mobile devices was often seen as an advantage to other users.

One of the most significant advantages is **portability**. The size and lack of additional peripherals meant that the iPad could be carried around and used significantly more often than many other forms of technology. The iPad has complemented their work processes and become an important tool to create, reference, research and communicate across locations and environments. This portability became increasingly important for students in workplace learning, as the iPad became central to study and communication because it was always present and available.

The **large internal storage** also had significant benefits. For example, marking paperless assignments was made easier by reducing the physical requirement of paper, but also allowed academics to mark wherever they liked, and rather than being tied to a workstation they could mark outside, in a coffee shop, the library or on the couch at home. Students and staff both discussed how the device also made having access to research readings much simpler and portable.

The **touch interface** has a specific affordance with its ability to replicate natural handwriting. The addition of a stylus has enabled many academics that require or prefer natural handwriting to keyboard and mouse. This has been extensively used by academics and staff teaching mathematics, who prefer the speed and accuracy afforded by this type of control. They are quickly able to create and demonstrate complex mathematics and processes in a much more naturalistic manner to the benefit of themselves and their students.

Smart mobile devices are not single purpose objects, but **a combination of various technologies creating distinct affordances**. Not only does a device provide a computing power to run applications, but is also equipped with a variety of sensors, GPS, microphone and camera that transforms them into extremely capable and adaptable devices. This multi-functionality creates a truly multipurpose tool, which can be applied to a wide variety of tasks across the discipline areas, such as capturing the world around them through video and sound, track positioning and providing location-based experiences, linking and connecting people around the world. It is truly powerful **when these functions are combined, creating almost limitless applications and new ways of developing engaging, practical learning and teaching possibilities**.

# CREATING SPACES

One of the unique affordances of mobile technology is its ability to create new learning spaces. eLearning was often described as 'anywhere, anytime', but mobile technology allows learning and teaching to become something that is 'everywhere, all the time'. It is a subtle difference but with significant impact. The ability of this technology to connect, combined with powerful applications to consume and produce **allow the device to create a space**. This permits a new user-centric model where space is defined by the user and the device, not the physical location or proximity to a campus. This has specific benefits and implications for staff and students at CSU.

The allowance of the technology to create new spaces releases us from the desk, or any other physical inhibitor. It means that staff and students can move into new physical environments and leverage spaces appropriate to the task:

"*The device freed me up to work in environments that were more conducive to creative activity. It also allowed me to show my students these places. For example, we held one writing class at the botanical gardens…to capture pictures, sound etc. After a time, we came back together to share…about a particular section of this space.*"

Academics also shared experiences of shifting from traditional spaces for convenience and comfort, "*using the iPad for marking on the train and sitting up in bed*".

This also applies to students on practicum, where they can incorporate the device into the specific learning experience much more easily, as well as staff who are able to capitalise on the overall portability of the device:

"*Once I got the iPad I did not need to lug the laptop around as much. I also think that getting away from my desk may have had physical benefits, but these may have just been mental benefits (but it was beneficial nonetheless).*"

# THE LEARNING CURVE

Most staff and students agreed that the setup and learning to use an iPad would be quite quick and easy, and that there is no need for prior learning or skills. However, while intuitive in design, the iPad still has a significant learning curve associated with its adoption. The main reason for this is that it is not simply a new device or tool that needs to be learnt, but mobile is significantly different to traditional desktop computers, utilising a variety of new and complementary technologies.

There is a need to adapt, not only to the new device, but to learn a variety of new concepts and methods of working with the technology.

Some of these include:

- lack of a visible file system is disorienting and a massive difference to traditional computing
- lack of available applications, in particular like-for-like versions of desktop standards like Word and Outlook
- a number of incompatible file types, in particular Flash-based content
- cloud computing services are integral to the functionality of the device so a range of new services are required to be signed up for to maximise the effectiveness of the user
- students are not as sophisticated as we think, being good at fairly low level tasks and basics, but struggling with more complex tasks
- not all students are confident using mobile devices – "It took quite a long time to get past the need to focus on how to use the technology and the apps, so that students could concentrate on the skills and concepts related to subject content."
- lack of information and knowledge available around apps, effective pedagogy, information around the use of mobile at CSU or official and 'supported' applications.

The Project team has found that setup tends to be the most difficult part of the rollout, and the most effective way to handle this was to be on hand through the initial phase, **providing face-to-face support during those initial stages**. In addition, the Project team developed and provided walkthroughs, documentation and video tutorials to support DE students and off campus staff.

Staff and students alike found the speed of the trials limited their ability to explore and test the limits of the device. A lack of available documentation and information around mobile devices, applications, software and usage, was highlighted by many participants. There is a need for the many existing users and for any future systemic rollouts, for CSU to provide more information and

advice. One academic commented on the need for "an instant advice service" where you could ask "I want to do this…What's currently the best app to do that?". The Project has worked to establish some community of practice style, peer-supported groups and has provided assistance through Yammer. The Project is planning to complete the development of a Mobile Hub in 2013 to meet some of these needs, and to engage with various stakeholders to provide a one-stop-shop source of information around mobile.

