PHD Thesis Proposal for Monash University Faculty of Education.

Thomas Cochrane
BE, BD, GDHE, MTS, MComp
Academic Advisor (e-learning & Learning Technologies)
Centre for Teaching & Learning Innovation, Unitec New Zealand.
tcochrane@unitec.ac.nz

Mobilizing Learning: The potential impact of wireless mobile computing on teaching and learning in higher education in New Zealand.

Harnessing the potential of social software tools (such as: Mobile Blogging, RSS, Instant Messaging, Moodle and Elgg) using wireless mobile devices, such as: PDAs, laptops, and the new generation of mobile phones.

Keywords: Social Software, wireless, mobile, cell phones, PDAs.

Contents

Introduction

This research project will investigate the potential for establishing the use of wireless mobile devices (WMDs) as core ICTs (Information and Communication Technologies) within tertiary education courses. The potential of mobile devices integrated with a campus wireless network can facilitate the use of e-learning tools to enhance tutor-student and student-student communication, collaboration, reflection and critique. Student productivity will be enhanced by the provision of a ubiquitous computing environment. The project outlines how this will be achieved at Unitec, and investigates wireless mobile integration in other similar institutions within New Zealand as well.

The research project will involve a series of reflective trials using WMDs to harness the potential of current and emerging social constructivist e-learning tools. (E.g. Moodle, Blogs, Wikis, PodCasting etc…) The research project is based upon explicit social constructivist pedagogy (Bijker *et al.*, 1987; Lave & Wenger, 1991; Vygotsky, 1978; Wenger *et al.*, 2002), and aims to develop a strategic implementation plan for incorporating WMDs into tertiary education in New Zealand, and sound pedagogical guidelines. The underlying social constructivist tools are not bound to any single WMD technology, or specific learning context, and therefore the outcomes/strategies/pedagogies identified by the research will be generalizable and transferable. It is postulated herein that WMDs are disruptive technologies that are useful in challenging established pedagogies, providing a catalyst to move tertiary education towards social constructivism.

While there are several examples of integration of Palm, PocketPC, Smart phone and laptop devices in tertiary education in overseas institutions, few are based on theoretical models of learning. It has also been noted that the majority of mobile learning trials have not used rigorous evaluation techniques, have failed to measure student learning, and have not attempted to provide a well-defined pedagogical basis for the research or learning activities used (Kukulsa-Hulme & Traxler, 2005; Traxler & Kukulsa-Hulme, 2005). This project attempts to address these concerns.

The research will implement and investigate the application of WMDs in a variety of Tertiary education courses within New Zealand. The author is part of the Centre for Teaching and Learning Innovation team at Unitec, and as such is ideally situated at Unitec to promote and research the potential of WMDs to enhance the delivery of courses and student learning. It is proposed to run trial implementations with courses from different schools within Unitec during 2007/2008 with the aim of integrating the use of WMDs into several courses for 2007 and beyond.

The project will follow established patterns of new technology integration, pedagogical development, and institutional change. Beginning with a small selection of early adopter trials, the results will inform a wider integration of wireless mobile computing.

Trials/pilots are needed to get buy-in for the concept from tutors and students at Unitec. Once a couple of courses are established integrating the technology, a domino effect will be created among the student population, much as that which spread the integration of Blackboard (the e-learning course management system used at Unitec) throughout courses at Unitec. The trials are also important to explore the skills and confidence of academic staff in utilizing the technology before full implementation within their courses.

Research Questions

(1). What are the key factors in integrating WMDs within tertiary education courses?

(2). What challenges/advantages to established pedagogies do these disruptive technologies present?

(3). To what extent can these WMDs be utilized to support learner interactivity, collaboration, communication, reflection and interest, and thus provide pedagogically rich learning environments that engage and motivate the learner? To what extent can WMDs be used to harness the potential of current and emerging social constructivist e-learning tools?

Literature Review

Social Software

'Social Software' - interactive collaborative software, is one of the key features of what has been termed 'Web2' (O'Reilly, 2005). The chapter: "Social Networks" by Leon Cych (2006) - is a good overview of the potential of social software in education.

Web2 is about:
- Moving beyond content delivery to personal publishing
- Ease of use
- Interactivity
- Collaboration & sharing
- Customisation

Wireless Mobile Devices (WMDs) coupled with open-source Social Software tools potentially provide the basis for enhancing teaching and learning in virtually any discipline. The use of social software in education has gained a lot of recent interest (Alexander, 2006; Alexander *et al.*, 2006; Attwell, 2006; Bryant, 2006; Cych, 2006; Mejias, 2006; Wilson, 2006).

Examples of current and emerging social software tools include blogs, wikis, RSS, instant messaging, podcasting, social book marking, etc… (Farmer, 2004; Glogoff, 2005; Kaplan-Leiserson, 2004).

Jafari (2006) recently proposed a model for a next generation e-learning environment that integrates social software tools.

> Stakeholders across the spectrum want an anytime, all-the-time, personalized experience of teaching and learning - one that utilizes all the currently available social tools, intuitive tools, smart agents, and interactive environments of Web 2.0 and social computing. In short, faculty, students, and administrators are waiting for an e-learning environment that is smart, environmental, archival, multi-modal, collaborative, and mobile (Jafari et al., 2006).

(Figure 1)

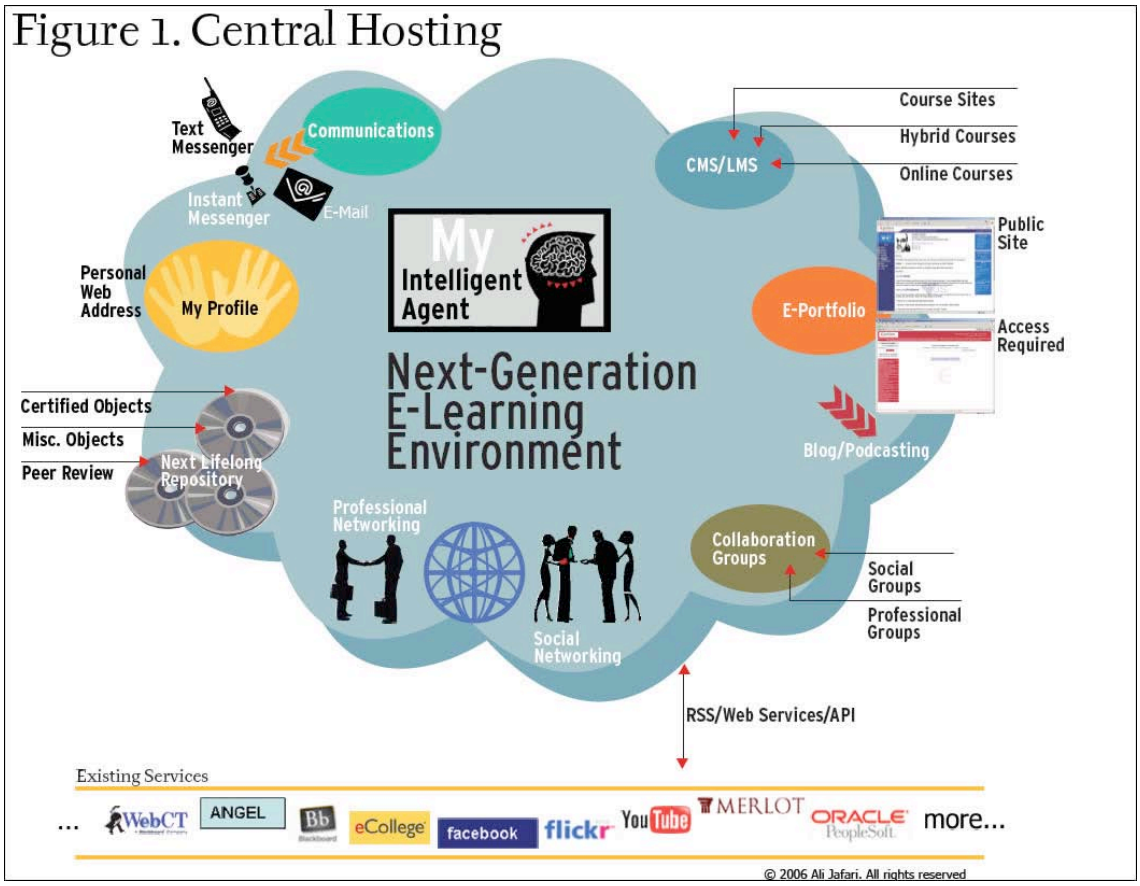

Figure 1. Central Hosting - the Jafari elearning environment model. p68

The popularity of these social, web-based tools is demonstrated by the design and support of current and soon to be released consumer mobile devices. An example is the inclusion of RSS news reading capability into Nokia (Nokia Lifeblog 2.0) and Sony Ericsson cell phones, and the Sony PSP. The next generation of Sony Ericsson cell phones will feature integrated mobile photo blogging (Gohring, 2006), and Nokia's N73 cell phone allows direct posting of captured photos to Flickr. Additionally, the two 'giants' of the Internet, Google and Yahoo, are both positioning themselves for the wave of wireless mobility by developing a suite of mobile social networking tools (see http://mobile.google.com and http://mobile.yahoo.com).

Blogs

A Blog is a reverse chronological online journal. Only the owner of the blog, and those given group membership by the owner can make blog postings. However, visitors can add comments to blog postings. There are a variety of free online blog hosts, the most popular being www.blogger.com. Blog posts can be made via a web browser, a dedicated blogging application, via email, SMS, or via plug in extensions to web browsers like Firefox or Flock, or even MS Word. Readers interested in regularly following a blog can subscribe to it via its RSS feed. There has been a lot of interest in the educational applications of blogs (Educause, 2005a, 2005e; Farmer & Bartlett-Bragg, 2005; Luca & McLoughlin, 2005; Trafford, 2005). In an educational context, blogging can be utilised as an online reflective journal. The use of reflective journals in education is well established (Bain *et al.*, 1999). Variations on blogging include image and video blogging. Currently two of the most popular examples are http://www.flickr.com (image blogging) and http://www.youtube.com (video blogging). Emerging Mobile multimedia blogging sites include: http://www.splashblog.com and http://www.mojungle.com.

Wikis

Wikis are a collaborative web space with a simple set of formatting tools. The ethos is on quick, easy, and collaborative publishing (Bryant, 2006). The most famous wiki is www.wikipedia.com, which uses mediawiki software that is freely available for setting up on your own web servers. Free wiki hosting is available at sites such as www.wikispaces.com. All that is needed to edit a wiki page is a web browser.

Social Book marking

Social book marking allows users to categorize and share urls via user-defined tags (descriptive keywords) online. Social book marking sites support RSS feeds and the defining and building of communities of interest. The most popular is http://del.icio.us (Educause, 2005d).

Learning Management Systems

Learning Management Systems (or Virtual Learning Environments) have been around almost as long as the web. They provide secure e-learning environments for students and teachers that are integrated with institutional enrolment systems. However, newer, open-source LMS's are attempting to integrate a range of social software tools, and support the enabling technology behind social software – RSS. A prime example is Moodle.

Moodle (http://moodle.org)
While Blackboard is currently the LMS of choice for Unitec as an institution, Moodle has several advantages over Blackboard for wireless mobile devices:

- Hosted on server independent of Unitec IT department
- Integration with RSS, Wikis, and now Blogs.
- A Social Constructivist underpinning (Dougiamis, 2005b).
- The availability of a PDA 'template' for courses – to make courses small-screen, PDA-friendly.
- More intuitive file management.
- Open Source platform, therefore software and extensions are free.
- A large (and growing) support and development base within New Zealand for the Moodle platform.

ePortfolios

An eportfolio is an electronic portfolio – a way for students to manage and share collections of their work. There are a variety of open source eportfolio systems available (Lorenzo & lttelson, 2005a, 2005b). Elgg is a maturing example that now has integration with Moodle.

Elgg (http://elgg.org)
Supports: Blogging, File Sharing, RSS aggregation, tagging, creation of groups, podcast hosting, external blog editors via metaweblog api etc…

Podcasting

Podcasting evolved out of blogging. A podcast is an RSS feed with an attached 'enclosure' – a compressed audio file. Internet delivery and the ability to subscribe and manage podcasts via software such as iTunes and the portable iPod have made it very popular. Podcasting is really a content delivery system (Educause, 2005c).

