Mobile Web 2.0: from Pilots to the Mainstream.

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ABSTRACT

This paper presents an evolving mlearning implementation plan for a tertiary education institution. Following an introductory mobile web 2.0 project in 2007, five small projects in three different disciplines were launched in 2008. Following the success of the 2008 projects, a series of wider scoped projects are planned for 2009. Drawing on these previous experiences, and those of similar mlearning projects at other institutions, a support and implementation plan has been developed. This paper briefly discusses identified critical pedagogical success factors, and key strategies for moving from mlearning pilots to mainstream implementation in 2009.

Author Keywords

Mobile, Social Constructivism, web 2, moblogging, action research, communities of practice.

INTRODUCTION

The 2009 New Media Consortium Report identifies Mobile Devices as a key emerging technology within tertiary education. " Already considered as another component of the network on many campuses, mobiles continue to evolve rapidly. New interfaces, the ability to run third-party applications, and location-awareness have all come to the mobile device in the past year, making it an ever more versatile tool that can be easily adapted to a host of tasks for learning, productivity, and social networking. For many users, broadband mobile devices like the iPhone have already begun to assume many tasks that were once the exclusive province of portable computers." (Johnson *et al.*, 2009)

Five small (each involving between 6 and 10 students and their lecturers) mlearning projects were implemented and evaluated during 2008 (Cochrane, 2008). Feedback from the 2008 mobile projects was very enthusiastic:

> It isn't 'easy' working in this way but it is immensely valuable and exciting. I think that it would be very hard go back to traditional teaching only methods now I have begun to use blogging and mobile blogging. (Third year Bachelor Product Design lecturer).
>
> I really really enjoyed the process, it was great. The things I liked were being able to be completely mobile, and having access to the Internet – you know, if I was lost or if I needed to find someone, or I needed to ring a business. I could go on the Internet, Google their website, look up their opening hours, things like that... (Bachelor Product Design student)

Compilations of 2008 student and staff VODCasts (Online video recordings) are available on YouTube:

1. BProduct Design Year 1 http://www.youtube.com/watch?v=8QUfw9_sFmo
2. BProduct Design Year 2 http://www.youtube.com/watch?v=6jwAFXBZAz0
3. BProduct Design Year 3 (and Lecturers) http://www.youtube.com/watch?v=8Eh5ktXMji8
4. DipContemporary Music http://nz.youtube.com/watch?v=0It5XUfvOjQ
5. DipLandscape Architecture http://nz.youtube.com/watch?v=c8IZSVtaMmM

Following this enthusiastic response from the students and lecturers, internal institutional funding was sought, and approved, for extending these small projects to a major large-scale mlearning project in 2009 involving the use of 250 smartphones, and 200 netbooks. The project is driven by pedagogy.

Pedagogy:

The mobile learning projects are based on an explicit social constructivist pedagogy (Kim, 2001). Herrington's chapter "Authentic Learning Environments" (A. Herrington & Herrington, 2006) illustrates one approach to the establishment of social constructivist learning environments.
The focus is on student-generated content, collaboration and communication, not on content delivery from lecturers to students. Therefore an explicit social constructivist pedagogy underpins each project. Mobile Web 2.0 tools are used to facilitate this (web 2.0 services that are formatted for use with mobile devices). Many educators have harnessed web 2.0 tools for creating engaging student-centred learning environments. This appropriation of web 2.0 tools within a social constructivist pedagogy facilitates what has been termed "pedagogy 2.0" (McLoughlin & Lee, 2008). This research project is interested in appropriating the benefits of web 2.0 and pedagogy 2.0 anywhere anytime using mobile web 2.0 and wireless mobile devices (or WMDs). Figure 1 below is a concept map developed to graphically illustrate the links between multiple learning contexts, and web 2.0 technologies that the smartphones afford.