# ADDING COMPLEXITY

There is an issue with mobile enforcing a technological determinist approach that can often overcomplicate tasks and actually add complexity and reduce efficiency. **Completing some tasks and processes is more complex on mobile devices than some low-tech options** – paper and pen can often be a quicker, easier and cheaper. The application of mobile technology, like all technology, should improve the user experience and should be applied only where appropriate.

# FUTURE LIBRARY OPPORTUNITIES

The 90 day circulation period due to Apple licencing, means that the iPads remain underutilised. At best, each can be borrowed 4 times per year. The only alternative is to configure the devices and preload them with apps before lending, which would require purchasing extra Apple computers and apps, and limiting student use. **A decision needs to be made as to whether the opportunity to experiment and learn about the devices is more or less important than the number of loans.**

Further marketing and promotion of the iPads may help with their circulation. This could include a concerted campaign on the Library and Student website, Facebook, Student News and so on, including information about iPads on the Library Services website for students on placement.

The use of iPads by the Faculty Liaison staff has been successful for demonstrating online resources and in online meetings. There is potential for Faculty Liaison Librarians to play a greater role in providing professional development for teaching staff.

Other Australian university libraries are offering classes, and demonstrating ways to use iPads and apps for learning. Feedback from the Library Information & Liaison Services staff, suggests there is a need for training. The Division of Library Services does not provide on campus classes, and there are aspects of this type of training that should be addressed by Learning Skills Advisors. However, there is potential for Library and Learning Skills to offer online iPad and app training through Adobe Connect, and support for a website that recommends apps.

Investigation of suggested options for lending Sony Readers is necessary. Alternatively, it is important to consider alternative uses, such as Faculty Liaison demonstrations and training for academics, or offering them to Student Service's Disability Liaison as potential resources for students.

# TECHNOLOGY PREFERENCES

As part of the exit surveys staff and students were asked what their technology preferences were and what should be mobile. This was done in an effort to understand the areas that CSU should focus on in order to develop a more user-focussed approach for future planning and projects. We also analysed the feedback from students in other areas of the survey to investigate further how they have been using the device, and for what purpose, so as to provide a richer perspective.

**Staff and students commented that the device could not replace their laptop/desktop**. The lack of a physical keyboard was prohibitive for many students, in particular for writing longer articles, essays and reports. The lack of like-for-like applications was also significant in this area, as was the

unconventional file management system the iPad uses, which made it difficult to move and transfer files without a reliance on other devices or Cloud services.

Staff and students were asked directly what their technology preference (laptop, desktop, paper, tablet & Smartphone) was for a number of tasks related to teaching, learning and research. Student Group 1 (SG1) participated in the first set of trials in Session 1 and Student Group 2 (SG2) continued through till the end of the year.

The combined totals are quite one sided:

Laptops are the preferred technology for

- writing an essay
- using PebblePad

Tablets are the preference for the remainder:

- writing blogs/wikis
- accessing Interact
- accessing student.csu
- accessing staff.csu
- reading learning materials
- taking to class
- taking to practicum
- taking to conferences
- taking home

If the university were to supply a device it should be a tablet.

One task had a preference for paper, which was "Read your Textbook".

However there are some areas where there are significant differences in responses:

- using PebblePad on the laptop was only SG1's preference; SG2 and the staff were evenly split
- results for writing blogs & Wikis were varied between student groups – SG1 preferring laptops and SG2 preferring tablets.
- SG2 overwhelmingly preferred to access Interact and read learning materials on the tablet compared to SG1 and staff responses
- staff and SG1 were much more inclined to read textbooks on a tablet but SG2 were overwhelmingly preferred paper
- 100% of staff and 80% of SG2 preferred a tablet to take to class, significantly higher in comparison with the 54% from SG1
- 80% of SG2 students who went on work placement during the trial preferred the tablet to take to practicum
- 78% of staff going to conferences preferred the tablet compared with the 22% who chose their laptop
- 89% of staff chose the tablet as their preferred technology to take home
- In the final question "If the university were to supply a device it should be a…", the SG1 participants were split, 46% for both laptops and tablets. However, in contrast, the SG2 and staff responses had a more consistent split of 80/20% and 78/22%

# REWARD FOR MOBILITY

The mLearn Project has not only attempted to find out how mobile technology can be applied to learning and teaching, but also to investigate the possible rewards for its adoption and rollout. While the Project has not conducted financial or cost/benefit analyses as part of its brief, some of the initial

financial impacts and teaching and learning related outcomes can be commented on, from which some emerging themes can be seen:

- Improved digital literacy
- Support for current initiative
- Increased engagement & flexibility
- Enhanced communication
- Reduction in costs

## Improved Digital Literacy

The discussions and survey data from the program demonstrate that staff and students are reporting improved confidence and knowledge working with the technology. Students and staff have demonstrated an improvement in digital literacy by taking on increasingly difficult tasks, adopting new technologies and practices, and taking technological leadership within their faculties. In some cases this has come from surprising sources, as the technology and freedom provided in the Project have created an environment for experimentation and learning. Conversations have progressed from low-level discussions around how to use the device to more detailed technical questions around associated technologies, such as Cloud integration, QR codes and augmented reality.