RSS

Rich Site Summary, or Real Simple Syndication, RSS provides a way of subscribing to content via news reading software (e.g. http://www.newsgator.com/). RSS can be used as an enabling/delivery mechanism common to all of these social software tools (Kaplan-Leiserson, 2004; Wenger *et al.*, 2005).

Instant Messaging

A synchronous Internet enabled communications tool, instant messaging allows real-time text chat, and the creation of groups, and user profiles. Instant messaging tools have developed: file sharing, audio, and video conferencing capabilities. They are best suited to a multitasking environment, operating in the background while the user works on other tasks. Almost all internet capable communications devices now support instant messaging, and it is the 'net-generation's preferred method of communication with peers (next to SMS text messaging) (Educause, 2005b).

(Figure 2)

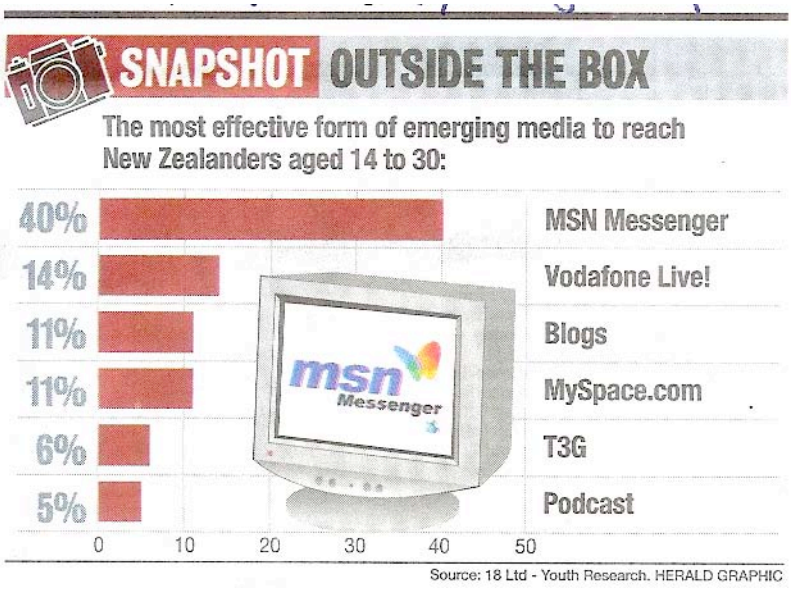

Figure 2. New Zealand Herald 10 August 2006, page C5

Wireless Mobile Devices

E-learning tools have been established as valuable enhancements to both distance and face-to-face tertiary education, particularly in facilitating collaborative, reflective, student-centred learning environments (JISC, 2004).

> A review of current practice suggests that mobile and wireless learning is the natural next step wherever institutions and practitioners have already adopted e-learning (Knight, 2005).

Wireless Mobile Devices include; the new wireless enabled ultra mobile PCs (UMPC Community, 2006), cell phones, smart phones, PDAs, and wireless enabled portable media devices. While the use of wireless laptops has been well established (but still mostly in an ad hoc mode within the tertiary education scene), today's WMDs potentially provide all the processing power and communication applications that students need, at a lower cost, greater portability and longer battery life than a laptop computer. Additionally, a WMD is not made redundant by a laptop or desktop computer, but is usually designed to complement them.

Wireless Connectivity

> New mobile and context-aware technology can enable young people to learn by exploring their world, in continual communication with and through technology (Sharples, 2005).

WiFi is the popular name for the 802.11 wireless ethernet standard. WiFi is basically an extension and bridge to your wired network. Anything that can be done on a wired network can be done on the WiFi network (unless IT departments limit the functionality of the WiFi network). This allows the PDA device to piggyback onto the network.

There are currently three types of WiFi, b = 11Mbps, g = 54Mbps (backwards compatible with 802.11b), and a = 54 Mbps but uses a higher frequency spectrum and is not compatible with b or g. PDA's currently use 802.11b, as it requires lower power consumption than 802.11g or a. The range of WiFi connectivity is typically 50-100m, with data rates dropping with distance from access points to a minimum of 1Mbps before losing connection. The access point transceiver's signal can be boosted with the use of external aerials, or reduced by decreasing the transmitter power.

Due to the range of WiFi connectivity, security of wireless data is an issue. An unauthorized person can be sitting in the car park, or a café across the road from an access point and use any unprotected wireless network. WiFi security protocols range from WEP to WPA which both use encryption and password protection to secure the access to the wireless network and encoding of network data. 128 bit WEP is relatively easy for a hacker to crack, while WPA is much more secure

A recent wireless mobile device trial at Unitec indicated that the key aspect of wireless mobile device utilization is their connectivity. Students value anytime anyplace connectivity with classmates, Lecturers, and resources. However, a surprising number of students have limited or no Internet connectivity at home (most still have dial-up internet access, and very few have broadband coupled with a home WiFi network). Additionally, WiFi access points on campus are rare, covering only a small percentage of the Unitec campus at present. Indeed many Tertiary education institutions in New Zealand have limited or no WiFi networks, and where they do - firewall restrictions limit access to many of the connectivity and communication applications that students/lecturers wish to use.

The flexibility of wireless connectivity is one of the keys to the collaborative use of mobile technologies. In conjunction with PDAs or laptops, wireless connectivity promotes the establishment of a virtual collaborative learning community producing a higher level of communication between tutors and students and between students themselves from anywhere on campus or any wireless hotspot.

New Zealand has lagged behind the UK and USA in adoption of wireless network access in larger tertiary institutions. The Telco-based 3G wireless infrastructure is still being rolled-out and along with 'broadband' Internet connection fees New Zealand experiences one of the highest user costs and therefore slowest uptake in the OECD. However, now the time is right for the introduction of innovative use of WMDs. Campus wireless networks are beginning to be established throughout New Zealand, and cellular 3G networks cover the main urban areas.

Cellular networks provide wireless connectivity beyond voice calls and text messaging. Cellular data plans allow the transfer of any type of digital data and Internet connectivity. The speed of the cellular data is determined by the capability of the cell phone transceivers within range, and the data rate capability of the cell phone being used. Third generation (3G) cellular data networks are currently the fastest available to the average consumer.

Table1: Cellular data speeds

Data Generation	Connection Type	Potential Data Rates	Network Supplier
1G	CSD/GSM	14.4 kps	Telecom/Vodafone
2G	GPRS	115 kps	Vodafone
2G	CDMA 1x	144 kps	Telecom
2.5G	EDGE	238 kbps	Vodafone
3G	UMTS	384 kps	Vodafone
3G	EVDO	2400 kps	Telecom
3G	HSDPA	2000 – 15000 kps	Vodafone

The data rate of 3G networks is still slower than that of a fast ADSL broadband connection, but it is far more flexible. The main limitation of 3G networks is currently the cost of sending and receiving data (about the same level as when dialup Internet access began ten years ago) and the lack of competitive suppliers. There is also development of 4G networks, providing around 10Mbps data rates, and WiMAX (802.16) - with the potential of 50km coverage and 75Mps data rates, but these are not currently widely available.

3G data connectivity provides a potential solution for students and lecturers. However, for students and lecturers, the cost of 3G data is the critical factor.

It is the high cost and small data caps of 3G data that have made it an unviable solution in education. The recent Vodafone broadband promotion (1GB data for $49/month) has finally made 3G data connectivity viable, at near traditional broadband costs.

3G Connectivity options include:
- 3G data card with laptop
- Bluetooth PDA paired with 3G cell phone
- 3G capable smart phone/cell phone
- UMPC with either 3G data card or paired to Bluetooth 3G cell phone
- 3G data shared with WiFi devices via 3G to WiFi router (reduced mobility though as the WiFi router requires a power supply)

Cell phones

The advantage of the cell phone is that virtually every student and teacher already own one. Marc Prensky (2005) has postulated that mobile phones can be used for a wide variety of learning activities. To date most research for 'standard' cell phones has focused around the use of SMS, however the capability of cell phones is growing rapidly.

The next generation of cell phones are aimed at facilitating the use of popular Web2 tools – particularly Blogs and RSS feeds (Gohring, 2006). To give an example:

> London, UK– Sony Ericsson and Google today announced that they have worked closely together to integrate Google's Blogger and Web Search features on Sony Ericsson mobile phones. The two companies are the first in the industry to provide a pre-loaded blog application with a tight integration to the mobile camera and intuitive automatic set-up for consumers who do not already have a personal blog (Sony Ericsson, 2006).

Even older 'standard' cell phones can leverage a growing host of social software tools using SMS, email, and downloadable Java applications. Generally a data account is required to access the more capable Java applications that make use of Internet connectivity. For example, a Java enabled cell phone can run a very capable Java-based web browser, instant messaging client, RSS reader, and blog client (GetJar.com, 2006). In particular the availability of the Opera Mini Java web browser for cell phones (Opera Software, 2006) has opened access to web services that many cell phones could not previously render acceptably with their built-in WAP browsers.

'Smart phones' – cell phones with a multimedia capable operating system, either; Symbian OS, Palm OS, or Windows Mobile, have many more options for integrating social software (see table 1.), and often come pre-loaded with a range of useful applications. The converged wireless communications market is a fast growing changing environment. While it is understood that operating systems such as those mentioned are subject to rapid change and eventually obsolescence, the research project will work within their current limitations and potential, while keeping up to date with future advances as they occur. It is anticipated that the fundamental pedagogical principles explored by the research will be valid for future mobile technologies.

PDAs

Personal Digital Assistants - digital devices originally developed for storing information and an electronic diary, address book, contacts list, and note pad, are now more powerful than the desktop computers of just a few years ago. They are cheaper and smaller to carry than laptops, yet provide access to many of the capabilities of laptop computers. The CPU performance, memory (including integrated hard drives and non-volatile RAM), screen resolution and brightness, and wireless networking capabilities have made these much more capable devices than a couple of years ago. It is now common to have both Bluetooth and WiFi wireless connectivity on PDAs, and cell phone based PDAs are now mostly 3G capable. There is a relatively long history of interest in the use of PDAs in education (Anderson & Blackwell, 2004; Smith, 2003).

There are two main varieties of PDAs: Pocket PC, Palm OS.

Applications include:

- Word, Excel, PowerPoint
- Synchronizing address book and calendar data
- Audio and Video players
- Email and web browsing
- Interconnectivity with cell phones for sending and receiving SMS
- Blogging and RSS applications
- Interactive Learning Objects – Flash, QuickTime etc…
- Handwriting recognition
- Instant Messaging
- Moodle (Dougiamis, 2005a) and Elgg (Tosh *et al.*, 2006) access via web browsers
- Network file access
- Access online file services such as dotMac (Apple Computer, 2006)

PSP

The Sony Playstation Portable (Sony, 2006) is the first wireless mobile gaming device that also has wider potential. It is a portable multimedia device, which is gaining new features that can be leveraged in education. The PSP features WiFi networking, a capable web browser, RSS feed downloading, Flash player, music, videos, Podcast capable, extensible for storing calendars, bookmarks, contacts and other data, and soon it will support VOIP communications. At the time of writing, however, the Achilles heel of the PSP is its poor text entry capability, which is much slower than txting on a cell phone. The PSP may be thus currently better suited for content delivery.

Wireless Laptops/TabletPCs/UMPCs

While the most capable wireless mobile device option, these are also the most expensive, heaviest to carry, lowest battery life options. The future of wireless laptop computing is the integration of 3G and WiMax.

> WiMAX (Worldwide Interoperability for Microwave Access) is an Institute of Electrical and Electronics Engineers (IEEE, see http://www.ieee.org) standard designated 802.16-2004 (fixed wireless applications) and 802.16e-2005 (mobile wire-less). The industry trade group WiMAX ForumTM (http://www.wimaxforum.org) has defined WiMAX as a "last mile" broadband wireless access (BWA) alternative to cable modem service, telephone company Digital Subscriber Line (DSL) or T1/E1 service.
>
> WiMAX provides fixed, portable or mobile non-line-of sight service from a base station to a subscriber station, also known as customer premise equipment (CPE). Some goals for WiMAX include a radius of service coverage of 6 miles from a WiMAX base station for point-to-multipoint, non-line-of-sight (see following pages for illustrations and definitions) service. This service should deliver approximately 40 megabits per second (Mbps) for fixed and portable access applications (WiMax.com, 2006).