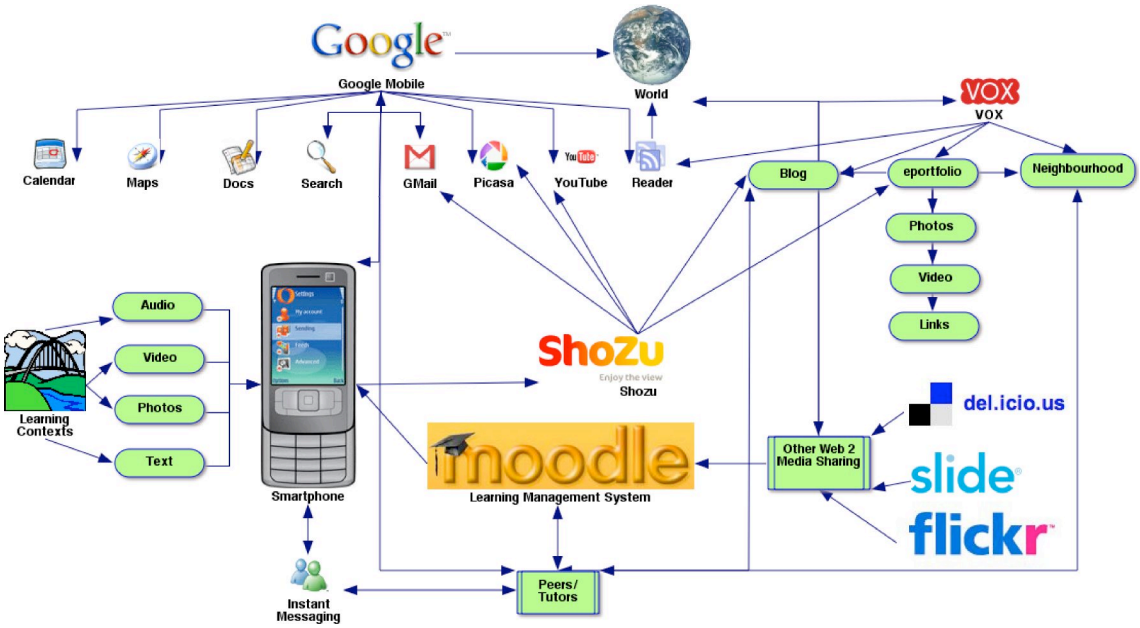

Figure 1. Mobile Web 2.0 concept map.

The pedagogical potential of Smartphones' is in their ability to 'bridge' learning contexts (Vavoula, 2007), providing the ability for lecturers to facilitate social constructivist learning environments that connect both the formal and informal contexts, facilitate peer support, and thereby situate learning within 'authentic learning environments' (A. Herrington & Herrington, 2007, 2006). 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 project, 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). In particular, the context bridging and media recording capabilities of today's smartphones make them ideal tools for mobile blogging. Smartphones allow a user to send text, photos, video and audio directly from the site of recording to the users online Blog. An example of the potential of mobile blogging is the rise of citizen journalism (Cameron, 2006; Elmendorp, 2007; Fulton, 2007; Skoeps, 2007). Collaboration and communication with peers and tutors can be maintained in any context using WMDs with a variety of communication technologies (email, online LMS, Instant Messaging, audio and video conferencing, SMS, MMS, mobile phone calls etc…) thus linking multiple contexts into the learning environment, continuing learning 'conversations' via social presence and communication technologies.

The learning outcomes for students are

- Developing critical reflective skills
- Experiencing and developing group communication skills
- Developing a life-long online eportfolio that showcases their potential
- Developing a potentially world-wide peer support and critique and support network
- Learning how to maximise technology to enhance their learning experience across multiple contexts

METHODOLOGY

Participatory Action Research

The research uses a participatory action research methodology. Yoland (Wadsworth, 1998) identifies the key characteristics of 'participatory action research': the researcher is a participant, the researcher is the main research instrument, it is cyclical in nature, involves action followed by reflection followed by informed action, and is concerned with producing change. This change is ongoing throughout the process, and the research is interested in input from participants/stakeholders. This allows for the continual development and improvement of the projects based on the feedback from participants at regular points in the projects.