## Support for Current Initiatives

Mobile technology provides a platform to support current university initiatives, such as eStudent, paperless marking and an increasing move to online and blended modes of teaching. The trials have seen a large number of staff from the Project participating in paperless marking and other current initiatives. The iPads provide specific affordances that could allow them to further support a range of sustainable, pedagogical and technological initiatives across the university. They provide a platform for change and embody a very real and tangible alternatives, such as the ability to increase sustainability at CSU by reducing print materials.

## Increased Engagement & Flexibility

Students and staff have been given much greater flexibility through the technological affordances and improved engagement with course and subject work. The devices are able to provide rich and engaging content, through apps and digital publications that take advantage of the unique abilities of mobile devices, sensors and digital affordances like 3D and interactivity. They can also facilitate an increase in work flexibility by providing the capability for staff to work remotely. They improve the options for flexible learning practice by leveraging the portability of mobile devices for digital content and wireless data connections.

## Enhanced Communication

Mobile device provide opportunities for opening new channels with staff and students across a range of social media and online tools, improving access to current and future communication technologies. If rolled out more widely, this could improve communication options for CSU to students and peer-to-peer, that can take advantage of new technologies, such as social networks, video chat, text messaging and webinars.

## Reduction in Costs

In one of the Project trials, a significant reduction in travel expenditure was achieved through the provision of iPads, providing a stable platform for contact while on placement. Instead of location visits, supervisory sessions were conducted via Skype and FaceTime and non-essential communication over social networks. Staff and students could also benefit from the reduction in costs of learning resources, such as textbooks or learning materials traditionally printed by CSU. Students could also reduce costs across a range of areas including hardware, textbooks, print and

travel, through the widespread adoption of mobile technology. These savings could assist students on the whole, and allow CSU to provide equity to specific cohorts of students by improving their ability to access CSU services, content and overcome issues related to costs and location. Costs could also be lessened through improved efficiencies providing staff greater flexibility in work location and time.

# THE IPADS

This section will detail the Project experience with the iPads over the last year. The Project has taken a 'best of breed' approach for the devices being trialled, and at the end of 2011 iPads were chosen. Despite the number of recent developments in operating systems and additional hardware manufacturers entering the tablet space, it is still felt that the iPad is the best tablet solution on the market. Some of the reasons for this include:

- both WiFi and 3G connectivity options provide access on and off campus. 3G is particularly suited for off campus usage particularly for workplace learning and remote locations
- abundant app store and development ecosystem
- largest market share and units sold worldwide
- infancy and unavailability of other operating systems (Android, Windows) for tablets
- lack of thriving app development for tablet devices for other platforms
- consistency of user experience across devices provides a simpler system to manage
- suitability for use across the course profile
- enterprise management options are available, Mobile Device Management integration, and of potentially more significance, the Volume Purchasing Program for apps
- the app ecosystem is thriving and 83% of developers have iOS listed as the platform of choice
- the peripheral market is thriving and can augment the device and increase its applications in real life contexts
- publishers have adopted the platform for making textbooks, enhanced texts and apps available to replace and supplement print texts
- iOS is the most maintained operating system with adoption rates of new versions significantly higher and well managed than competing platforms

## Connectivity

One of the main features of the iPad is that it is available with both WiFi and 3G connectivity options. Many tablet devices are available with WiFi only, which can be quite limiting in terms of their portability because of this dependency. The cellular data network, provided by Telstra, is able to be used in conjunction with the on campus, or at home WiFi, and extends the range of the device far beyond the normal location constraints. The trials have found this is particularly suited to off campus usage, in particular for workplace learning students, and those operating in rural and remote locations.

Some students found that the WiFi models were limiting their mobility. The required connection restricted the locations and environments in which they could operate, that is, some only to the university, as they had no WiFi at home.

While mobile data was never intended to be used as the primary connection for the device, 3G was an important component in extending its range, particularly for staff and students away from campus and home. For students on work placement and staff wishing to work remotely 3G became a lifeline and allowed them to operate outside of the normal constraints.

## Content

The iPad created and established the tablet market and because of its market share and the sheer number of units sold, it has become the **first choice for developers and publishers when developing content**. In a recent survey, the developers of cross platform (iOS and Android)

development tool Titanium, responded that 83% have iOS listed as the platform of choice (Shirer, 2012). Over the last year there has been significant growth in app development for tablet devices for other platforms, but they are in essence playing catch-up. Another key area to note is the number of traditional publishers that have adopted the platform for making eBooks, textbooks, enhanced texts and apps available to replace and supplement print texts. **From a content perspective the abundant app store, signed up publishers and development ecosystem, make the iPad suitable for use across the course profile**.

## Content Provisioning

The iPad is almost completely reliant on an Internet connection for functionality. The device is heavily dependent on Cloud storage and access to a PC to sync, manage and transfer content, settings, files and backup. This imposes some challenges relating to the provision of content, in particular traditional learning resources.

Files cannot be copied from physical storage straight onto the device, as there are no inputs for third party peripherals. Instead, files must be accessed online or transferred via the iTunes application on the user's PC. The reliance with online storage has significant implications for the provision of copyright material as it exposes CSU to different copyright statutes, which are more limiting than those applied to print or digital copies on a disc. This has significant implications for subjects or study areas heavily reliant on provided readings.