The Ultra Mobile PCs (UMPCs) are basically small tablet PCs, and do not yet represent an attractive price/performance proposition, and have short battery life. It is expected that the second generation of UMPCs (UMPC Community, 2006) will address these issues.

This research project will focus mainly upon the potential of cell phone and PDA type mobile devices.

Research so far

Although wireless and mobile computing is still in its infancy in New Zealand tertiary education, there has been a flurry of research and pilot studies from the UK, and USA in the last couple of years. The increase in m-learning-focused conferences, research projects and briefing papers from organizations such as JISC, and articles in educational journals such as Educause, JCAL etc, demonstrate an increase in interest in m-learning. However most of these studies have been relatively short-term pilot studies, and lacking rigour in evaluation and epistemological underpinnings.

> The field of mobile learning is at present characterized by a proliferation of pilots and trials that allow mobile technologies to be tested out in a variety of learning contexts. The sustained deployment of mobile learning will depend on the quality of these pilots and trials, which includes evaluation methodology and reporting… The vast majority of pilots and trials in our sample had no explicit or apparent educational or epistemological foundations. (Traxler & Kukulsa-Hulme, 2005)

Larger mobile learning projects have had specific focuses, rather than developing pedagogical strategies for tertiary education in general. E.g. the m-learning project extended over four years, focusing on retention of at risk learners by using cell phone technologies (Attewell, 2005). Most studies have also focused upon content delivery and the personal digital assistant capabilities of mobile devices rather than leveraging collaborative learning.

> Content delivery to mobile devices may well have a useful place in m-learning, however, there is an imperative to move from a view of e- and m-learning as solely delivery mechanisms for content… Handheld devices are emerging as one of the most promising technologies for supporting learning and particularly collaborative learning scenarios. (Hoppe *et al.*, 2003)

A recent mobile learning project (Trafford, 2005) investigated the use of mobile devices for blogging and accessing a VLE (virtual learning environment). However the mobile devices (Palm OS PDAs) were not wireless capable, relying upon desktop computers for synchronization to update the students blogs.

There is a wealth of research into the use of mobile devices in education that can be utilized for future research e.g. JISC have produced a guide to implementing mobile learning within a tertiary institution (JISC, 2005b), and user evaluation surveys for implementation trials, and a manager's framework for implementing WMDs in higher education (Knight, 2005).

Pedagogical Framework

Teaching and learning innovations are best implemented when informed by learning theory. A pedagogical framework for implementing social software tools via wireless mobile devices can be developed by drawing on concepts from constructivism, social constructivism, communities of practice, and a conversational model.

Constructivism

Constructivism is based on the work of Piaget (1973), Dewey and Bruner (1966). According to these theorists, knowledge is constructed from our own experiences, and enabled by teachers. The learner learns best by being involved in the learning process, discovering new concepts.

> A student who achieves a certain knowledge through free investigation and spontaneous effort will later be able retain it; he will have acquired a methodology that can serve him for the rest of his life (Piaget, 1973).

The role of the teacher varies in the thinking of these founders. For Piaget the teachers role was mainly to provide a stimulating environment for learning, while for Bruner the teacher plays a much more significant role in directing the student in their construction of knowledge. Constructivism is a synthesis of these various ideas.

> The main constructivist proposition is that the child constructs his own version of reality from his own unique experiences. It is this construction he then uses to deal with any new experience in that field. The process of constructing his own knowledge is an active one. He does so by forming new relationships between ideas he already has. To these he incorporates new pieces of information... the most important thing for teachers to know is what each pupil knows. The teacher can then plan a learning programme for each pupil, taking his initial knowledge and learning strategies as the starting-point (Sutherland, 1992).

Social Constructivism

> Social constructivism is an alternative approach to the content approach and is based on communication. Learning is seen as the result of active participation in a 'community' where new meanings are co-constructed by the learner and his/her 'community'. This communication approach favours learning technologies which support communication between communities of learners (Evans, 2005).

Some of the seminal thinking behind Social Constructivism is attributed to Vygotsky, according to whom the social context is very important in constructing knowledge. Vygotsky argued that learning is a collaborative process.

> Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals (Vygotsky, 1978, p57).

According to Vygotsky the role of the teacher is to create and maintain the Zones of Proximal Development (Head & Dakers, 2005) – an environment that will help move the learner from their current understanding to a potential deeper level. Bandura (1986) is one of the theorists who have expanded upon Vygotsky's ideas.

> Instructional models based on the social constructivist perspective stress the need for collaboration among learners and with practitioners in the society … Social constructivist approaches can include reciprocal teaching, peer collaboration, cognitive apprenticeships, problem-based instruction, webquests, anchored instruction and other methods that involve learning with others (Kim, 2001).

Social constructivism forms the underlying basis for learning theories such as 'Communities of Practice' and the 'Social Construction of Technology'.

Collaborative learning and Communities of Practice

'Communities of Practice' is a relatively new approach to learning. The concepts were developed by Lave and Wenger, while studying the apprenticeship model of learning (Lave & Wenger, 1991), "Communities of practice are formed by people who engage in a process of collective learning in a shared domain of human endeavor" (Wenger, 2005).

The main differences to traditional educational environments are an emphasis on inventiveness, evolution of ideas and direction of the community, and all community members are peers.

The three characteristics of communities of practice

- The Domain – the shared interest.
- The Community – some form of regular group relationship.
- The Practice – the development of a shared repertoire of resources, involving time and sustained interaction.

Legitimate Peripheral Participation

Lave and Wenger assert that passive community members learn from the active members of the community, and are gradually brought into an active role in the community.

Attwell (2006) draws a comparison between the concept of legitimate peripheral participation and Vygotsky's zone of proximal development.

> Bridging the zone of proximal development construct with legitimate peripheral participation construct may be accomplished if one thinks of a zone in which the expert or mentor takes the learner from the peripheral status of knowing to a deeper status… the expert scaffolds the environment to the extent in which the learner is engaged with the discourse and participants within the zone and is drawn from a peripheral status to a more engaged status. The peripheral learner interacts with the mentor, expert learners and peers within the zone. More able learners (peers) or the mentor will work with the less able learner potentially allowing for socially constructed knowledge (Attwell, 2006).

The Technology Steward
The Technology Steward (Wenger et al., 2005) is a member of the community with a grasp of how and what technologies can enhance the community. They act as a guide to the rest of the community as the community learns to utilize and benefit from technology.

Conversational Model

Diana Laurilard (2001) developed the conversational model of learning, based upon a Socratic conversation between student and teacher. According to this model, technologies that enhance communication between the student and teacher can thus enhance learning. Sharples describes the potential of mobile devices for enabling 'conversations in context'. "New mobile and context-aware technology can enable young people to learn by exploring their world, in continual communication with and through technology" (Sharples, 2005).

Pedagogies for integrating WMDs and Social Software

The previously described models of teaching and learning will be used to provide a theoretical grounding to the research on the pedagogical impact and potential of WMDs and social software.

Sotillo describes the pedagogical impact of ubiquitous wireless computing:

> In summary, the advantages of wireless computing in education are ubiquity, portability, and flexibility for collaborative learning projects. Computer power everywhere and all the time means the ability—and the challenge—to integrate computers into every aspect of teaching, learning, and research. This represents a Copernican revolution in instruction, with the professor as guide and mentor rather than "fount of knowledge" or ultimate classroom authority (Sotillo, 2003, p3).

Advantages that WMDs have in facilitating collaborative m-learning environments include:

> *Portability* - can take the computer to different sites and move around within a location
> *Social Interactivity* - can exchange data and collaborate with other people face to face
> *Context Sensitivity* - can gather data unique to the current location, environment, and time, including both real and simulated data
> *Connectivity* - can connect handhelds to data collection devices, other handhelds, and to a common network that creates a true shared environment
> *Individuality* - can provide unique scaffolding that is customized to the individual's path of investigation (Squire *et al.*, 2002, p7).

Implications for Learning
Wireless networks have been described as 'disruptive technologies', and so have the social tools that have developed (blogs, wikis etc…) (Alexander, 2004; Fielder, 2004; Lamb, 2004). Their disruptive nature forces a rethink of pedagogical strategies and relationships in education. Wireless mobile computing facilitates the development of collaborative learning communities, enhancing student-student and student-tutor communication and interaction. Wireless Mobile Devices coupled with open-source Social Software tools potentially provide the basis for enhancing teaching and learning in virtually any discipline.

Choice of Technologies

Technologies (hardware and software) will be chosen according to their fit with the underlying pedagogies guiding the project. However, often there are more factors influencing the ultimate choice of technologies used in a learning situation than those that present the best pedagogical fit. Often the 'best' technology for a particular situation does not become the mainstream choice. The social construction of technology is one approach to analysing technological development and survival.

Social Construction of Technology

The social construction of technology is based upon a constructivist approach to learning and technological development. Bijker promotes the idea that society influences the development of technology, and technology influences society.

> "The technical is socially constructed, and the social is technically constructed. All stable ensembles are bound together as much as by the technical as by the social. Social classes, occupational groups, firms, professions, machines - all are held in place by intimate social and technical links." (Bijker, 1995, p273)

According to Bijker there are five key elements in the social construction of technology:
1. Relevant Social Group.
A social group that has a common use/interpretation of the technology.

2. Interpretive Flexibility.
A technology has different meanings for different social groups. The social analysis of the design.

3. Technological Frame.
This is Bijker's term for the previous two change elements - a specific social group with a particular interpretation of the technology. Inclusion describes how influential that frame is on an actor. There will usually be multiple relevant social groups. It is the interaction of 'frames' that produces change in the technology.

4. Closure and Stabilization.
Closure is an inter group process, while stabilization is an intra group process. As Closure & stabilization occur, Interpretive Flexibility disappears - the history of the technology is rewritten to focus on the final interpretation!

5. Power.
Power is linked to the closure & stabilization process. How a group (technological frame) fixes the meaning.

Communities of Practice

Communities of Practice also provide some theoretical frameworks for guiding the choice of technologies in a learning situation. In education, the technology steward role would most beneficially be that of the teacher. However when the teacher is not up to speed with the technology utilized by the community, or does not engage with it, then the technology steward role defaults to someone else within the community or class. The problem then is the potential for the community or class to go off on a tangent from lack of pedagogical guidance.

To facilitate the technology steward role in each of the research trials, the researcher will act as an assistant technology steward to the teacher of each group of students, and communities of practice will be established.

Methodology

The research project will involve several stages:

- Review current research and implementation of WMD in tertiary education
- Investigate New Zealand implementation – e.g. Waikato School of Management, Unitec School of Nursing…
- Establish trial projects at Unitec
- Attempt to keep up to date with the developing technology, particularly the convergence of wireless PDA functionality in smart phones and mobile media-centre consumer devices.
- Devise an implementation strategy applicable to the New Zealand tertiary education sector

Qualitative Research

The researcher believes that research is more than gaining knowledge. Knowledge brings responsibility to disseminate this knowledge and bring about beneficial change to the community involved. Communities are made up of groups of people with unique strengths and needs. The rich data that comes from qualitative research is needed in order to understand communities, and to provide beneficial insights for them. Qualitative research is valuable in the

field of educational research, and is compatible with a constructivist approach to learning. Qualitative research provides rich data for educational situations (Hoepfl, 1997).

The research will also involve the use of some quantitative data collection instruments used as yardsticks to guide the qualitative reflections and analysis.

Action Research

The research is qualitative in nature, and will initially use small 'samples' of participants evaluating the integration of WMDs. The project will be conducted over a two-year period, and use action research as its methodology (Dick, 1997; Ellis & Kiely, 2000; Holian, 1999), involving one research cycle per semester. The action research cycles will provide time for reflection and feedback between researching and developing the implementation of WMDs within tertiary courses. This reflection and feedback will provide data on the success of the implementation and integration of the WMDs and areas needing modification, informing the following research cycle. Each trial cycle will include: assess the course needs, plan the integration of WMD hardware & social software, implement, reflect, redesign of the pedagogical strategies employed for the following trial. Implementing four different research trials over two years will allow the research to track changes/progress in the development of WMD hardware and social software.

