



Mobile Web 2.0: The new frontier

Thomas Cochrane

Centre for Teaching and Learning Innovation

Unitec, New Zealand

Today's smartphones are mini multimedia computers, they are generally equipped with: 3G and WiFi internet connectivity, a 2 to 5 megapixel camera, Bluetooth for device interconnectivity, USB2 for computer connectivity and media synchronisation. They have digital media storage capacities of 1 to 16 GB, will play back most standard audio, image, and video formats, are GPS enabled, are integrated into online media and social networking sites (Flickr, YouTube, blogs, MySpace, Facebook etc...), and are capable of recording (and some can even edit and display on large screen video devices) video between QVGA and VGA quality. These smartphones are promoted by their manufacturers as lifestyle tools to enable sharing experiences and social networking via web2.0 sites, and mobile friendly media portals (e.g. Ovi, iTunes Store). The ubiquitous connection to web2.0 tools and collaborative communication and user generated content creation capabilities of these devices make them ideal tools for facilitating social constructivist learning environments across multiple learning contexts. However, designing good pedagogical environments to integrate the successful use of these tools is essential. This paper reports on the progress of several qualitative action research trials being conducted to investigate the impact of smartphones and mobile web2.0 on teaching and learning in higher education. These trials illustrate a variety of pedagogical designs and the creation and support of mobile learning environments.

Keywords: mobile web2.0 social constructivism.

Introduction

The main focus of this research is on the support and enhancement of face to face teaching and learning by using wireless mobile devices (WMDs or smartphones) 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...). These are often called "social software" or web2.0 tools. The research project links the use of freely available mobile friendly web2.0 tools accessed via a smartphone with the learning objectives of a variety of different tertiary education courses. The smartphone's wireless connectivity and data gathering abilities (e.g. photoblogging, video recording, voice recording, and text input) allow for bridging the on and off campus learning contexts – facilitating "real world learning". The research is focusing on social constructivist approaches to education (Bijker *et al.*, 1987; Lave & Wenger, 1991; Vygotsky, 1978; Wenger *et al.*, 2002) and a conversational model (Laurillard, 2001, 2007) of teaching and learning. The disruptive nature of web2.0 and mobile technologies (Sharples, 2000, 2001, 2005; Stead, 2006) facilitates a move from instructivist pedagogies to social constructivist pedagogies. The personal, social networking, and context awareness of mobile devices democratise power relationships and are best suited to open learning environments. Disruptive technologies are those technologies that challenge established systems and thinking, requiring change and are thus viewed by many as a threat to the status quo. Disruptive technologies democratise institutional learning environments challenging the established power relations between teachers and students. Mishra *et al* (2007) argue that "appropriate use of technology in teaching requires the thoughtful integration of content, pedagogy, and technology".

Defining mobile learning: Context bridging

Definitions of mobile learning (mlearning) initially focused upon the mobility of the devices, and more recently the mobility of the learners. Sharples proposes a form of Laurillard's conversational framework, excluding the teacher, to define mobile learning by its contextual and informal learning characteristics. "The processes of coming to know through conversations across multiple contexts amongst people and personal interactive technologies" (Sharples *et al.*, 2006). However, a key element in the conversational framework is the dialogue between teacher and student. In contrast to Sharples *et al* (2006), Laurillard

(2007) emphasises the teacher's input in mobile environments through good pedagogic design that facilitates continuity between the face to face and remote peer learning contexts. Her definition of mobile learning incorporates the critical pedagogical design input of the teacher: "M-learning, being the digital support of adaptive, investigative, communicative, collaborative, and productive learning activities in remote locations, proposes a wide variety of environments in which the teacher can operate" (Laurillard, 2007).

It is the potential for mobile learning to bridge pedagogically designed learning contexts, facilitate learner generated contexts, and content (both personal and collaborative), while providing personalisation and ubiquitous social connectedness, that sets it apart from more traditional learning environments. Mobile learning, as defined in this paper, involves the use of wireless enabled mobile digital devices (Wireless Mobile Devices or WMD's) within and between pedagogically designed learning environments or contexts. From an activity theory perspective, WMD's are the tools that mediate a wide range of learning activities and facilitate collaborative learning environments (Uden, 2007).