The reliance on online storage also poses some issues with regard to access and equity. WiFi connections are dependent on physical infrastructure to be in place in the student homes, in the workplace or on campus. On campus, students are covered by CSUConnect during their time in class or on the grounds, but once they leave they are left to their own devices. This is felt far more acutely by those studying in blended or distance modes, as they are completely reliant on providing the infrastructure themselves.

The 3G and mobile data options are a work around for many students and staff, but suffer from a dependency on an external service provider. Students may live in remote areas that have poor or no service available. Cellular data is also far more expensive and limited than that available from a home broadband plan. **An increase in the adoption of services that have high data requirements, in particular those with rich media, such as video lectures and online meetings, may place an additional burden and cost onto students**.

## Support

**The Project has found that support requirements have been minimal for the iPad**. The rollout of a single device has provided an environment where there are "Known knowns and known unknowns" improving risk management, support provision and reducing ongoing issues. Past the initial setup stage, ongoing support requests have been non-existent. There have been a number of students and staff with single isolated issues, but these are often problems with outside platforms or interfacing with CSU infrastructure. These have been quickly resolved when the team can help, and ongoing issues logged via support requests.

The iPad has provided consistency of user experience across devices, making it a simpler system to manage. It has also helped to establish an organic community of practice, which is able to inform each other of practices and techniques, reducing the need for direct intervention.

No devices have failed, but there have been three devices damaged. These have been accidental drops and have resulted in smashed screens, but with hardware still functioning.

## Extensibility

The designed simplicity of the iPad is one of its key selling points, the availability and proliferation of a peripheral market can augment the device and increase its applications in real life contexts. The Project has trialled a variety of keyboards and stylus to test the iPad's ability and efficacy in a variety of tasks.

The keyboards provided a much-improved experience for those whose main objective is the creation and editing of large amounts of text. When combined with the portability of the device, the keyboard adds a new dimension allowing the user to replace or extend the use of a larger, bulkier laptop or desktop.

The styli were used in a variety of mathematical applications to test their efficacy in improving handwriting and mark-up to replicate the functionality of pen and paper. Mathematics is a specific discipline area where handwriting is the quickest and most effective way of communication. Complex equations are easier to write and annotate the process of working through a mathematical problem.

There are a vast amount of other peripherals that the Project has not explored, which could easily be used in various discipline areas to augment and extend the capabilities of the iPad. There is a range of new and upcoming possibilities in the medical field, as well as in the arts and digital media. **These peripherals have the ability to change and adapt a very generic and adaptable device into a very specific and high spec tool, often at a much-reduced cost than a single purpose device**.

## Build Quality

One of the unexpected aspects of having to support the iPad has been the lack of hardware issues. **None of the devices used throughout the Project has had any hardware or operating system failures**. Three devices were damaged by accidental drops, which resulted in smashed screens, but the underlying hardware was still intact. Comparing the quality of materials, fit and finish to the other devices purchased by the Project for the testing suite, the iPad is ahead of the field. The glass and aluminium body holds up particularly well to long periods of use and everyday wear and tear, and the plastic bodies on other devices may have difficulty in maintaining the same level of quality over the same periods of time.

## Data Usage

**The Project provided all 3G devices with 10Gb of data to ensure that access and equity were not issues**. During these trials only one student and one staff member exceeded the data available. The student had to rely heavily on their iPad during a placement in a regional area, because of the lack of available services and infrastructure. The staff member forgot to turn off roaming when overseas, so expended their allowance at a significantly accelerated rate.

Students were concerned about data usage especially those using 3G. Despite all costs being covered by the Project, students did show an unexpected concern. Once shown how to could check progress, they were pleasantly surprised, especially as some students were heavy Skype users during their practicum.

Given that there were only two requests for additional data, it can be safely assumed that in most cases heavy data usage occurred over WiFi and not 3G. Most staff and students reported that they used CSU Connect and their home WiFi far more than the 3G connections. A number of other conclusions can be inferred from this:

- most use of the iPad was on campus or at home
- operating system limitations on the download of larger apps may have prevented some downloading

- 3G was used to augment WiFi and used only when it was unavailable due to location
- some staff and students reported using 3G when there were issues with CSU Connect, as it provided a safety net in these situations

## The Tablet

The form factor of the tablet has been shown to be beneficial in an educational context. The larger screen and ergonomic design allow the device to be both portable and functional for a variety of tasks. Reading and writing tasks were performed extensively on the iPad and the large screen size was an important factor. In comparison with a Smartphone **the larger screen makes it easier to read, improves usability and functionality for a number of tasks, such as email, marking, mathematics, writing and often extends functionality by providing a richer and more fully featured interface to allow more complex and intricate tasks**.

The feedback from participants shows that the device will not replace their laptop/desktop. This fits the current trend in post PC computing, where tablets do not replace other devices, instead users add technology, so that they are interacting with multiple devices. The limitations of the device also impact on this decision as they are not as full featured as a standard PC:

- sacrifice features to be more portable and provide longer battery times
- ability to write essays is impacted as well by the lack of a physical keyboard
- lack of like-for-like software equivalents
- lack of a visible file system

However, the mobility of the iPad has complemented many teaching and learning processes and become an important tool to create, reference, research and communicate across locations and environments. **It fits seamlessly into their current practice and in many cases improves their ability to connect and perform**. It provides them with a form factor where they feel comfortable to read, which is one of the many complaints of PCs and the increasing move online. The tablet provides an interesting platform in the education sector, as it bridges the personal Smartphone and the work-oriented PC. Its role can be seen as additive, as it does not reduce functionality or purpose from these two universal devices, but adds a new dimension. As an interactive and media-rich consumption device through to an all purpose portable creation tool, the tablet has created a new niche for technology, one that embodies the potential for a better connected and authentic learning environment.