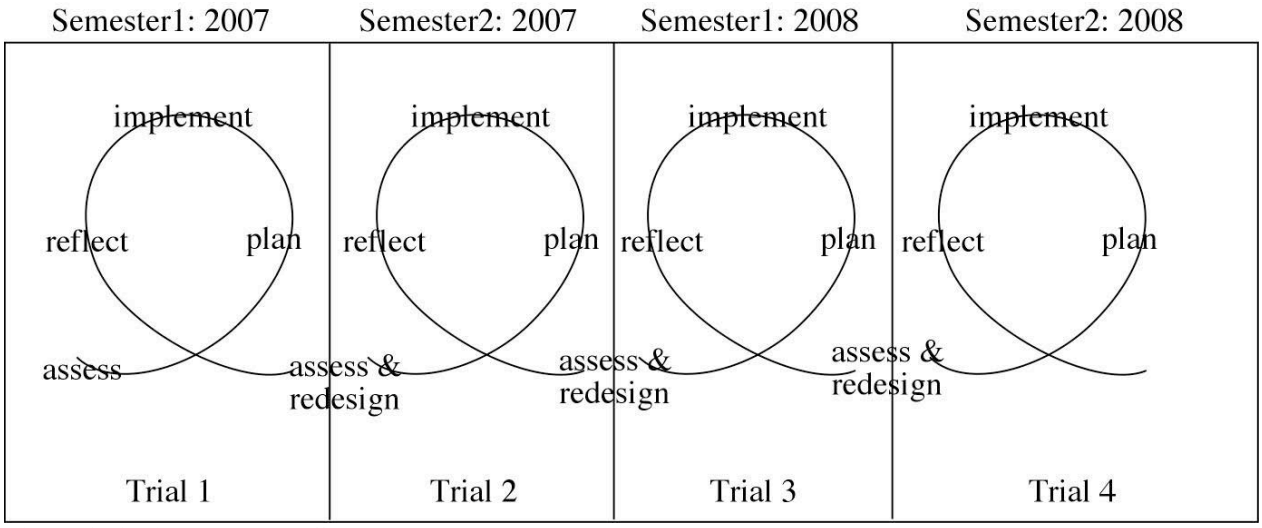

Figure 3. Action Research Cycles.

The approach of action research provides a close fit with the researcher's own view of education (transformative – seeking to produce change) and preference for qualitative rather than quantitative research. Action research also provides a close fit with the chosen underlying pedagogy - social constructivism. An action research methodology will also allow the research to keep up to date, as each research cycle allows for reflection and modification for the next cycle. This would allow the incorporation of new mobile hardware and software, and even new research questions that come to light as a result.

> It is an approach which has proved to be particularly attractive to educators because of its practical, problem-solving emphasis, because practitioners (sometimes with researchers from outside the institution; other times not) carry out the research and because the research is directed towards greater understanding and improvement of practice over a period of time (Bell, 1999).

Participatory Action Research

The research will involve a partnership between the researcher, the course academic staff, and the students involved in each successive trial. The researchers role will be that of the prime collector of data, and the technology steward (Wenger et al., 2005) within the communities of practice developed for each trial. The research approach is thus participatory action research (Wadsworth, 1998).

> Essentially participatory action research is research which involves all relevant parties in actively examining together current action (which they experience as problematic) in order to change and improve it. They do this by critically reflecting on the historical, political, cultural, economic, geographic and other contexts which make sense of it … In participatory action research, while there is a conceptual difference between the 'participation' 'action' and 'research' elements, in its most developed state these differences begin to dissolve in practice. That is, there is not participation followed by research and then hopefully action. Instead there are countless tiny cycles of participatory reflection on action, learning about action and then new informed action which is in turn the subject of further reflection… Change does not happen at 'the end' - it happens throughout (Wadsworth, 1998).

Each action research cycle (trial) will involve a series of research cycles that occur throughout the trial providing continuous feedback, reflection and modification of the research approach. The in-trial feedback will be facilitated by the following :

- Weekly face-to-face technology support sessions, facilitated by the researcher.
- Instant Messaging – between students and academics, students and technology steward/researcher, and academics and technology steward/researcher.
- RSS feeds from forums set up on the learning management system (Moodle and Elgg).
- RSS feeds from student Blogs and Online Photo hosting service.

The research will investigate the pedagogical issues of utilizing mobile wireless devices in tertiary education. The aim is to improve pedagogy and positively enhance students learning. The study situates itself firmly in the discursive and student-centred pedagogies rather than didactic and teacher centred pedagogies. The emphasis is upon 'what the student does' – getting the students involved in the discovery of learning, rather than being merely receptors for course content. Communication is a key in this e.g. Laurillard's 'conversational model' of learning (Laurillard, 2001; Sharples, 2005). Another key issue in successful tertiary education is the alignment of teaching and learning activities with the course assessment and outcomes. Biggs has coined this 'constructive alignment' (Biggs, 2003). Models of teaching and learning are continually 'evolving'. As outlined previously, the theories of constructivism, social constructivism, communities of practice, and the conversational model, all have relevance for the research project.

Taking on-board these concepts, the main focus of this proposed project is on the support and enhancement of face to face teaching and learning by using the mobile wireless devices as a means to leverage the potential of current and emerging collaborative and reflective e-learning tools (e.g. blogs, wikis, RSS, instant messaging, podcasting, social book marking, etc…). The e-learning activities developed to make use of the WMDs in the various trials will focus upon the use of social software tools.

This research project will build upon the substantial research and resources developed by JISC (2005b) in their recent projects in innovation in e-learning.

Trial Outlines

Each research trial (1 to 4) will comprise a different student group and a different combination of WMD hardware and/or social software options. These different scenarios and participants are outlined below. (See Appendix 15 for an example Trial scenario).

Participants

The following courses have, so far, been identified as potential participants for WMD research trials.

Table 2. WMD Trials

Trial	Course	Participants	WMD	Social Software	Summary
Trial 1	Diploma of Landscape Design, Unitec	18 students, 2 Academic staff, researcher.	Palm TX with folding wireless keyboard for	Moodle Splashblog.com Litefeeds.com Blogger.com	Use of WiFi PDA to create reflective Blogs. Group members subscribe to each other's blogs and to a central

			text entry	Letmeparty.com AIM, MSN	course blog using an RSS reading Java application. Deliver basic course content via Moodle, and encourage students to experiment with capabilities.
Trial 2	Year Two, Bachelor of Product Design, School of Design, Unitec	18 students, 2 Academic staff, researcher.	Palm TX paired with a bluetooth 3G mobile phone	Moodle Elgg Splashblog.com Blogger.com Litefeeds.com Letmeparty.com AIM, MSN	Use a combination of a WiFi PDA paired with a bluetooth enabled 3G-cell phone, for anywhere, anytime connectivity to social software tools. Students establish reflective blogs, subscribe to each others blog via RSS, and upload photos to splashblog.com.
Trial 3	Year Three, Bachelor of Product Design, School of Design, Unitec	18 students, 2 Academic staff, researcher.	WiFi & 3G enabled UMPC – e.g. Samsung Q1	Moodle Elgg Blogger.com Flickr.com Meebo, AIM, MSN Newsgator.com Pbwiki.com YouTube	Use a WiFi enabled UMPC (Ultra Mobile PC), with 3G data card for connectivity beyond WiFi access points, interacting with the full range of social software options – including online newsreading, video uploading via YouTube, and instant messaging options.
Trial 4	School of Sport, Unitec	18 students, 2 Academic staff, researcher.	WiFi & 3G enabled Palm Treo	Moodle Elgg Splashblog.com Blogger.com Litefeeds.com AIM, MSN	Use a WiFi/3G 'smart phone', for anywhere, anytime connectivity to social software tools – as in Trial 1, but with the flexibility of 3G roaming.

Project Steps/Timeline for each trial:

Each trial will run for one semester (12 weeks). However, academic staff training will begin several weeks before each trial to get them up to speed before involving their students.

1. (8 weeks before semester trial) Install (if not already) Wireless network in main teaching areas of the School/department.
2. (7 weeks before semester trial) Set-up appropriate resources to support the implementation of the mobile devices (e.g. desktop synchronization software).
3. (6 weeks before semester trial) Introduce teaching staff to technology, brainstorm new pedagogies for use with the wireless mobile device.
4. (weeks 5 – 1 before semester trial) Device capability overview with Teaching Staff.
5. (4 weeks before trial) Integrate technology into project/assessment.
6. (1 week before semester trial) Choose students to participate in trial (sign Acceptable Use Policy, & insurance for loan equipment – if appropriate for trial).
7. (Week 1 of trial) Device capability overview with students.
8. (Weekly during trial) Device training with staff & Students.
9. (Week 12) Evaluate Trial (student & staff feedback).
10. (During semester break) Plan to integrate wireless WMDs into curriculum requirements for following semester.
11. (The following semester) Extend Trial to other students and staff.

Data Collection procedures and guidelines

Table 3. Primary Data Gathering Processes.

Data gathering processes	Supporting Documentation	Sample Size	Explanation
1. Initial feasibility study and needs analysis with teaching staff	Appendix1	Two academic teaching staff per course – per semester trial. (One trial per semester, with 4 research cycles).	A short survey deployed to academic staff to establish the level of experience with and the perceived potential of WMDs and social software within their courses.
6. Initial (prior to trial) survey of students & teaching staff prior experience and project expectations.	Questions from two earlier studies were used as guides (Keegan, 2005; Rawlinson & Bartel, 2006) (Appendix10).	All academic staff and students involved in each trial (2 academics, 18 students per trial).	A set of questions designed to evaluate the participants' prior experiences, technology capability, and preconceptions about WMDs and social software. The survey will provide data to measure the participants learning and quality of experiences throughout the trial. Responses will be collated using Excel spreadsheets and graphs.
7. Survey form for students and staff to complete at end of each trial.	Questions from two earlier studies were used as guides (Keegan, 2005; Rawlinson & Bartel, 2006) (Appendix11)	All academic staff and students involved in each trial (2 academics, 18 students per trial).	A set of questions designed to evaluate the impact of the WMD trial on participants' experiences, technology capability, and conceptions about WMDs and social software. The survey will provide data to measure the participants learning and quality of experiences throughout the trial. Responses will be collated using Excel spreadsheets and graphs.
9. Focus groups at the end of each trial.	Proposed questions and structure – see Appendix12	Representatives from each trial group – 5 students, 1 academic staff member.	Post trial focus group to provide qualitative feedback to inform reflection on the trial and changes needed for the following trial.

10. Reflective Journals	Student, teacher, and researcher Blogs. Hosted externally via http://www.blogger.com and http://www.splashblog.com Hosted internally via elgg http://elgg.unitecnology.ac.nz	All academic staff and students involved in each trial (2 academics, 18 students per trial).	A reflective journal will be kept by the researcher detailing key events etc of the project. A Word document journal template has been created for recording thoughts, events, and ideas throughout the time-span of the project (see Appendix 14). The template is designed to facilitate reflection and keep the comments focused on the pedagogical implications and outcomes of key events and experiences. A key activity in each trial will be the creation and maintaining of a reflective Blog by each participant. The trials will experiment with different Blog hosting scenarios – e.g. externally hosted via blogger.com, or splashblog.com, and internally hosted via Elgg. The type of Blog utilized will be negotiated with the academic staff before the beginning of each trial (some courses have stricter intellectual property concerns than others etc…)

Table 4. Secondary (Supporting) Data Gathering Processes.

Data gathering processes	**Supporting Documentation**	**Sample Size**	**Explanation**
1. Usage statistics from Learning Management System (LMS) activity. In this research Moodle will be used.	http://203.110.5.250/moodle http://moodle.unitecnology.ac.nz	All academic staff and students involved in each trial (2 academics, 18 students per trial).	Moodle user activity logs will be kept for each trial/course. These logs provide data showing what aspects of the Moodle support course have been utilised, frequency of posting to discussion forums and other online interactions between staff and students, students and students. The online

			forums will also provide support forums and tutorials for the trials.
2. Eportfolio content and collaborative networking by participants	http://203.110.5.250/elgg/ http://elgg.unitecnology.ac.nz	All academic staff and students involved in each trial (2 academics, 18 students per trial).	Eportfolio (Elgg) user activity logs will be kept for each trial/course. These logs provide data showing what aspects of the eportfolio have been utilised: file sharing, the creation of communities of practice, frequency of posting to discussion forums and other online interactions between staff and students, students and students.