The learning outcomes for students include:

- developing critical reflective skills
- facilitating group communication
- developing an online eportfolio
- developing a potentially world-wide peer support and critique network
- learning how to maximise technology to enhance the learning environment across multiple contexts

Research trials and methodology

Foundations and concept development

The current (2007 and 2008) mobile web2.0 research trials have their foundations built on investigations into mobile learning beginning in 2003. Palm Tungsten C and Windows Mobile 2003 WiFi devices were experimented with by the author in 2003 as a potential solution for bridging the educational technology divide between a first year Certificate course that utilised traditional fixed computer labs and a second year Diploma programme that had established (since 1999) ubiquitous wireless laptop ownership and use for all students in the course (Cochrane, 2003; Webster, 2004). In 2005 a mobile learning trial was proposed and begun with the School of Sport at Unitec, using Palm WiFi PDAs (Cochrane, 2005). However the trial never went beyond getting the teaching staff to experiment with the PDAs. This first attempt at mobile learning implementation began the process of establishing an appropriate staff development model and a 'keeping it simple' approach to the pedagogical design and integration of the mobile technologies. This was also a time of significant growth of web2.0. In 2006 two mobile learning trials were implemented using Palm WiFi PDAs and social software (Cochrane, 2006). At the same time the researcher was developing a community of practice model for educational technology literacy in tertiary academics (Cochrane & Kligyte, 2007). These strands merged to form the foundational concepts underpinning the current research into mobile learning (Cochrane, 2007b, 2007c, 2007e). The 2006 trials were also used to develop and test the research questions and data collection instruments.

An action research methodology is used to build upon lessons learnt in each successive trial, and to allow flexibility and critical reflection leading to appropriate trial redesign within each trial. The researcher is interested in bringing about positive change within the teaching and learning environment. Teaching staff were invited to be potential participants for the research trials by the researcher, and were all previously participants in communities of practice facilitated by the researcher focusing on the potential of educational technologies to enhance teaching and learning. Each trial was created as the result of collaborative discussions between the researcher and each set of tutors, choosing appropriate mobile devices and project goals to enhance each respective course. Tutors then called for volunteer student participants from each of their courses, outlining the scope and participation requirements. All participants were provided with the chosen mobile device, wifi access on campus, and a variety of 3G data accounts for use during the period of each trial. Students and staff were surveyed pre-trial to gauge their previous experience of the mobile web2.0 tools. They were also provided with outlines of the research, an acceptable use policy and ethics consent forms. An intentional community of practice was then established for each trial, consisting of the researcher (technology steward), the course tutors, and the student participants. Each community of practice aimed to meet regularly and formed the basis for scaffolding the use of the technology and the integration into each courses curriculum. Survey instruments and focus group discussions gathered feedback from all participants mid and post trial. The first trial (Diploma Landscape Design 2007) provided a basis for informing the second trials in 2008. The

three 2008 trials are being conducted in parallel with one another, and issues raised by one trial are then identified and used to modify the other two trials, providing an inter-connected action research environment.

Research questions

1. What are the key factors in integrating Wireless Mobile Devices (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 utilised to support learner interactivity, collaboration, communication, reflection and interest, and thus provide pedagogically rich learning environments that engage and motivate the learner?
4. To what extent can WMDs be used to harness the potential of current and emerging social constructivist e-learning tools?

Data gathering consists of:

1. pre-trial surveys of lecturers and students, to establish current practice and expertise
2. post-trial surveys and focus groups, to measure the impact of the wireless mobile computing environment, and the implementation of the guidelines
3. lecturer and student reflections via their own blogs during the trial.

The survey tool and focus group questions can be viewed in the appendix hosted online on Google Docs at http://docs.google.com/Doc?id=dchr4rgg_5478zdzbgw&hl=en_GB (Cochrane & Bateman, 2008c). Additionally each trial has used the mid semester and end of semester breaks to provide opportunities for reflection on the progress of each trial, gather formative feedback from participating students and staff, and brainstorming with the tutors on how to better integrate the technologies into each courses curriculum. Students and tutors have been encouraged to create summary VODcasts (video blogs) providing critical reflection on the trial at these points. These VODcasts, along with the wide variety of media students are uploading to their blogs, have provided rich media for later analysis and reflection.