# MOBILE DEVICES

Mobile Devices offer educational institutions significant opportunities over other types of hardware for a number of key reasons:

- align closely with strategic moves by this institution and publishers away from paper, by offering a highly capable alternative
- incorporation into our workplace and learning and teaching practices will create a platform for institutional growth and innovation

## Device Sizes & Uses

The Project has been working in an increasingly volatile marketplace as mobile technology evolves rapidly with new models, devices, operating systems and applications. Change tends to happen on a daily basis. At the beginning of the Project, devices were typically broken down into tablets and Smartphones, however the last year has seen the blurring of those distinctions. There has been a push to develop a range of in-between screen sizes, so that the landscape now typically looks like this:

- Smartphones 3-5” displays

- Phablets 5-7"displays
- Mini Tablets 7-8" displays
- Tablets 9-11" displays

The varying sizes lend themselves to a range of specific purposes and tend to come with their own set of unique pros and cons.

The Smartphone tends to be the 'hero' device attracting the majority of sales and its small size lends itself to being the most portable and frequently used. The phone component tends to link the device to a personal plan as devices are contracted through telecommunications companies. These contracts tend to make them excellent personal devices, but difficult to rollout or provision in any other way, unless explicitly required for the employer. The contracts are typically 24 months, which means turnover of devices is far more rapid than other technologies and creates an ecosystem that is more current and up to date in terms of latest standards.

The next size up is the Phablet, a crossover between a tablet and phone, and tends to suit those who want a device that is more capable for creating purposes, but the portability of a Smartphone, hence the need for larger screen real estate. They often come with a stylus that allows notepad-like functions. These devices tend to come with a phone so the same contractual arrangements apply. The Phablet is perhaps in a niche of its own for those willing to compromise on the portability of the phone or the functionality of the tablet.

The Mini Tablet range suits those who want to primarily consume content as the device likely to be lighter and better fits a hand. These devices are fantastically portable, have large data capacity and long battery life, compared to phones because of the extra size. This makes them extremely popular for those wishing to read, watch and listen, and offer a far more immersive and rich media experience than an eReader. The smaller size however impacts their ability for typing, sporting a small keyboard more suited to thumbs than a traditional ergonomic typing position. The smaller screen also diminishes the available screen real estate which many developers struggle with, either cramming a full tablet into the smaller space or upscaling the Smartphone version.

The tablet size provides the larger screen for more interactions and adds functionality for touch interactions and consumption of media. This is the territory carved by the original iPad, with a footprint slightly smaller than an A4 page. These devices provide the optimal blend for mobile experience. They are far more portable and lighter than their laptop equivalents and have much longer battery life. They come without the contractual implications as most devices sold are WiFi only, but many allow cellular data to be used that can be additionally purchased independently.

## Recommending Devices

For an institution moving forward with a mobile strategy, recommending a single device would not be prudent. A better way to approach this would be to examine the affordances of the different types of devices, and where they may fit into a more rounded and inclusive strategy.

### Smartphones

The Smartphone is already deeply embedded in Australian society and should be considered the heart of any mobile implementation strategy. In June 2011, 25% of the adult population of Australia had a Smartphone, and by June 2012 that figure was 49% (ACMA, 2013). Such market penetration and the associated difficulties around personal contracts would preclude provision of devices, except to staff for work purposes. **The adoption of an enterprise-wide BYOD to Smartphones would be the most suitable**.

A mobile strategy needs to accept the diversity of this group of devices and enable an open and agnostic approach to support. This would include:

- ensuring web over app for access to essential or required services, i.e., building a web presence as preference to ensure a cross platform and device agnostic approach
- app development matches student and staff ownership, i.e., analytics and climate surveys of staff and student ownership should become consistent metrics for analysis

### Phablets & Mini Tablets

These products are a niche of their own for those willing to compromise on portability or functionality, and would preclude provision unless they were specifically suited to an application. CSU should ensure that the same **enterprise wide BYOD policy applies to this device group**

### Tablets

For educational institutions the tablet is the most suitable device type for a number of key reasons:

- still not as prevalent as Smartphones among the general public and do not come with any associated issues around contractual obligations
- larger screen provides increased sizing and improved readability to provide a viable alternative to print
- extra size allows for a larger battery and the extra screen real estate allows for an optimal typing, writing and drawing experience
- devices are the easiest to provision and rollout to staff and students, and have proven success across a range of institutions including CSU

CSU needs to ensure support for a BYOD policy for these devices, but should investigate complementary provisioning models to groups of staff and students. A range of provisioning models could address issues around equity and access, course requirements and professional development.