Table 5. Project Guidelines.

Project Guideline processes	**Supporting Documentation**	**Sample Size**	**Explanation**
1a. Project Plan. Timeline and key goals	Project plan template – see Appendix2	Two academic teaching staff per course – per semester trial. (One trial per semester, with 4 research cycles).	An example project plan for setting key outcomes and dates for the trial.
1b. Project Plan. Design of WMD exercises – integration into the curriculum & assessment	JISC e-learning activity planner (JISC, 2005a), and practitioner planner (JISC, 2005c) – see Appendix3 and Appendix4	Two academic teaching staff per course – per semester trial. (One trial per semester, with 4 research cycles).	A consultative approach with academic staff to develop contextualized assessments and activities that enhance the course by integrating the use of WMDs and social; software.
2. Participant information (explanatory statement) (Monash University,	Appendix6 & 7	Two academic teaching staff per course, and 18 students per course trial.	Outline of the research trials, what is expected of the participants, and form

2003b) and consent forms (Monash University, 2003a)			for gaining their consent to participate in the research trials.
3. Institutional research permission form	(Monash University, 2003c) (Appendix8)	One per Institution involved in WMD trials.	Form for gaining permission from participating institutions for the research trials.
4. Acceptable use policy for students	Appendix9	All students involved in each research trial (18 per trial per semester).	Outlines guidelines for use of the institutions networks and hardware and software during the trial. Participants sign form to confirm they will look after loaned equipment and return in working order.

All of the data collection and guideline instruments above have been pre-tested and modified via two different pre research trials at Unitec during 2006.

Web Resources Development

Integration of the social software tools, and course content delivery will be investigated using Blackboard and Moodle Learning Management Systems (LMS's). While Blackboard is currently the LMS of choice for Unitec as an institution, Moodle has several advantages over Blackboard for the research project:

- Hosted on server independent of Unitec IT department
- Integration with RSS, Wiki's, (and Blogs in an upcoming update).
- A Social Constructivist underpinning (Dougiamis, 2005b).
- The availability of a PDA 'template' for courses – to make courses small-screen, PDA-friendly.
- More intuitive file management.
- Open Source platform, therefore software and extensions are free.
- A large (and growing) support and development base within New Zealand for the Moodle platform.

Course content will be made available for download from Moodle, and the social-collaborative tools embedded within Moodle will be utilized within the trial courses.

Management of Social Software

The research project will focus on free web hosted solutions, and open source software installed on the researcher's Mac OSX Server based at Unitec. These software tools will be client platform independent (i.e. they will run on any of the chosen WMDs).

Blogs

- Hosted on http://www.blogger.com
- Hosted on http://elgg.unitecnology.ac.nz

Wikis

- Option1: Mediawiki on Mac OSX server managed by researcher, http://ltxserver.unitec.ac.nz/mediawiki/

- Option2: Using the built-in wiki feature of Moodle
- Option3: Wiki server dedicated to Blackboard at Unitec
- Option4: http://www.wikispaces.com

Photo sharing

- Option1: Hosted on http://www.flickr.com
- Option2: Hosted on Http://www.splashblog.com
- Option3: Hosted on http://picasaweb.google.com
- Option4: Hosted on http://elgg.unitecnology.ac.nz

Social Book marking

- Option1: Hosted on http://www.shadows.com
- Option2: Hosted on http://del.icio.us

Podcasting

- Option1: Shared over local network using iTunes
- Option2: Hosted on http://www.podomatic.com
- Option3: Hosted on http://homepage.mac.com
- Option4: Hosted on http://elgg.unitecnology.ac.nz

Video Blogging

- Option1: Hosted on http://www.youtube.com

Instant Messaging

- The free AIM, MSN, Yahoo or Jabber instant messaging services will be used.

RSS

RSS will be used as an enabling/delivery mechanism common to all of these social software tools (e.g. http://www.newsgator.com/). As other new social software tools become available, they will be evaluated for suitability and inclusion into the research project.

Hardware Resources

The aim of the trials is for students to purchase their own wireless mobile device. This enables the students to customize and take care of the devices to a higher level than if they were lent devices for the trials. In evaluating WMDs to trial, the Centre for teaching and Learning Innovation at Unitec has a limited budget that allows for purchasing a number of such devices for evaluation per year.

The Centre for Teaching and Learning Innovation at Unitec also has purchased a set of 10 wireless equipped Macintosh laptops and a roaming 3G to WiFi network router for demonstrating wireless networking anyway on campus. A set of 20 wireless Palm OS PDAs has also been loaned from the New Zealand Palm importer for trial purposes. It is hoped that similar relationships with suppliers of a variety of wireless mobile devices will be able to be established over the lifetime of the project.

Unitec is in the process of establishing a campus-wide wireless network, and the researcher is part of the research and establishment team for implementing the wireless network rollout. There are also avenues for research funding that could be explored if needed to fund the development of WMD trials.

The Centre for Teaching and Learning Innovation at Unitec has purchased a 3G Data card, 3G to WiFi router, and 1GB/month data account to investigate the potential of 3G wireless data access. Negotiations have been established to set up an educational 3G wireless cellular data plan with Vodafone New Zealand (See Appendix 13 for a copy of the letter sent to Vodafone 6 July 2006).

The Centre for Teaching and Learning Innovation at Unitec owns and maintains several Internet accessible servers, including two Macintosh Xserves and several Linux based ‘production’ servers. These have been configured as test and production servers for the LMS, eportfolio, and wiki software to be used in the research trials.

Test Server for trials
http://203.110.5.250/moodle/
http://203.110.5.250/mediawiki/
http://203.110.5.250/elgg/

Production Server for trials
http://moodle.unitecnology.ac.nz
http://elgg.unitecnology.ac.nz
http://mediawiki.unitecnology.ac.nz

Redundancy and Backup Contingencies

The test server will provide a backup of the production server. Additionally there is an Internet accessible server configured for Moodle, Elgg, etc that can be pressed into service for the trials if needed: http://ltxserver.unitec.ac.nz The test and production servers are housed in physically separate locations on the Unitec campus. Backup copies of trial course will be made regularly, and archived on external CD and DVD media.

Possibilities/Scenarios for research trials

Below we suggest four possible scenarios for utilizing social software with different wireless mobile devices. A table that outlines some available applications to access social software tools on various wireless mobile device platforms follows the scenarios.

Scenario1: A group with no WiFi access and only GPRS cell phone coverage.

Use cell phones to create reflective Blogs. Group members subscribe to each other's blogs and to a central course blog using an RSS reading Java cell phone application. Deliver basic course content via Moodle and Elgg, and encourage students to experiment with capabilities.

Scenario2: A group with local WiFi network access.

Use WiFi enabled PDAs to facilitate a collaborative environment as above, plus add richer multimedia elements such as image and video blogging.

Scenario3: A group with 3G data access.

Use a newer 3G cell phone to access social software tools.

Scenario4: A group with local WiFi access, and 3G-network access.

Use either a WiFi/3G 'smart phone', or a combination of a WiFi PDA paired with a bluetooth enabled 3G-cell phone, for anywhere, anytime connectivity to social software tools.

Scenario5: A group with WiFi and 3G enabled UMPCs.

Use a WiFi enabled UMPC, with 3G data card for connectivity beyond WiFi access points, interacting with the full range of social software options.

The following is a table of indicative social software applications available for a variety of wireless mobile devices.

Table 6: Social Software Options for Different Mobile Devices

Device	Blog options	RSS	Instant Messaging	Social Book marking	Web Services – Moodle, Elgg, Wikis etc…

Cell phone	1. SMS via www.letmeparty.com 2. mobileBlogger (Java) 3. MoJungle – (image & video via SMS) 4. Mobispline 5. Flickr via email 6. ShoZu	1. www.Litefeeds.com –set-up feeds on web, download Java reader to cell phone 2. RSSReader (Java)	1. eMSN (Java) 2. IM+ (Java) 3. www.mobispine.com	1. www.deliciousmona.com 2. http://mobilicio.us – delicious formatted for mobile devices	1. Opera Mini (Java) 2. KaBlog (Java) – supports Elgg Blog via Metaweblog API
Smart phone	1. Built-in app 2. All above 3. SplashBlog	1. Built-in app 2. All above	1. All above 2. Yehba	1. mobilicio.us	1. All above 2. Opera for Symbian or PPC 3. mobile.google.com 4. mobile.yahoo.com
WiFi PDA Palm OS	1. uBlog 2. Vagablog 3. SplashBlog 4. MoBlog	1. LiteFeeds.com 2. QuickNews 3. mRSS	1. Agile Messenger 2. MunduIM 3. Verichat	1. mobilicio.us	1. Blazer 2. Opera Mini 3. Xiino
PSP	1. Built-in web browser login to Blogger.com	1. Built-in RSS reader	None yet	1. Built-in web browser & RSS reader	1. Built-in web browser
WiFi Mac	1. MarsEdit 2. Flock 3. Firefox with BlogThis extension	1. www.newsgator.com 2. NetNewsWireLite 3. Flock 4. Firefox with Sage or WizzRSS extension	1. iChat 2. Adium	1. Flock 2. Firefox with "another delicious sidebar' extension	1. Firefox 2. Opera 3. Flock
WiFi Laptop, TabletPC, UMPC	1. Abilon 2. Flock 3. Firefox with BlogThis extension	1. www.newsgator.com 2. FeedDemon 3. Flock 4. Firefox with Sage or WizzRSS extension	1. MSN 2. Trillium	1. Flock 2. Firefox with "another delicious sidebar" extension	1. Firefox 2. Opera 3. Flock

For links to the above applications, and more ideas on using social software on mobile devices, see the author's wiki page http://ltxserver.unitec.ac.nz/mediawiki/index.php/MlearningOverview.

Data Analysis

> … it is possible to use word processors and databases to assist in the analysis of qualitative data. This is particularly the case when undertaking initial, broad-brush examination of the data and when generating simple counts (Bourdon, 2002).

The data collection instruments provide a combination of qualitative and quantitative data for analysis. Pre and Post trial survey data for each action research trial will be collated using Microsoft Excel, enabling tabular and chart

display of quantitative data. Long answer questions, and focus group discussions will be collated in Microsoft Word for analysis of themes and key reflections for following research cycles. Student and Tutor Blogs will also form a written record of participant reflections throughout each trial. Trials that use an eportfolio system, such as elgg, will provide a collection of student work and social networking.

Qualitative research data analysis software tools will be explored to highlight trends within the qualitative data for the research. Such tools include: nVivo, Nud*ist (QSR International, 2006), CAQDAS (Computer Aided Qualitative Data Analysis Software) (Fielding & Lee, 2006). Such software provides tools for verification of themes and insights gathered from qualitative data that are otherwise difficult to defend. The software allows searching transcribed qualitative data for keywords or phrases. Survey comments, and focus group question responses can be analysed this way. CAQDAS is also useful in guarding against any researcher bias or selectivity of data.

> The use of CAQDAS can make a positive contribution here, not least, as FIELDING points out (2002) because it takes away much of the sheer tedium of qualitative analysis. Using the software it is easier to be exhaustive in analysis and to check for negative cases and there are some techniques for ensuring that text has been coded in consistent and well-defined ways (Bourdon, 2002).

The use of CAQDAS can also facilitate collaborative teamwork in qualitative research (Bourdon, 2002).

Ethical Considerations

Ethics approval

Ethics approval for the research will be sought from the Monash University research ethics committee.

Server Security

Installations of Moodle, Elgg, and Mediawiki will be upon Unitec hosted servers. The servers are Internet accessible and maintained by the Centre for teaching and Learning at Unitec. Both Moodle and Elgg support student logons via administrator assigned usernames and student configurable passwords. The Mediawiki software installation is by its nature open to public access, but wiki pages can be locked to prevent spam or unwanted editing by non-participants.

Wireless Network security

The Unitec wireless network is encrypted using WPA, and requires configuration of client wireless devices to enable connection to the wireless network.
3G data services will be for external web services that are publicly available, however all of the web services used support individual sign on via a username and password.