Pedagogical design

The following sections outline the four mobile learning trials. The tutors involved in the trials have previously been involved in the development of academic peer support groups guided by a teaching and learning professional, i.e. an intentional Community of Practice (Cochrane, 2007d; Cochrane & Kligyte, 2007), investigating the use of Web 2 social software tools and then mobile learning in education. This Community of Practice also provides a model for academics to use in their own student classes as they later integrate social software and mobile technologies into their courses. The project is guided and supported by weekly “technology sessions” facilitated by a ‘technology steward’ (Wenger et al., 2005) who is the researcher and an Academic Advisor in elearning and learning technologies in the Centre for Teaching and Learning Innovation (CTLI) at Unitec. The projects are collaborative projects between the ‘technology steward’, the course tutors, and the students on the course. Although each trial has a specific project focus, the trials are exploring how a mix of mobile web2.0 tools can enhance the student’s learning throughout their whole course and facilitate a social constructivist pedagogy. Each trial uses a Learning Management System (LMS) to provide scaffolding and support for both tutors and students. Each project also uses a different ‘smartphone’ device, appropriate to the requirements of the course, and each project has a specific timeline that has been negotiated between the course tutors and the researcher. The timeframe of the trials was designed to firstly familiarise the tutors with the tools and technology before introducing it to their students. Semester one goals are mainly to get tutors and students experimenting and confident with the tools, embedding them into their course workflows, followed by more explicitly targeted pedagogically designed learning experiences in semester two.

The core activity of each trial is the creation and maintenance of a reflective Blog as part of a course group project. Additionally a variety of mobile friendly web2.0 tools are used in conjunction with the smartphone. The trials investigate how the smartphone can be used to enhance almost any aspect of the course, but focus particularly on their collaboration and communication capabilities. The project uses the smartphone within a wide range of activities aligned with the projects underlying social constructivist pedagogy. Each of the trials explicitly uses a social constructivist pedagogy by focusing upon students creating teams to create some form of team project, usually involving real clients external to the classroom, fostering peer critique and review via commenting on each other’s blog posts and Vox’s ‘neighbourhood’ social network facility, and by using instant messaging to create a context independent learning community. The focus is on student-generated content, not on content delivery from tutors to

students. Course tutors are encouraged to create a learning environment where regular formative feedback is posted as tutor comments on students' blogs, and to use instant messaging to be able to respond to students' questions whenever they are available online (as well as in the classroom). There is an interactive online concept map illustrating this alignment available at <http://ltxserver.unitec.ac.nz/~thom/mobileweb2concept2.htm>. A ten minute video overview of the project process, including staff and student feedback (focusing on the Bachelor of Product Design trial) can be viewed on *YouTube* at <http://www.youtube.com/watch?v=8Eh5ktXMji8> (Cochrane, 2008b).

The following sections briefly outline each of the four mobile web2.0 trials, and the core project outline briefs for each, illustrating the pedagogical designs used across different learning environments and contexts.

Diploma of Landscape Design (2007)

The trial began in February 2007, with Diploma Landscape Design students implementing the use of Blogs, online image sharing, basic eportfolios and RSS aggregation to create a collaborative team-based project design for the Ellerslie International Flower Show (November 2007). With research funding made available in July 2007, students were provided with Nokia N80 smartphones to post to their Blogs and upload photos and videos to their online eportfolios via 3G or WiFi networks. Students were provided with a prepay SIM card for voice calls and text messaging, for which they were responsible for 'topping up'. The main limitation of this approach was the high cost of casual 3G data, limiting most direct web access to WiFi hotspots on and off campus. The students could however use the smartphone's camera to record still images and video at any location for later uploading. The purpose was to provide students with a flexible collaborative and context-sensitive elearning environment with which to document their Flower Show projects. This proved very useful, as much of the project involved sourcing materials, ideas and plants from a wide variety of locations that are off campus, and beyond the formal learning environment. It is this flexibility and context-awareness in which mobile wireless devices can enhance learning. A brief overview of this trial is available on Google Docs, and a full journal paper on the trial is in pre-press (Cochrane, 2007a, 2008c).

Bachelor of Design (2008)

Starting in February 2008, the focus of this trial is the development of group product design teams formed between the students and external client product manufacturers. Students must develop a commercially viable product for their assigned client. Student blogs and eportfolios are used to record and reflect on their design processes, and are made available to the client for comment and interaction. Students and staff were initially supplied with a Nokia N80 WiFi/3G smartphone and folding Bluetooth keyboard, which was later upgraded to a Nokia N95 smartphone. Students use the smartphone for recording and uploading evidence of their design process and prototypes to their VOX blog and other online media sites such as YouTube for video. Students are marked on this evidence of the design process and reflection, as well as their critique and reflection on other students' blogs via commenting. The smartphones are also used as a communication tool between students and with teaching staff for immediate feedback via instant messaging, email and RSS subscriptions. Students are responsible for paying for a voice call and text message account but are reimbursed the cost of a 1GB/month 3G data account.