# PROVISIONING DEVICES

## Why should CSU Provision Devices?

The mobile device market is extremely suitable to a BYOD model but it comes with significant risks and implications for institutional resources. In particular, there will be a requirement for increased support simply because of the dispersed and diverse profile of devices available. This diversity is only set to increase in the next 12 months as new operating systems, **FirefoxOS**, **Ubuntu Touch** and **Tizen**, are being rolled out. This is on top of the significant fragmentation of Android operating systems and massive range of devices with wide ranging capabilities.

This diversity creates significant issues for the development of specific solutions for mobile devices and impacts the ability of the university to provide best of breed solutions instead of low-common denominator answers. In terms of developing apps and delivering content, it presents significant challenges as there is no ability to develop a one size fits solution, instead requiring a range of solutions, which increases cost and time for development.

**Provisioning devices means taking a single vendor approach, not necessarily a single device approach**, but one where there is a common operating system, hardware specifications and device types. A single vendor approach comes with the risk of lock-in, but also has significant benefits for the university:

- Reduction in support requirements as there are "Known knowns and known unknowns" improving risk management, support resources and issues can be replicated and responded to in a timely manner.
- An organic community of practice can form around a common ecosystem capable of supporting each other with regard to practices and techniques reducing the need for direct intervention.

- Simplification of development and testing due to platform consistency applies to the development of content, resources, applications and systems.
- Devices can be managed to a greater degree and open new opportunities for different types of ownership models, such as leased, loaned or contracted

## Provisioning Models

From initial discussions in the Project the implementation of a range of provisioning models addressed concerns around costs and sustainability, and provide the institution with a best practice model. It could also provide a way for CSU to leverage its relationships with corporate interests to develop some new, innovative methods ensuring our students and staff are provided with cutting edge, high quality equipment.

Some example models could include:

**Institution Provided** – CSU would provide the device to staff and students to own and cover costs, or recover through other measures. This would only be suitable in small numbers but could be used to provide assistance to Indigenous and low SES students.

**Institutional Loans** – CSU would provide the device as a loan to staff or students. These could be similar to leasing arrangements and made contingent on employment and enrolment. The institution would need to make the large initial investment but would be able to recoup costs. This would lessen the upfront impact on students, faculties and divisions.

**Institution Sourced** – CSU would act as an agent for various hardware providers and leverage bulk buying and discounting to reduce costs. Existing internal services could be expanded to students who would benefit from savings.

**Vendor Sourced** – CSU would establish working relationships with vendors to provide staff and students with discounts, with all sales conducted outside the university. This would require negotiations with external manufacturers and/or vendors, but could result in significant savings without major internal investment.

**Data Contracts** – CSU could negotiate an agreement with a telecommunications company to provision devices to staff and students. Each contract could operate outside the university but leverage the bulk buying capabilities to reduce costs to students. This arrangement could extend to allow CSU data to be un-metered, in effect providing students and staff with free data for their work, learning and teaching. This method could leverage on the type of margins that retail sellers earn from sales, but could be used to offset costs to students.

## Rollout Options

Along with choosing the provisioning model, there may also be scope to investigate deployment models. Most tablet solutions can support **managed and unmanaged deployment** models, providing flexible solutions to individuals and institutions. Each method has specific pros and cons that need to be matched to the specific purpose and goal of any deployment to ensure suitability.

## Managed

The processes around Managed Devices are similar to current methods used in DIT. The university would retain ownership and management control of the device and would also need purchase software to be made available. **This method requires a manual initialisation process where an 'image' is created, and then rolled out across the other devices**. The image can contain protocols to simplify the setup of some processes like email, restrict functions and features on the device, allow tracking to 'find' devices and preinstall applications and web links. There are however significant

drawbacks to this methodology. Devices are essentially locked to the original computer that managed the setup, and require a back-to-base approach for management of devices needing the devices to be physically sent back to their original setup location. To provide many management features **the devices essentially become locked down and any customisation, installation of other apps or data on the devices is unable to be backed-up or maintained by the user**. This model would be suitable for applications such as creating class sets of devices that can be borrowed and returned, but never owned or customised. This kind of arrangement would be similar to a computer lab model.

### PROS:

- Devices can be set up to be loaned & shared to provide similar functionality as a computer lab
- This computer lab model is portable and less reliant on physical infrastructure.
- Provides a way of giving access to apps, interactive texts, rich media for classes and groups

### CONS:

- Manual process of setting up can be both difficult and time consuming. Additional equipment would be required for large deployments.
- Back-to-Base support requirements limit flexibility and increase the need for additional support and ongoing maintenance.
- Any devices that are loaned and are not using this model may violate Apple's Terms and Conditions, which have specific requirements around a user's Apple ID and how it can be applied to a device.
- There are options to reduce the management features on the devices but in these circumstances there is little benefit.

In a general sense a managed deployment would suit applications where devices are required to be managed, such as a lab environment, loan devices, or where support requirements need to be kept to a minimum and externalised.