Partnerships with courses/classes

WMD trials will involve a partnership between the researcher, as a technology steward, facilitating the creation of a community of practice including the researcher, tutor/s and students of the course/class.

Anonymity of research participants

Surveys will be kept anonymous, and no information that could identify participants will be published.

Informed Consent

Research participants will be provided with an information pack (see Appendix for details) about the research, and will sign a participation acceptance form if they wish to be part of the trials.

Time Frame

1. Research proposal development. (2006)

2. Research proposal confirmation. (September/October 2006)
3. Action Research Trials. (2007 – 2008)
4. Final evaluation/analysis of research trial results. (2009)
5. Theses write up. (2009)
6. Thesis submission. (2009)

Conclusions

The characteristics of wireless mobile devices and social software resonate with the pedagogies espoused by constructivism, social constructivism, communities of practice, and a conversational model of learning. The potential of wireless mobile devices to provide the technology to enhance teaching and learning has been established by various research projects. Now tutors/lecturers, administrators and students need to be convinced of this and be willing to embrace and utilize the technology. Merely providing technology does not guarantee it will be used in an educational way, as Duke University has recently learnt with its iPod programme (Bugeja, 2005). Moving beyond theory to implementation guided by sound pedagogical strategies is the next step. By establishing trial courses using WMDs and fostering teaching 'champions' the benefits of wireless mobile use can be illustrated to other courses, and best practice principles will be developed.

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Appendices

Appendix1: Initial feasibility study and needs analysis.

WIRELESS MOBILE DEVICE NEED ANALYSIS

The information gathered from this questionnaire will be confidential and anonymous, and will be used solely for the purposes of a research Thesis for a PHD at Monash University.

Participant Details:		
Position: (Circle one) UNITEC Student, UNITEC Tutor/Lecturer.		
Course:		
Location:		
Contact info (optional) Email:	Name:	Phone:

Please answer the following questions.

1. Please describe the underlying pedagogical (teaching/learning) model used in this course.
2. In your opinion, is there a need for providing wireless mobile computing for your students/course? Why?
3. What would a useful learning activity that utilized a Wireless Mobile Device involve?

4. What system requirements (e.g: Palm PDA, PocketPC PDA, smartphone, laptop, tabletPC, Ultra Mobile PC, iPod, PSP, etc…) would be most suitable for these Wireless Mobile Devices?

Why?

5. What concepts do learners in your situation need help with: (tick appropriate column, and state areas not covered).

Concept	**Y/N**	**Comment**
• Critical reflection skills		
• Communication skills		
• Time management		
• Organizational skills		
• Group work skills		
• Social Software Tools o Blogs, o Wikis, o RSS Feeds o Social Bookmarking o Photo Blogging o Google Maps o Instant Messaging o Podcasting		
• OTHER		

6. Have you ever used a Wireless Mobile Device within a teaching/learning environment? (if yes, please state what these were, and whether they were effective or not).
7. What level of computer literacy do your students/lecturers currently have?
8. How would you benefit from having access to social software tools via a wireless mobile device?
9. What would you consider to be the most important design factors in creating useful learning activities utilizing Wireless Mobile Devices and Social Software?
10. What barriers exist to utilizing Wireless Mobile Devices in your course?
Thanks for your time and feedback.

Thom Cochrane

tcochrane@unitec.ac.nz

Unitec
Academic Advisor.
Centre for Teaching & Learning Innovation
Ph. 09 8154321 x7067 wk.

Appendix2: Project Plan Template.

P r o j e c t P l a n

The purpose of this document is to outline the scope of the agreement between the Centre for Teaching and Learning Innovation (CTLI) and the School of _____ for CTLI to provide _____.

Project Title	
Project Manager	
CTLI staff involved	
Other staff involved	
Timeframe	

Project scope, goals and objectives
The scope of the project, its outcomes – preferably in a measurable form, and its outputs/deliverables

Success Criteria
What will be seen as evidence of success (preferably measurable)?

Main Tasks

Possible Risks
Any internal / external decision or events which impact this project
Key staff / champion leaves.

Milestones

When are key go/no go decisions made? What are the points at which something of value is delivered?

Milestone	**Date**	**Responsibility of …**
1		
▪		
▪		
2		
▪		
▪		

Organisational Behaviour & Strategy & Change		
▪		
▪		
▪		

Key Review Points

When will the project's scope and tactics be reviewed?

Key review points	**Date**

Resources Plan

Project Team Structure

Team Member	**Role**

Project Resource Acquisition

Where are we getting our resources from? How – on what terms? When?

Resource Required	Where from	Any cost?

Any Other Information Relevant to This Proposal

Appendix3: JISC elearning activity planner.

Effective practice planner - designing a learning activity to incorporate e-learning

Issues to consider	Details of your planned learning activity
1. Learners (their needs, motives for learning, prior experience of learning, social and interpersonal skills, preferred learning styles and ICT competence.)	
2. Intended learning outcomes (acquisition of knowledge, academic and social skills, increased motivation and ability to progress.)	
3. Learning environment (face-to-face or virtual) – available resources, tools, facilities and services and their match with the learners' needs.	**Where does the activity take place?**
	What resources are available?
	What technologies are available?
	What features of established practice will be important?
4. The learning activity (the means by which the practitioner brings about learning and seeks to influence the development of the learners.)	**Describe the learning activity**
5. The approach taken (related to learners' needs, preferred learning styles, the nature of the learning environment and the intended outcomes.)	**Associative, constructive (individual focus), constructive (social focus), or situative**
	Learning styles
	Inclusion
	Assessment

Appendix4: JISC elearning practitioner planner.
Innovative practice with e-learning

A practitioner's planning tool for use of mobile and wireless technologies

This planning tool can be used to assist practitioners in planning to implement practice using mobile and wireless technologies. It covers four separate areas which appear as steps in the planning process:

- Your learners and their experience of learning with technology.
- The kind of learning and teaching you are involved in.
- The infrastructure you will be working with.
- The opportunities you have to develop and disseminate skills and expertise.

Points to note:
This tool could also be used to evaluate practice with mobile and wireless technologies to identify ways in which the quality of the learners' experience has been improved, or could be improved further. Points for further action could then be highlighted.
When planning the use of mobile and wireless technologies, remember that the focus should be on the learner and the quality of the learning experience, not on the technology.

All tools in this publication can be downloaded from the CD-ROM and amended to suit individual circumstances.

Step 1: Learners and their experience of learning		
Issues	**Commentary**	**Your next steps**
What are the characteristics of the learners you will be working with? Review: • Their programmes of study and qualifications sought. • Their mode of learning (face-to- face,	Finding an alignment between the learners, the learning environment and the intended outcomes is fundamental to successful learning experiences. Use the case studies and the 'Opening the box section' in the publication or CD-ROM to explore uses of mobile and wireless technologies that will match the needs of your learners and the outcomes you are aiming for. Identify groups of learners who would be most likely to benefit from mobile and wireless learning, then consider their characteristics. Making learners the starting point in your preparations will ensure that any use of mobile and wireless technologies will add value to the learning	

distance, virtual). • Their ICT skills and likely confidence in using technology. • Their skills in independent learning. • Their skills in collaborative learning (i.e. capacity to work with others).	experience.	
How will learners' skills be assessed and developed? *What steps can you take to ensure that learners using technologies will be appropriately trained and supported?* *How are learners with non-typical needs supported in their use of technology?*	Consider how, before the use of any device, you will: • Identify those learners who could be disadvantaged through inexperience with mobile and wireless technologies, or who may require additional support. • Liaise with IT and learning support teams to ensure an effective learning experience for all learners. • Develop the confidence of inexperienced learners by using peer support.	
Are there learners who would find mobile and wireless technologies particularly beneficial, or particularly difficult to use?	Consider: • Whether learners will have disabilities or learning difficulties and prepare to support them with additional resources, e.g. portable clip-on keyboards, magnifying tools to assist visually impaired learners using PDAs, or other assistive devices. • Which learners could gain from use of mobile and wireless technologies e.g. those with mobility problems.	
How will learners give feedback on the use of mobile and wireless technologies?	Learners' evaluations of the activity and of related management and support systems will be valuable. Consider how: • Learners will be able to assess the effectiveness of the learning	

	activity. • Contribute ideas for future activities.	
Step 2: Learning and teaching		
Issues	**Commentary**	**Your next steps**
Does your institution have an e-learning strategy, or a teaching and e-learning strategy which incorporates e-learning? *What aspects of the strategy have a bearing on the courses/modules/units that you deliver?*	Review: • The strategic e-learning and/or teaching and learning aims for your institution, department, faculty or team. • Evaluate how mobile and wireless learning could assist both institution-wide and local targets, e.g. in widening participation, improving attendance, and increasing motivation.	
Which elements within your courses, modules or units of learning would benefit from uses of mobile and wireless technologies? This will depend on: • The learners • The outcomes • Access to technologies and e-learning resources	Mobile devices can be used as a small element within a sequence of learning activities or as the dominant mode of learning. Look at the case studies within this publication for ideas on how mobile and wireless technologies can address specific challenges. Consider: • Which elements of the curriculum could be best supported via mobile and wireless technologies. • Whether learner surveys and course data could indicate other possible areas for use of mobile and wireless technologies.	
Who will you need to discuss your plans with? *What information will they need and when?* *What will you need them to do?*	Identify others within the institution who you may need to consult, inform or involve in any aspect of the planning and implementation. Consider the benefits of: • Presenting your ideas first to a curriculum planning group, head of faculty or department for evaluation. • Involving e-learning champions, learning technologists and staff development managers.	

	• Discussing implementation issues with the IT support team. • Checking systems for equipment management, i.e. policies and instructions for use, booking, maintenance and battery charging arrangements. • Making learning support teams aware of planned use of mobile devices in the case of individual learners.	
What are the aims of the activity you are planning? *What are the intended outcomes for learners?*	Consider how you will: • Identify the aims and intended outcomes of an activity. • Investigate how the use of mobile technologies can be coordinated with use of other e-learning technologies, such as email, discussion lists, blogs or a VLE to extend the range and quality of the activity. • Document the aims and outcomes carefully to support any benchmark data produced (e.g. on attendance) and to provide evidence of impact on learners. • Ensure that the planned activity will meet the needs of all learners, including those with disabilities.	
What specific technologies will your learners use in this activity? *How will these technologies add value to the learning outcomes?* *How will you evaluate the degree of success?*	Consider: • Looking through case studies to make sure that you are using the right mobile technologies for the purpose. • Checking that you have designed the activity so that it fits with assessment criteria. • Identifying appropriate ways of evaluating the activity and the use of technologies.	

What learning resources will you require? Consider: • Access to existing resources. • Production of purpose-built resources.	Case studies in this publication illustrate creation and adaptation of resources and software for mobile devices. Consider preparing by: • Identifying gaps in existing e-learning resources. • Identifying who in your institution could assist you in the development of further resources. • Using and adapting others' ideas where possible.	
Step 3: Technologies and infrastructure		
Issues	**Commentary**	**Your next steps**
Mobile devices *What types of activity do you want to use mobile devices for?* *What will be your requirements from the devices?* *Who may be able to help you make appropriate decisions?*	Consider: • Discussing plans with your IT team so that they can research the best option for your purpose, or assist you in making best use of available devices. For example, you will need to know whether connectivity will be vital to the outcomes of the activities you are planning, and whether you can make bulk purchase of SMS or MMS messaging with the institution's existing network provider to cut costs. • How to develop pedagogically sound uses of mobile technologies by working with learning technologists, e-learning champions, advanced practitioners and e-learning coordinators, as appropriate. • Using discussion lists to get in touch with a wider community of practitioners to help you find solutions to problems or discover new ideas.	
Wireless networks *How can you make most use of a wireless network if one is available?*	Use the case studies in this publication to explore ways in which a wireless network can assist learner-centred approaches. Recognise that: • Network managers may not know about your needs and experiences with the network unless you tell them.	