Diploma of Contemporary Music (2008)

Starting in February 2008, this trial is centred on the music technology paper that is part of the Diploma of Contemporary Music. Students experiment with and evaluate current music creation and delivery technologies, including podcasting and sharing via blogs, eportfolios, and social networking. A short overview of the trial was published in a local newspaper (Talagi, 2008), and a report on the first semester of the trial is available on Google Docs (Cochrane, 2008a). For semester one of the trial tutors and students have been provided with an iPod Touch (16GB) each, was replaced by a 3G iPhone in semester two when they became officially released in New Zealand. While the iPod Touch is not a smartphone, it has WiFi and is essentially an iPhone without the phone or camera capability, thus it provides a limited connectivity version of the iPhone until they became available. The iPod/iPhone includes a virtual keyboard for text entry as part of its touch-screen interface. The Trial is initially examining how the iPod Touch can be used as a communication and collaboration tool between students and staff (using email and instant messaging) and as a tool for accessing, editing and commenting on their online blogs and media eportfolios. The iPod/iPhone works particularly well with iTunes, PODCasts, VODCasts, and YouTube – all of which are new and strategic delivery mechanisms for the music industry. This trial is the newest course to experiment with mobile web2.0 tools, leading to a longer time frame for curriculum integration

Table 1: Comparative outline of the four mobile web2.0 trials.

Course: Diploma Landscape Design 2007, elective project	
Participants	<ul style="list-style-type: none"> • 8 students (three teams) –average age 28 (19 to 49), and the gender mix was 5 female students and 3 male students. • 1 Course Tutor • Technology Steward (Thom Cochrane – CTLI)
Mobile technology	Nokia N80 WiFi and 3G smartphone, prepay voice and data SIM
Pedagogical Focus	To design and build a group exhibition garden for the Ellerslie International Flower Show
Community of practice	Focused on beginning and middle of the project, with 4 sessions at the beginning of the trial and 4 sessions mid trial with the introduction of the N80.
Support LMS	Moodle
Deliverables	A reflective blog of the design and build process. (Initially Wordpress, then moved to Vox in July 2007) A portfolio (either electronic using VOX or print-based).
Timeframe	March 2007 to November 2007, with N80 mobile introduced in July 2007.
Course: Bachelor of Product Design, third year class	
Participants	<ul style="list-style-type: none"> • 8 students –average age 24 (19 to 33), and all are male students. • 2 Course Tutors • Technology Steward (Thom Cochrane – CTLI)
Mobile technology	Nokia N80 WiFi smartphone (upgraded to N95 in Semester2), Bluetooth folding keyboard, 1GB/month 3G data
Pedagogical focus	Documenting the research and design of three products throughout the year, including working with a client company in small design teams
Community of practice	Weekly throughout the entire course
Support LMS	Moodle
Deliverables	An online Blog/eportfolio documenting and showcasing your design processes and forming the basis of a collaborative hub with worldwide peers and potential employers/clients.
Timeframe	February 2008 to November 2008, expanding to entire three year course 2009.
Course: Diploma of Contemporary Music, elective class	
Participants	<ul style="list-style-type: none"> • 11 students –average age 22 (17 to 32), and the gender mix is 6 female students and 5 male students. • 2 Course Tutors • Technology Steward (Thom Cochrane – CTLI)
Mobile technology	iPod Touch WiFi PDA, upgraded to iPhone 200MB/month 3G data in Sem 2
Pedagogical focus	A group investigation of the potential of the iPod and iPhone to enhance the Contemporary Music programme
Community of practice	Weekly throughout the entire course
Support LMS	Blackboard
Deliverables	A regular Blog entry documenting participants experiences A regular PODCast show episode
Timeframe	February 2008 through to November 2008, continuing in 2009.
Course: Diploma Landscape Design 2008, elective overseas field trip	
Participants	<ul style="list-style-type: none"> • 4 students –average age 55 (42 to 69), and the gender mix is 3 female students and 1 male students. • 2 Course Tutors • Technology Steward (Thom Cochrane – CTLI)
Mobile technology	Sonyericsson P1i WiFi smartphone, Bluetooth folding keyboard, 1GB/month 3G data
Community of practice	Focused on the beginning of the trial with four introductory sessions, then a further four sessions in August/September before the trip to Japan.
Support LMS	Moodle
Pedagogical focus	Creation of an eportfolio preparing, researching cultural background, and recording and then exhibiting an investigative trip to Japan
Deliverables	A Vox eportfolio and blog.
Timeframe	April 2008 to October 2008