## Unmanaged

Unmanaged rollout is essentially handing the device over as new in the factory default. **This method requires a user to manually setup the device they receive**. This is the model that the project deployed for all its trials in 2012, as it provided the most flexibility and allowed greater ownership and buy in from the students and staff. The users are allowed complete freedom to set up, install and use the devices however they want. **The devices are essentially totally open to all customisation, installation of other apps and data on the devices is backed-up or maintained by the user**. This model would be suitable for all other applications other than creating sets to be borrowed and returned. It is similar in scope to the Bring Your Own Device (BYOD) model, but takes advantage of the university for purchasing, logistical rollout and support. In terms of software, Apple has recently enabled the Volume Purchasing Plan, which would allow the university to buy apps in bulk and then distribute them to staff as redemption codes.

### PROS:

- Provides maximum flexibility and customisation from the user's perspective to encourage personalisation and usage.
- This method improves digital literacy by encouraging ownership of the device through responsibility. With the correct support this has seen the growth of significant and applicable skills and knowledge in staff and students.

### CONS:

- Requires users to set up the device themselves, which can be simplified by rolling out documentation, tutorials and face-to-face support.

- Users are responsible for backing up and maintaining the device. This is a simple process but does require users to learn the process.

An unmanaged approach does put the onus on the user to maintain and manage their own device. This goes against the traditional approach to provisioning technology at CSU and many institutions, however some of the **distinct benefits to this are a greater sense of ownership and the development of better digital literacy**. Users are required to learn and understand their device to a further degree, but are able to customise and personalise their experience to suit themselves. This model is a trade off between the provision of additional support and development instead of management services and infrastructure.

# SUPPORT

It is vital that part of the decision-making in this area includes support. Overall, the Project has seen a reduction in support requirements through the adoption of a single vendor approach, which has improved the efficiency and efficacy for our rollouts.

In the surveys, staff and students were asked to choose which support resources were the most useful from the following:

- Documentation
- Walkthrough Videos
- Interact Site
- Forums
- Face to Face
- Other

Staff and students overwhelmingly found face-to-face support to be the most useful. This can be confirmed by the Project team, as it appeared to be the most productive way to rollout the technology, up skill staff, and provide feedback and ongoing support. During the staff trials the Project also tested the establishment of an organic community of practice. These events were informal but provided a chance to meet with technical staff. It was observed that these sessions would quickly concentrate on peer-to-peer learning, as staff shared their experience, so facilitation became the main role for the Project.

# VENDOR ALTERNATIVES

At the launch of the Project there was really only one tablet – the iPad. Throughout 2012 we have seen a huge range of android devices being released and newcomers, like Microsoft, come to the mobile party. The following table maps out the three main tablet candidates in the current crop of operating systems (May 2012) and how they compare in a number of key areas.

| Model | Apple iPad | Window Surface | Samsung Galaxy Note |
|---|---|---|---|
| *Device Type* | Tablet | Tablet | Tablet |
| *Operating system* | iOS | Windows 8 RT | Android 4.0 |
| *Wi-Fi* | Yes | Yes | Yes |
| *Cellular Data* | Yes | No | Yes |
| *External Storage* | No | Yes | Yes |
| *HiRes Resolution* | Yes | No | No |
| *Software Availability* | Hi | Low | Med |
| *Software Compatibility* | Med | Med | Med |
| *Build Quality* | Hi | Hi | Med |
| *Peripheral Support* | Hi | Low | Med |
| *Internal Storage* | Hi | Med | Low |
| *Support Requirements* | Low | Low | Low |
| *Device Price* | $539 - $1009 | $559 - $679 | $585 - $835 |
| *Cover Price* | $45 - $80 | $140 - $150 | $45 - $60 |
| *Total Price Range - RRP* | $584 - $1089 | $699 - $829 | $630 - $895 |
| *Comments* | * Pricing scale includes WiFi and 3G | | * Pricing scale includes WiFi and 3G |

# NEXT STEP

Moving forward towards developing a better plan for mobile will require collaboration and consultation between divisions, faculties, staff and students. T**he first step would be to establish a working group to investigate how CSU can support a rollout of mobile devices to both the staff and student bodies**. This group will be tasked with providing details relating to the issues involved in a rollout, and a variety of provisioning models based on financial and sustainable practices.

This working party would be tasked with:

- Opening a specific and focused dialogue with each school and division to develop requirements, opportunities and affordances that mobile technology could deliver. Discuss the device specifications, software and hardware requirements for a range of discipline-specific tasks and possible research opportunities.
- Opening up dialogue with potential commercial partners and investors. Mobile technology could offer a range of new commercial opportunities for CSU, with many companies interested in establishing relationships in this area. This would be mutually beneficial in terms of exposure and marketing of CSU as a progressive and modern university and possibly lead to new income streams.

From the specifications developed the cost of provisioning models would be developed including ongoing management of devices, lifecycle and deployment. This should be done in conjunction with Finance and DIT to consider appropriate funding sources. Judging the current climate should be based on a 24-month turnaround of devices.

# ISSUES

The mLearn Project has faced many challenges introducing a range of new technologies into the CSU ecosystem. Most technical challenges could be overcome through consultation between the users, the Project team and DIT. Other challenges around practice and process were able to be met through the diligent work of the academics and the support of the Project team. However, a number of ongoing issues have arisen that cannot be simply fixed and require more consideration and effort.

## CSU Connect

For internal students the advent of CSU Connect has been immense. It has simplified access and created a system where more devices can now be connected. These improvements can be seen in the level of uptake and the amount of traffic this component of the network now attracts.