What further developments would make a difference to your learners?	*(please turn over)* • You will need to look ahead and identify your requirements for the next academic year to discuss with IT teams and curriculum advisory groups. • You will need to work together with other practitioners to ensure that a new technology is effectively embedded.	
What support systems would need to be set up in order to use mobile devices?	Consider who will have responsibility for the following: • Battery charging facilities. • Equipment monitoring, including reconfiguration of settings after use. • Security of equipment. • Extensions to acceptable use policies and health and safety information to cover misuse, damage, theft or injury. These may not be your immediate responsibility, but you will need to be aware of these requirements when planning for learners' use.	
Step 4: Planning for skills development		
Issues	**Commentary**	**Your next steps**
Learners *What training is needed for your learners?* *How can they access support and training if not on the main campuses?* *Can they support each other in the use of mobile devices?*	Skills for e- and m-learning will involve research skills, time management, independent study and communication skills as well as technical skills. Consider: • How learners, including those not able to attend face-to-face classes or travel to main campus sites, will be supported when acquiring these skills.	
What support is there for learners? *Is there guidance for learners in acceptable uses*	Consider: • How those working off campus will access IT support. • Whether a variety of different routes to information is desirable,	

of mobile and e-learning technologies?	e.g. telephone helpline, online guides, handbooks. • Learners will receive induction into their rights and responsibilities when downloading resources, borrowing equipment, or using their own mobile devices for learning activities.	
Practitioners *What opportunities are there for you to:* • Become technically proficient in resource creation for mobile devices? • Become effective at embedding m-learning and e-learning into your practice? • Disseminate your skills to others?	Many institutions have learning technologists, e-learning champions, advanced practitioners or mentoring schemes. You may be already holding such a post; if not, consider: • Discussing your ideas with staff in those roles to develop further skills. • Asking for, or setting up workshops to develop pedagogically sound uses of mobile and wireless technologies. • Using the intranet, an online newsletter or a blog to share achievements and new skills with others.	

Appendix5: Example elearning activity.

Assessment

Weighting: Proj 1 = 50% of total course grade
Due Date: Exact dates and times to be confimed.
Criteria: Refer to course assessment schedule - BProdDes Blackboard site:
Criteria Weighting:

Research & Analysis	25%	
Creativity & Innovation	25%	
Communication		25%
Management		25%

Please note: In team or collaborative projects, all team members will receive a common grade.
Each team member must complete and submit a Project/Team evaluation form (available on Blackboard DESN 7353).

Communication	25%	Allocation of marks:
	Blog Postings	10%
	Blog comments	5%
	Use of multimedia	5%
	Quality of reflection	5%

You are required to create an individual Blog for this project, and subscribe to each others blogs between 2May and 30 June 2006. You must post at least 10 different Blog postings (minimum = weekly) to your own Blog, and at least 5 comments on other student Blog postings. Messages should be relevant to the design project, be regular (not all in the last week!), build on others contributions, include analysis and critique, and also refer to reputable sources - web pages, magazines, journals, books... To facilitate discussion, you should try to make your postings assuming the team role that you have chosen within your virtual design company (e.g. project manager, production manager, design, testing …).
Your Blog RSS feeds will also be aggregated into your DESN 7353 Balckboard course.
A PDA friendly version of the DESN 7353 Blackboard course will also be provided using 'Moodle'.
You can also use Instant Messaging and email to communicate with each other, and with your tutors, and even network with industry experts.
Also - experiment with multimedia communication technologies, e.g.

- Record and host your own Podcast outlining your project/progress.
- Use Flickr to create an online visual slideshow of your product/project.

Useful Links:
http://www.blogger.com
http://www.flickr.com
http://www.podomatic.com
http://ltxserver.unitec.ac.nz/moodle/

Download the Palm Desktop software for synching your PDA to a desktop/laptop at:
http://www.palm.com

MONASH University

Appendix6: Explanatory Statement

April 2006

Explanatory Statement -

Title: Mobilizing Learning: The potential impact of wireless mobile computing on teaching and learning in higher education in New Zealand.

This information sheet is for you to keep.

My name is Thomas Cochrane and I am conducting a research project with Dr Bernard Holkner a Senior Lecturer in the Department of Education towards a PHD at Monash University. This means that I will be writing a theses which is the equivalent of a 300 page book.

You have been chosen to be participants in this research because of your department's willingness to explore the use of Wireless Mobile Devices (WMDs) within your course.

I am conducting this research to find out:
(1). What are the key factors in integrating WMDs within tertiary education courses in New Zealand?

(2). What challenges/advantages to established pedagogies do these disruptive technologies present?

(3). To what extent can these WMDs be utilized to support learner interactivity, collaboration, communication, reflection and interest, and thus provide pedagogically rich learning environments that engage and motivate the learner? I.e. to what extent can WMDs be used to harness the potential of current and emerging social constructivist elearning tools?

Possible benefits
WMDs provide ubiquitous access to elearning resources, increasing student productivity, and tools for enhancing student-to-student and student-to-staff communication.

What does the research involve?
The study involves trialing the use of a wireless mobile device as part of your course over the next semester, reflecting on its use on a blog, a pre-trial survey, a post-trial survey, and a focus group discussion.

How much time will the research take?
It is anticipated that you will be interacting with the wireless mobile device daily as part of your course over the semester. The initial survey should take about 30 minutes to complete, the post-trial survey will take about 45 minutes to complete, and the focus group will take the form of structured questions and discussion for about an hour and a half.

Can I withdraw from the research?
Being in this study is completely voluntary - you are under no obligation to consent to participation. If you do decide to participate you may withdraw at any stage or avoid answering questions which you feel are too personal or intrusive.

Confidentiality
Survey forms will be kept anonymous, and focus group data will not include any reference to participant names.

Storage of data
Storage of the data collected will adhere to the University regulations and kept on University premises in a locked cupboard/filing cabinet for 5 years. A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report.

Use of data for other purposes
Your anonymous data may be used in research papers relevant to the study.

Results
If you would like to be informed of the aggregate research finding, please contact Thom Cochrane on 09 8154321 extension 7067 or email tcochrane@unitec.ac.nz. The findings are accessible for one year.

If you would like to contact the **researchers** about any aspect of this study, please contact the Chief Investigator:	If you have a **complaint** concerning the manner in which this research **<insert your project number here, i.e. 2006/011>** is being conducted, please contact:
Dr Bernard Holkner Senior Lecturer, Faculty of Education Monash University, Australia 61 3 9905 2767 bernard.holkner@education.monash.edu.au	Human Ethics Officer Standing Committee on Ethics in Research Involving Humans (SCERH) Building 3d Research Office Monash University VIC 3800 Tel: +61 3 9905 2052 Fax: +61 3 9905 1420 Email: scerh@adm.monash.edu.au

Thank you.

Thomas Cochrane

Appendix7: Participant consent form.

Consent Form

Title: Mobilizing Learning: The potential impact of wireless mobile computing on teaching and learning in higher education in New Zealand.

NOTE: *This consent form will remain with the Monash University researcher for their records*

I agree to take part in the Monash University research project specified above. I have had the project explained to me, and I have read the Explanatory Statement, which I keep for my records. I understand that agreeing to take part means that I am willing to:

I agree to take part in a focus group discussion	☐ Yes ☐ No
I agree to allow the discussion to be audio-taped and/or video-taped	☐ Yes ☐ No
I agree to make regular reflections on a blog	☐ Yes ☐ No
I agree to complete questionnaires asking me about the WMD trial	☐ Yes ☐ No

and

I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalised or disadvantaged in any way.

and

I understand that any data that the researcher extracts from the interview / focus group / questionnaire / survey for use in reports or published findings will not, under any circumstances, contain names or identifying characteristics.

and

I understand that any information I provide is confidential, and that no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party.

and

I understand that data from the survey and focus group will be kept in a secure storage and accessible to the research team. I also understand that the data will be destroyed after a 5 year period unless I consent to it being used in future research.

Participant's name _____

Signature

_____

Date

_____

Appendix8: Institutional permission letter.

May 2006

Permission Letter for "Mobilizing Learning: The potential impact of wireless mobile computing on teaching and learning in higher education in New Zealand."

Thomas Cochrane
Faculty of Education
MONASH UNIVERSITY VIC 3800

Dear Mr Cochrane,

Thank you for your request to recruit participants from Unitec for the above-named research.

I have read and understood the Explanatory Statement regarding the research "Mobilizing Learning: The potential impact of wireless mobile computing on teaching and learning in higher education in New Zealand" and hereby give permission for this research to be conducted.

Yours Sincerely,

Dr John Webster
President Unitec

Appendix9: Acceptable use policy for students.

THE USE OF COMPUTERS, WIRELESS PDAS, THE INTERNET AND ELECTRONIC MAIL WHILE TAKING PART IN WIRELESS MOBILE DEVICE TRIALS[1]

PERMISSION FORM

UNITEC is pleased to offer students access to a computer network for electronic mail and the Internet, and a wireless PDA (Palm Lifedrive or TX). To gain access to e-mail and the Internet, all students must verify their agreement with the following Acceptable Use Policy by placing their signatures on the form below.

What is possible?

Access to e-mail and the Internet will enable students to explore thousands of libraries, databases, museums, and other repositories of information and to exchange personal communication with other Internet users on campus and around the world. You should be aware that some material accessible via the Internet may contain items that are illegal, defamatory, inaccurate, or potentially offensive.

What is expected?

Students are responsible for appropriate behaviour on UNITEC's computer network. General socially acceptable rules for behaviour and communications apply. It is expected that users will comply with standards and the specific rules set forth below. The use of the network and the PDA is a privilege, not a right, and may be revoked if abused. The user is personally responsible for his/her actions in accessing and utilising UNITEC's computer resources. The students are advised never to access, keep, or send anything that they would not want their tutors to see.

What are the rules?

Privacy -- Network storage areas may be treated like personal property. Network administrators may review communications to maintain system integrity to insure that students are using the system responsibly.

Storage capacity -- Users are expected to remain within allocated disk space and delete e-mail or other material which take up excessive storage space.

Illegal copying -- Students should never download or install any commercial software, share ware, or freeware onto network drives or disks, unless they have written permission from the Network Administrator. Nor should students copy other people's work or intrude into other people's files.

---

[1] Modified from an example given by Houston Independent School District. *A Sample AUP Form* [Internet]. 21 November 1997. Available from http://www.rice.edu/armadillo/aupenglish.html.

Inappropriate materials or language -- No profane, abusive or impolite language should be used to communicate nor should materials be accessed which are not in line with the rules of UNITEC behaviour. A good rule to follow is never view, send, or access materials which you would not want your tutors to see. Should students encounter such material by accident, they should report it their tutor immediately.

Succinct Advice (while at UNITEC)

These are guidelines to follow to prevent the loss of network privileges at UNITEC.

1. Do not use a computer/PDA to harm other people or their work.

2. Do not damage the computer/PDA or the network in any way.

3. Do not interfere with the operation of the network by installing illegal software, share ware, or freeware.

4. Do not violate copyright laws.

5. Do not view, send, or display offensive messages or pictures.

6. Do not share your password with another person.

7. Do not waste limited resources such as disk space or printing capacity.

8. Do not trespass in another's folders, work, or files.

9. Do notify a tutor immediately, if by accident, you encounter materials which violate these standards of appropriate use.

10. BE PREPARED to be held accountable for your actions and for the loss of privileges if the Rules of Appropriate Use are violated.

11. Do not play games or use the computer resources for other non-academic activities when others require the system for academic purposes.

USER AGREEMENT - 2006

As a student at UNITEC, I have read the above
information about the appropriate use of computers at the school and I understand this agreement will be kept on file at UNITEC. (Questions should be directed to the campus manager for clarification.)

The use of the PDA is for the duration of the project only, and the PDA must be returned in the same condition it was received at the end of the project (30June 2006). Students will be responsible for replacing any damaged, stolen or lost PDAs or accessories.

I agree to use e-mail the Internet, and the supplied PDA and accessories while at UNITEC according to the rules outlined above.____

As a user of the UNITEC computer network, I agree to comply with the above stated rules and to use the network in a constructive manner.

Student Name (print)_____

Student Signature_____

Tutor_____

DATE:_____

PDA model and accessories received (circle appropriate):

- None
- Palm Lifedrive
- Palm TX
- Serial Number:_____
- MAC Address:_____
- Palm Keyboard Serial Number:_____
- Charger Serial Number:_____
- USB Synch Cable

Appendix10: Initial (prior to trial) survey of students & teaching staff prior experience and project expectations.