than the other trials as tutors take significant time to redesign course assessments to integrate the tools. In semester one 2009, the iPods/iPhones will be integrated into the course delivery and assessment as part of a PODcast and VODcast sharing project with another similar course at another New Zealand institution. This will include elements of peer critique and review recorded on their VOX blogs.

Diploma of Landscape Design (2008)

This trial has a focus on an elective experiential trip to Japan in September 2008 and is set to start in semester two 2008. The students are required to create a reflective journal of their trip and its influence on landscape design ideas in New Zealand. Because of the expense involved in the Japan trip, the average age of the class is much higher (55) than the other trials, as the younger students cannot afford the extra cost of the trip. The smartphones will be used to record, upload and comment on photos and video of their landscape design projects, including sourcing plants and ideas while off campus, and in Japan. The smartphones are also used for communication and collaboration via email, instant messaging, and RSS subscriptions to each other's blogs.

MLearning trial discussion

A full report of the first trial can be found on Google Docs (Cochrane, 2007a). The first trial highlighted the disruptive nature of mobile learning technologies, and their potential to move teachers and learners from an instructivist to a social constructivist pedagogy. The following trials attempt to better scaffold this pedagogical change and address the key technological shortcomings highlighted in the first trial. Critical success factors identified in trial one (2007) included:

- Introducing the mobile devices at the beginning of the trial
- Getting academic staff on board early
- Clearly identifying course integration and goals
- The importance of the teaching staff modeling the use of the technology to the students
- Planning and providing on-going support and scaffolding for students both in terms of the technology and pedagogy
- Providing suitable text entry facilities (Bluetooth keyboard or handwriting recognition touch screen device)
- Providing both WiFi and 3G data access for ubiquitous connectivity

While virtually all participants already owned a cellphone and had access to an Internet connected computer, for the majority of students and staff in the mlearning trials web2.0 is a relatively new experience, particularly in participating in user-generated content. Less than twenty percent of participants were regular users of web2.0 tools before the start of the trials. Instant messaging and text messaging held the highest pre-trial usage, however these were used for social communication only. This has had significant implications for the level of scaffolding and technology support required for these mobile web2.0 projects, highlighting the critical role of the partnership with a 'technology steward' to guide the implementation and integration of these tools into the courses. This was mainly achieved with the establishment of a regular (weekly) 'Community of Practice' consisting of the students, tutors, and technology steward for each course. As the first trial in 2007 highlighted the critical importance of these sessions, the regularity of these Community of Practice sessions was significantly increased in the 2008 trials. Each trial 'learning community' was also supported by various communications technologies, such as the 'neighbourhood' social networking feature of Vox, and the use of instant messaging for facilitating communication and a sense of social presence. Tutor engagement with student blogs and communication via instant messaging was significantly increased in the BDesign trial, leading to a greater sense of interaction and community than had been developed in the 2007 trial.

At the time of writing the three 2008 mobile learning trials are still in early days, with both the Diploma Contemporary Music and Diploma Landscape Design trials set to begin their main projects in semester two 2008. The amount of support required to initiate and nurture the three groups of students and tutors in 2008 has been more than was envisioned. Nurturing successful intentional Communities of Practice requires significant time and effort (Langelier, 2005; Wenger et al., 2002). However this has been minimised by using a common design for the three trials that has been developed from the experiences of mobile and web2.0 projects over the past three years. The partnership between the researcher and the three groups of tutors has been built-up over this period as well - initially through communities of practice investigating the use of educational technology, and now this model is being loosely used to create learning communities consisting of the researcher, tutors, and their students. The challenges include modeling the pedagogical use of the technology to the students, and making the learning outcomes explicit for the students while allowing the flexibility for each group to creatively experiment and develop

uniquely. Using an action research methodology for the trials provides the flexibility to critique, reflect on, and modify the projects as required.