The coverage on most campuses is exceptional with very few areas that do not have an acceptable signal. However, **the most complained about component of the project has been CSU Connect**. The student surveys and feedback from staff highlight a number of key concerns:

These issues are often not singularly experienced and are regularly combined – so lack of a stable connection, the Sleep/Wake cycle and the IAS authentication all happening simultaneously, which often creates an overwhelmingly frustrating user experience. This negative user experience is what the staff and students have fed back to the Project asking specifically to identify problems and areas that impact on the experience of using mobile devices at CSU. A bad user experience is not something that will often be reported through standard reporting functions – service desk and student central – so DIT is most probably operating in the dark.

Another problem occurred in the Library trials of the Sony Readers on CSUConnect as the network encryption method (EAP) is not supported by the Reader. Instead, a personal Wi-Fi point must be used with security type Open, WEP or WPA.

The issues related to User Experience are going to be increasingly relevant and important as it becomes relied on for assessments, class work, subject administration and access to online content and resources. With the number of devices now available, especially those that have no 'wired' alternative, the WiFi network will be critical for the core business of the university. The reliance on WiFi for mobile devices means that CSU Connect is a vital component of CSU's overall mobile strategy, so it is important to highlight a number of areas that would improve the experience:

## An Agile Approach

The Project's development of the Subject Outlines as a web application has been accompanied by a range of new issues and challenges. **The use of an agile development process has ensured that the team has been able to adapt quickly to changes in circumstances**, particularly the rapid technological changes in the mobile space, which has also led to some significant delays. These **delays have been primarily caused by the friction of an agile development approach trying to mesh with CSU's existing waterfall methodology**. In essence, these are two systems operating in different ways, agile as a cyclical process and waterfall as a staged progression, but it was hoped that the two would be able to complement each other. However, the experience of mLearn has highlighted that the current methodology and process relies on a strict process and documentation workflow to be followed, so what eventuates is a two speed system, where the gears tend to jam and clash at key points in the process.

The mLearn Project has always been driven to explore the practicalities of mobile in situ, and it is only through this experimentation that we have been able to measure and learn from the process. The requirement for mobile development to be agile, adaptive and iterative is linked explicitly to the realities of the marketplace and the technology sector, as it undergoes massive growth, expansion and investment. **Change is the norm in the mobile space and agility is a requirement, not an option**. In some ways this is in contrast to CSU's requirement for its IT systems to be risk averse, stable and planned for the long term. This is not to undermine the fundamental business

requirements, but **additional scope and capacity for agility, is becoming increasingly vital for innovation, particularly in the learning and teaching space**.

## Learning Resources

After investigating, the Project found that existing formats are too specific for their delivery, and **the mobilisation of existing resources is too difficult to adapt to a huge variety of mobile devices**. This is also challenged, but there is a lack of consistency in development processes – some being done by media services to a high level of skill, others done by less capable academics and using software that creates a proprietary level of code to the content. The final level of complexity comes from the diverse content across our broad course profile. There are so many different types of content across the courses and discipline areas, which often require bespoke and customised solutions.

In essence what we have found is that **a solution to mobile requires not a 'one size fits all' approach, but a way of creating content that is adaptable to many points**, such as a way of creating and authoring content once it has the ability to be adapted to many end points (print, web, app, eBook), and the ability to Create Once Publish Everywhere (Jacobson, 2009). Content has traditionally been linked directly to presentation – books were developed to be printed, web pages for web sites, video for TV. However, new digital formats and devices are challenging that behaviour. **To provide a consistent user experience, content needs to flow like water, changing its shape to match every presentation channel**. In 2013 the Project aims to address this by developing a proof of concept that would allow the development of adaptive educational resources.

# Conclusion

The methodology employed by the project has provided an excellent model for introducing and trialing new technology. The project has been able to conduct a variety of trials across different faculties, disciplines, locations, applications, staff and student cohorts. Conducting real world trials on a small scale has proved easier to support and the team has been able to respond quickly to issues, significantly reducing their impact. The trials have provided us with many lessons as to what works and what does not within our current situation and because they have been conducted in situ - with our students, the current technology and infrastructure - they have provided insight and a better understanding our present environment and capabilities.

The project has made a rigorous attempt to be expansive and touch on a wide range of areas related to our institution, our staff and students to discover the issues and opportunities associated with mobile technology. What we can say is that mobile represents a significant opportunity for CSU but presents us with many challenges and questions to explore.

Mobile is now the New Normal and can no longer be considered an add-on or a nice-to-have; it is the standard technology that more people right around the world have access to than any technology before it - including cars, radio and television (Ahonen, 2011). Mobile is changing technology (Evans, 2013) and represents the dawn of a new normal that is a user-centric ecosystem that encompasses multiple devices - tablets, phones, laptops and desktops. An ecosystem where mobile devices increasingly represent the primary device because it is compact and affordable. We are already living, working and learning across multiple devices and mobile represents just the first wave of embedded and contextual technology. Higher education is entering a stage where we need to change how we think about technology, less about single solutions, more about operating in ecosystems. There is no single device, no single app, and no single service that can provide the solution because the new normal is inclusive rather than exclusive, complex rather than simple, and expansive not restrictive.