Wireless Mobile Study – pre trial questionnaire (BDesign Students):

QUESTION: (This is an anonymous questionnaire)	**Your Answer: tick or circle most applicable answer/s, or write your answer in the space provided below.**					
1. What is your Student ID number?						
2. What is your age?						
3. What is your gender?	Male	Female				
4. What has been your experience of group work in your course so far?	Very Good	Good	Not Bad	Neither Good nor Bad	Not Good	Terrible
5. Do you have access to a Desktop computer at home?	Yes	No				
6. Do you have access to a laptop computer for bringing to Unitec for your studies?	Yes	No	If Yes – does your laptop have wireless (WiFi) capability?	Yes	No	
7. Have you ever owned a PDA? (Palm or PocketPC device)	Yes	No				
8. What other mobile devices do you own?	• Cellphone • iPod • Sony PSP • Other? (specify)					
9. Do you currently subscribe to any Blogs or News Sites?	Yes	No	If Yes – please give your favourite URL:			
10. Do you already have your own Blog?	Yes	No				
11. Have you used any of the following before?:	Blogger.com	Flickr.com	Del.ico.us	Shadows.com	Podcasting	Instant Messaging
12. What applications do you think will be suitable for use on a PDA? (Tick or circle all applications you think are appropriate).	a. Email b. Instant Messaging c. Video d. Audio e. Web Browsing f. Document editing					

	g. Document Reading h. Calendar i. Contacts/Addressbook j. Notes k. Accessing online course material l. Games m. File sharing

Appendix11: Survey form for students and staff to complete at end of each term.

Wireless Mobile Study – end of trial questionnaire (BDesign Students):

QUESTION: (This is an anonymous questionnaire)	**Your Answer: tick or circle most applicable answer/s, or write your answer in the space provided below.**					
1. What is your Student ID number?						
2. What is your age?						
3. What is your gender?	Male	Female				
4. What has been your experience of group work facilitated by Blogs and RSS?	Very Good	Good	Not Bad	Neither Good nor Bad	Not Good	Terrible
6. It was easy to use the wireless PDA?	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree	
7. This mobile learning experience was fun.	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree	
8. Based on my experience during this trial, I would use a wireless PDA in other courses	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree	
9. I would be willing to purchase my own wireless PDA	Yes	No				
10. Where did you use the PDA? Circle all that apply.	a. At home b. At Unitec in class c. At Unitec not in class d. While Travelling e. Other (specify)					
11. Mobile learning increases the quality of learning?	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree	
12. Course learning objectives can be met by mobile learning?	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree	
13. Accessing course content was easy?	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree	
14. Mobile learning increases access to education?	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree	

15. Communication and feedback from the course tutor/lecturer was made easier?	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
16. Mobile learning is convenient for communication with other students?	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
17. Rate the usefulness of the following applications using mobile devices? (0 = no use, 10 = extremely useful).	n. Email o. Instant Messaging p. Video q. Audio r. Web Browsing s. Document editing t. Document Reading u. Calendar v. Contacts/Addressbook w. Notes x. Accessing online course material y. Blogging z. File sharing aa. RSS subscriptions				
18. What factors would be most important in deciding upon mobile learning?	• Cost of device • Size of the screen • Size & weight of the mobile device • Phone integration • Wireless capability • PocketPC or Palm OS • Availability of applications • Other				
19. Do you have any other comments on the mobile project?					

Appendix12: Focus groups questions and structure.

Focus Group Protocol and questions for Wireless Mobile Device Trials:

Duration and how often
Once per semester (every 6 months), for 60-90 minutes each session.

Participants
Two separate focus groups will be convened at the end of each semester of the project. (1). Representative students involved in the trial, (2). Representative teaching staff involved in the trial. All participants will have trialed a Wireless Mobile Device in a social software based learning activity during the semester, and provided written feedback via their blog, and an evaluation survey before the focus group meeting. Some will also have undergone observation by the researcher while using the WMD for various exercises during the trial.

Questions for discussion
The main purpose of the focus group is to provide critical reflective feedback on the design and implementation of the learning activities and enhanced communication facilitated by the WMD. This feedback will provide valuable insights into the design of the following trial, and forms a critical reflective action research cycle of evaluation.

1. How would you rate the effectiveness of the WMD for accessing your/your students' blogs?
2. How user friendly was the interface of the WMD?
3. How would you rate the effectiveness of the WMD for increasing communication:
    a. Between students
    b. Between Students and Tutors/lecturers?
4. How useful were the WMDs for accessing course content?
5. Describe how the integration into the course of the WMDs may be improved.
6. (For Tutors) How would you rate the usefulness of the WMDs for your own teaching?
7. What level of interactivity did the WMDs provide?
8. What were the benefits of wireless connectivity?
9. What were the support requirements for the WMDs?
10. What other uses did you find for the WMD?
11. In what situations would the WMDs be most effective?
12. What do you think worked well, and what would you do differently another time?

Location
UNITEC
The trials will involve various courses from Unitec.

Carrington Rd
Mt Albert
Auckland
09 8154321

Data Collection
Notes will be taken by the researcher during the meeting, and the meeting will also be audio taped.

Expected outcomes
Utilizing feedback from the two main stakeholder groups will provide a good indication on the impact of the WMDs on learning. Involving representative staff from UNITEC in the evaluation process will provide an element of peer review into the research and also provide feedback on the pedagogical usefulness of the WMDs. The feedback gained from the focus groups will enhance that gained through written evaluations and observations, and also provide opportunity for further clarification of any issues.

Following collation of the data from the focus group, participants will be given newly developed learning activities utilizing WMDs and social software tools to evaluate during the following semester. These will then be compared to earlier trials.

Researcher Details
Thomas Cochrane
Centre for Teaching & Learning Innovation, UNITEC
09 8154321 x 7067
tcochrane@unitec.ac.nz

Appendix13: Letter to Vodafone 6July 2006.

Proposed 3G Data Plan for Tertiary Students and Lecturers

Elearning tools have been established as valuable enhancements to both distance and face-to-face tertiary education, particularly in facilitating collaborative, reflective, student-centred learning environments.

"A review of current practice suggests that mobile and wireless learning is the natural next step wherever institutions and practitioners have already adopted e-learning" (JISC, 2005b).

Wireless Mobile Devices coupled with open-source Social Software tools (sometimes termed 'Web2') potentially provide the basis for enhancing teaching and learning in virtually any discipline. The next generation of cellphones are aimed at facilitating the use of popular Web2 tools – particularly Blogs and RSS feeds, e.g. "28 February 2006 (http://www.sonyericsson.com/spg.jsp?cc=global&lc=en&ver=4001&template=pc3_1_1&zone=pc&lm=pc3_1&prid=4832), London, UK– Sony Ericsson and Google today announced that they have worked closely together to integrate Google's Blogger and Web Search features on Sony Ericsson mobile phones. The two companies are the first in the industry to provide a pre-loaded blog application with a tight integration to the mobile camera and intuitive automatic set-up for consumers who do not already have a personal blog."

"New mobile and context-aware technology can enable young people to learn by exploring their world, in continual communication with and through technology" (Sharples, 2005).

A recent wireless mobile device trial at Unitec indicated that the key aspect of wireless mobile device utilization is their connectivity. Students value anytime anyplace connectivity with classmates, Lecturers, and resources. However, a surprising number of students have limited or no Internet connectivity at home (most still have dial-up internet access, and very few have broadband coupled with a home WiFi network). Additionally, WiFi access points on campus are rare, covering only a small percentage of the Unitec campus at present. Indeed many Tertiary education institutions have limited or no WiFi networks, and where they do - firewall restrictions limit access to many of the connectivity and communication applications that students/lecturers wish to use.

3G data connectivity provides a potential solution for students and lecturers.

Connectivity options include:

1. 3G data card with laptop
2. Bluetooth PDA paired with 3G cellphone
3. 3G capable smartphone/cellphone
4. UMPC with either 3G data card or paired to Bluetooth 3G cellphone
5. 3G data shared with WiFi devices via 3G to WiFi router (not as 'mobile' though)

However, for students and lecturers, the cost of 3G data is the critical factor.

It is the high cost and small data caps of 3G data that have made it an unviable solution in education. The recent Vodafone broadband promotion (1GB data for $49/month) has finally made 3G data connectivity viable, at near traditional broadband costs. Making this plan (or even lower priced) available for Tertiary students and lecturers beyond the promotion cutoff date would enable us to trial 3G data connectivity options with small groups of students and lecturers for 2006, with the view to larger numbers of students/lecturers utilizing it in the future. Keeping the data costs (for a decent amount of data) to below this $50/month level allows students to afford both a wireless mobile device (for around $500) and a years worth of data (around $500) for approximately $1000/year total – which is their yearly loan allowance for 'course-related costs'.

As an Academic advisor in elearning & learning technologies here at Unitec, I have experimented with a 3G data plan over the last 3 months and found it to be a potential solution for student & lecturer connectivity on and off campus where there is no WiFi access.

We plan to run several wireless mobile device trials over the next year at Unitec, with the aim of 'mobilizing' 50% of computing on campus in the next two years.

There is potentially a huge market for Vodafone for 3G data services to tertiary education in New Zealand, but only at the right cost/benefit ratio for the end users (students and lecturers). Satisfied students would then be potential data customers beyond the end of their studies.

For a theoretical framework underpinning these wireless mobile device trials, I am also studying towards a PHD in Educational Technology with a thesis topic: Mobilizing Learning: The potential impact of wireless mobile computing on teaching and learning in higher education in New Zealand.

I look forward to continued dialogue with Vodafone on possible 3G data connectivity options for tertiary students and lecturers.

Thom Cochrane
BE, BD, GDHE, MTS, MComp
Academic Advisor (eLearning & Learning Technologies)
Centre for Teaching & Learning Innovation, Unitec
B119
(00649) 815-4321 xtn 7067

http://ltxserver.unitec.ac.nz/~thom/

http://ltxserver.unitec.ac.nz/mediawiki/index.php/Main_Page

Appendix14: Reflective Journal:

Having never been a 'dear diary' type person, rather, goal and event driven, my reflective journal takes shape around key reflective events (experiences/moments/events):

Date:	17May
REFLECTIVE EVENT	
Description	
Pedagogical Implications/Outcomes	
Change	
Reinforcement	
Development (growth)	
Relevance/LINKS	
To the Research Project	
To my Teaching Practice	
REFERENCES	

Appendix15: Example Trial Scenario

Project Outline

LPSC5996 NEGOTIATED STUDY (18 credits)

Aim:
To allow students to develop an area of specific interest outside the scope of other courses within the programme. The area of specialisation will involve a negotiated research project **or** field study **or** design project.

Exhibition Garden design option

Learning Outcomes:

- To design a exhibition garden for Ellerslie Flower Show
- To develop a timeline for the project
- To prepare a budget for the exhibition garden
- To prepare a strategy for marketing the design team to the public
- To procure sponsorship for a range materials
- To prepare construction drawings
- To complete the exhibition garden (construction not assessed)

These learning outcomes will be assessed by way of a **portfolio of evidence** to include:

- Conceptual drawings
- Design statement
- Design concept plan, elevations and/or cross sections and model
- Project timeline
- Project budget – model available
- Marketing plan
- Construction drawings
- Sponsorship proposal and records
- Photos of the completed garden
- Individual analysis of the completed garden and drawings in design terms, from student's perspective including level of success, strengths, weaknesses.

The **portfolio** will include the use of the following tools:

- A reflective Blog (www.blogger.com)
- Commenting on each others Blogs
- An online Photo album (www.SplashBlog.com)
- Discussion Forums and file/document sharing via Moodle (http://203.110.5.250/moodle/)
- Wireless PDAs to access the above!

You are expected to make at least weekly updates to your Blog & splashblog, and regularly comment (critique/reflect/discuss…) on each others blog postings. You must also regularly check the Diploma landscape Design Project section on Moodle for project news etc…

Criteria for acceptance into this course option includes:

1. Proven capacity for independence
2. Strength in design
3. Evidence of group process planning for project

Each student will need to meet with the Programme staff to present a proposal to demonstrate personal and project suitability for the course.