The emerging success of these trials is illustrated by the Bachelor of Product Design teaching staff requesting that similar mobile learning trials be established throughout the entire course – i.e. within first, second and third years in semester2 2008, with the aim of complete course integration for 2009. Additional internal funding (\$10080) to expand the mobile learning trial within the Bachelor of Product Design was successfully obtained for semester2 2008. Staff and student feedback has been extremely positive, with significant gains in student output and engagement noted, and a desire for further use of the technology within their courses. Other schools within the institution are also showing interest – e.g. the School of Screen and Performing Arts, and the School of Architecture. Innovation in programme delivery is a strategic direction for the institution in 2009.

Student feedback

Although for the majority of students these projects were their first real experience of using web2.0 tools in their learning environment, their feedback indicated they have found it an enjoyable experience. They particularly valued the reflective and collaborative nature of blogging and the convenience of mobile blogging. While initially finding learning the various smartphone interfaces daunting, students integrated their use into their everyday lives. Students particularly valued the ability to capture and record ideas and content using the smartphones multimedia capabilities (Cochrane & Bateman, 2008b). They uploaded significantly more media (Mainly still images) to their online eportfolios than actual blog posts, providing evidence of critical selection of media. Several students preferred to VODCast (record and upload a video monologue) rather than post text based reflections on their blogs. Feedback from students clearly related their desire (and expectation) of regular formative feedback from their tutors on their progress at virtually anytime or anyplace. Students' also expressed the time intensive nature of regular moblogging and peer commenting, but unanimously (in 2008) preferred this approach to producing an essay or other more traditional assessment. Least valued by students was the ability to access course content on the smartphones. This is a reflection on the underlying pedagogy chosen for the trials (Social constructivism) where a conscious decision was made to focus on communication, collaboration and user generated content rather than re-purpose course content for small screens. The exception to this has been the Diploma of Contemporary Music trial, where students and staff have quite regularly accessed the LMS (Blackboard) via their iPod Touch's and iPhones. The iPod/iPhone mobile web experience is significantly more user-friendly than any other currently available mobile device. Students who owned laptops used the smartphones to complement their use of their computer laptops. In some cases students replaced the use of their laptop for general web and communication use with their easier to carry smartphone and bluetooth keyboard.

The Nokia N95 smartphones were perceived as a significant leap forward in speed and capability in comparison to the often 'buggy' N80s used in 2007 and semester1 of 2008. While the upgrade from iPod Touch to the iPhone in semester two for the Diploma of Contemporary Music overcame the limitation of reliance on WiFi hotspots for connectivity, two limitations of the iPhone were found to be its inability to record video (for mobile VODCasting) or to multitask for instant messaging. A sustainable model for expanding the integration of mobile web2 would focus on student ownership of an appropriately specified smartphone. Although a small number of the 2007 Diploma Landscape Design students rejected the idea of purchasing their own smartphone, Bachelor of Design (2008) students and Diploma Contemporary Music (2008) students have been unanimous in indicating they would purchase their own smartphone in the future.

When asked in what situations the WMDs were most effective, students replied:

As a mobile computer – instead of a laptop, and as a communication tool for a team who are in different places all the time, too busy to meet, to transfer information, pictures, documents etc. (Diploma Landscape Design student 2007)

Spur of the moment, spotting something inspirational, documenting an idea when a PC is not around. (Bachelor of Product Design student 2008)

It's the convenience of the small device, nice and handy fits into the pocket. No matter where I was I could use it, spare time having lunch, toilet, even in the classroom while the teacher wanted some information about a particular person. At school looking for information on the net, leisure times, looking at other classmates' webpage's, blog and YouTube videos etc... (Diploma Contemporary Music student 2008).

Staff feedback

While integration into the courses required significant rethinking of staff pedagogies and assessment procedures, all the staff involved in the trials were very positive at the results (Cochrane & Bateman, 2008a; Cochrane & Clifflin, 2007). The mobile web2.0 tools have been accepted as significant enabling technologies for their students and their own pedagogical toolkits, and are being integrated increasingly throughout each course. Tutors have noted an increase in student collaboration and peer critique after the integration of moblogging, and the development of a more flexible, context independent learning community.

Once I learnt how to use the technology I then moved on to be able to work with the students. I modified an elective exercise that we didn't formally teach, but was an opportunity for students to put their studies into practice by creating a design for the Ellerslie Flower Show. We decided to make it a course, that doesn't have to have content, but a process, synthesising all aspects of their Landscape Design course and we can bring in all these learning technologies to support it, including blogs, wikis, and an eportfolio instead of presenting it the traditional way. So in 2006 we trialed it and have built on the idea since then. Thom helped us along the way with this... The Community of Practice that was fostered and the new skills that the students gained in the e-world were fantastic and contributed to them doing so well. It's been a great success and we get savvier every year continuing to experiment with new technologies. Students are feeling more satisfied with the capabilities of the tools they are using and I'm going to keep learning too! (Diploma Landscape Design staff 2007)

It isn't 'easy' working in this way but it is immensely valuable and exciting. I think that it would be very hard to go back to traditional teaching only methods now I have begun to use blogging and mobile blogging. (Bachelor of Product Design staff 2008)

WMDs are very effective for motivated students who need to communicate for group projects. I would now be better able to integrate the WMD into assignments rather better. (Diploma Contemporary Music staff 2008).

Teaching staff typically require significant time to become comfortable with using the mobile web2.0 tools, and with their potential for enhancing their course. The integration of mobile web2.0 into course assessment is a critical step. The point of acceptance into course integration of the mobile web2.0 tools is typically reached as tutors realise the flexibility of learning context and feedback that these tools facilitate. Learning activities typically begin as translations of more traditional paper based activities into a mobile web2.0 alternative. As tutors become more acquainted with the possibilities afforded by mobile web2.0 tools more creative learning activities are developed and integrated into the courses. This will be analysed in more depth in additional papers.

Conclusions

Creating 'successful' mobile web2.0 learning environments requires careful planning, appropriate pedagogical design, and plenty of technology support. However the outcomes of student engagement, increased motivation and productivity, and the integration into academic teaching staff's pedagogical toolkits are worth it. The potential to facilitate social constructivist learning environments using these tools is illustrated by the four mobile learning trials outlined within this paper. It is hoped that the lessons learnt and models developed will be useful for others wanting to harness the potential of the devices that are increasingly in the pockets of our learners and teachers, and their integration into freely available web2.0 tools. The three 2008 trials continue throughout the rest of the 2008 academic year, and will provide further rich data for analysis and discussion.

References

- Bijker, W., Hughes, T., & Pinch, T. (Eds.). (1987). *Social construction of technological systems: New directions in the sociology and history of technology*. Cambridge: MIT Press.
- Cochrane, T. (2003). *Creating an e-learning environment for a polytechnic course*. Paper presented at the eFest 2003, CPIT Christchurch.
- Cochrane, T. (2005). Mobilising learning: A primer for utilising wireless palm devices to facilitate a collaborative learning environment. In *Balance, fidelity, mobility: Maintaining the momentum?*

- Proceedings ascilite Brisbane 2005.*
http://www.ascilite.org.au/conferences/brisbane05/blogs/proceedings/16_Cochrane.pdf
- Cochrane, T. (2006). Learning with wireless mobile devices and social software. In *Who's learning? Whose technology? Proceedings ascilite Sydney 2006.*
http://www.ascilite.org.au/conferences/sydney06/proceeding/pdf_papers/p50.pdf
- Cochrane, T. (2007a, 11 October). Idf mobile trial1 report: Review and evaluation of first mobile wireless trial. From http://docs.google.com/Doc?id=dchr4rgg_215tknwt
- Cochrane, T. (2007b, 16-19 October). Mobile blogging: A guide for educators. Paper presented at *MLearn 2007 - Making the Connections 6th International Conference on Mobile Learning*, Melbourne.
- Cochrane, T. (2007c). Mobile web2 pedagogies. *Conference on Mobile Learning technologies and Applications (MOLTA)*. Massey University, Auckland, New Zealand.
- Cochrane, T. (2007d, 16-19 October). Moving mobile mainstream: Using communities of practice to develop educational technology literacy in tertiary academics. Paper presented at *MLearn 2007 - Making the Connections 6th International Conference on Mobile Learning*, Melbourne.
- Cochrane, T. (2007e, 16-19 October). Moving mobile mainstream: Using communities of practice to develop educational technology literacy in tertiary academics. Paper presented at *MLearn 2007 - Making the Connections 6th International Conference on Mobile Learning*, Melbourne.
- Cochrane, T. (2008a). Contemporary music students and technology. From http://docs.google.com/Doc?docid=dchr4rgg_66dsnt9xgp&hl=en_GB
- Cochrane, T. (2008b, 25 September). Mobile learning case studies overview2. From <http://www.youtube.com/watch?v=8Eh5ktXMji8>
- Cochrane, T. (2008c). Mobilizing learning: Intentional disruption. Harnessing the potential of social software tools in higher education using wireless mobile devices. *International Journal of Mobile Learning and Organisation* (Special edition: Developing Themes in Mobile Learning - in pre-press).
- Cochrane, T., & Bateman, R. (2008a, 20 June). Bachelor of product design blogging reflections video. from <http://www.youtube.com/watch?v=d44q77cz7H4>
- Cochrane, T., & Bateman, R. (2008b, 20 June). Bachelor of product design moblogging reflections video. from <http://www.youtube.com/watch?v=V5co1cdzfik>
- Cochrane, T., & Bateman, R. (2008c, 1-3 October). Engaging students with mobile web2.0. Paper presented at the EIT Teaching & Learning Conference, EIT, Napier, New Zealand.
- Cochrane, T., & Clifflin, P. (2007). Ctlis minisymposium presentation video: Diploma landscape design moblogging. from <http://www.youtube.com/watch?v=CBWkRrG7-xo>
- Cochrane, T., & Kligyte, G. (2007, 11-14 June). Dummies2delight: Using communities of practice to develop educational technology literacy in tertiary academics. Paper presented at the JISC online conference: Innovating eLearning, JISC online conference.
- Langelier, L. (2005). *Work, learning and networked: Guide to the implementation and leadership of intentional communities of practice*. Quebec City: CEFIRO (Recherche et Études de cas collection).
- Laurillard, D. (2001). *Rethinking university teaching: A framework for the effective use of educational technology* (Second ed.). London: Routledge.
- Laurillard, D. (2007). Pedagogical forms of mobile learning: Framing research questions. In N. Pachler (Ed.), *Mobile learning: Towards a research agenda* (Vol. 1, pp. 33-54). London: WLE Centre, Institute of Education.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.
- Mishra, P., Koehler, M. J., & Zhao, Y. (Eds.). (2007). *Faculty development by design: Integrating technology in higher education*. Charlotte: Information Age Publishing.
- Sharples, M. (2000). Disruptive devices: Personal technologies and education. Retrieved 27 June, 2006, from <http://www.eee.bham.ac.uk/handler/ePapers/disruptive.pdf>
- Sharples, M. (2001). Disruptive devices: Mobile technology for conversational learning. *International Journal of Continuing Education and Lifelong Learning*, 12(5/6), 504-520.
- Sharples, M. (2005). Learning as conversation: Transforming education in the mobile age. Paper presented at the Conference on *Seeing, Understanding, Learning in the Mobile Age*, Budapest, Hungary.
- Sharples, M., Taylor, J., & Vavoula, G. (2006). A theory of learning for the mobile age (pre-print). Retrieved February, 2007, from <http://kn.open.ac.uk/public/document.cfm?docid=8558>
- Stead, G. (2006). Mobile technologies: Transforming the future of learning. *Emerging Technologies for Learning* Retrieved 6 April, 2006, from <http://www.becta.org.uk/corporate/publications/>
- Talagi, S. (2008). Learning goes mobile. *Western Leader*, p. 4.
- Uden, L. (2007). Activity theory for designing mobile learning. *International Journal of Mobile Learning and Organisation*, 1(1), 81-102.
- Vygotsky, L. (1978). *Mind in society*. Cambridge, MA: Harvard University Press.

- Webster, M. (2004, January/February). Mainz macs. *New Zealand MacGuide*, 13, 28-34.
- Wenger, E., McDermott, R., & Snyder, W. (2002). *Cultivating communities of practice: A guide to managing knowledge*. Boston: Harvard Business School Press.
- Wenger, E., White, N., Smith, J., & Spa, K. R. (2005). Technology for communities. Retrieved 14 July, 2006, from <http://technologyforcommunities.com/>

Author: Thomas Cochrane. Email: tcochrane@unitec.ac.nz

Please cite as: Cochrane, T. (2008). Mobile Web 2.0: The new frontier. In *Hello! Where are you in the landscape of educational technology? Proceedings ascilite Melbourne 2008*. <http://www.ascilite.org.au/conferences/melbourne08/procs/cochrane.pdf>

Copyright 2008 Thomas Cochrane.

The author assigns to ascilite and educational non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The author also grants a non-exclusive licence to ascilite to publish this document on the ascilite web site and in other formats for *Proceedings ascilite Melbourne 2008*. Any other use is prohibited without the express permission of the author.