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 utilized 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.

Participants

The projects are collaborative partnerships between the researcher, the course lecturers, and course students. Potential courses have been identified by the researcher, and the projects are developed in conjunction with volunteering lecturers. Students and teaching staff will be provided with a 3G smartphone for the duration of the trial (2008). Students and staff are responsible for 3G data costs: either on prepay ($1 per day for a limit of 10MB 3G data) or a data plan (e.g. 200MB $39/month or 1GB $59/month mobile broadband account) plus any voice and txt account (Prepay or on plan). Internet connectivity will also be available via Unitec's WiFi network while on campus. This provides faster, free web access while on campus. Unitec will also provide a free SMS service for course related communication and announcements via Moodle or Blackboard.

Based on the experiences gathered from eight mobile learning trials over the last three years (Cochrane, 2005, 2006, 2007, 2008) the researcher has short-listed several pedagogical critical success factors. Several of these are also corroborated by the 'nine critical success factors' of authentic learning (A. Herrington & Herrington, 2007, 2006).

1. The level of pedagogical integration of the technology into the course criteria and assessment.
2. The level of lecturer modelling of the pedagogical use of the tools.
3. The use of regular formative feedback from both Lecturers and student peers.
4. Appropriate choice of mobile devices and software.
5. Technological and pedagogical support.

Therefore the integration of the mobile web 2.0 technologies into lecturers' daily workflow and integration into course activities and assessment are critical success factors, as is the establishment of a collaborative learning environment. Course lecturers are encouraged to create a learning environment where regular formative feedback is posted as lecturer comments on students' blogs, and to use instant messaging and microblogging to be able to respond to students' questions whenever they are available online (as well as in the classroom). Appropriate assessment activities will be developed, and a detailed survey of the key mobile device affordances will be undertaken for each specific context (student group, and course context) to determine the most appropriate smartphone for each group.

The project will be guided and supported by weekly "technology sessions" (Community of Practice) facilitated by a 'technology steward' (Wenger *et al.*, 2005) investigating the potential of mobile web 2.0 technologies for integration within each course. Taking some broad framework ideas from the recent Wollongong mlearning projects (J. Herrington *et al.*, 2008), lecturers participating in the projects will be required to fulfil several commitments (as below), and the projects will be rolled out over two semesters: beginning with the continuation and expansion of established projects in semester one, (which will be used as example champions) with new projects focusing initially on lecturer professional development during semester one, followed by student implementation in semester two of 2009 as outlined in Table1 below..

Participant (Lecturers) requirements:

1. Participation in a weekly Community Of Practice.
2. Personalised integration of mobile web 2.0 technologies.
3. Development of mlearning activities based on social constructivist pedagogy for implementation with students.
4. Implement a semester-long mlearning project with students.
5. Publish a research output based on the project, e.g. cas study paper at a conference, or in a journal, or presentation at a symposium to other staff.
6. Ethics consent for researchers anonymous use of data.

Table1: Mobile Project Timeframe.

Deliverable	**Timeframe**	**Outcome**
mLearning projects with Bachelor Product Design (4 staff, 54 students)	Semester 1 2009	mLearning champions, present staff stories at mini symposium mid semester1
Establish weekly COP with (8-10) lecturers from Faculty of Creative Industries. Establish support requirements (with ITSC and Vodafone)	Second half Semester 1 2009	Staff develop competency with mlearning. Staff develop pedagogical mlearning activities based on social constructivist pedagogies
mLearning projects with staff and students from Faculty of Creative Studies (8-10 staff, 150 students). Implementation of the mlearning activities within each course and assessment.	Second Semester 2009	Increased student engagement. Flexible delivery. Facilitating social constructivist pedagogies and bridging learning contexts.
Staff publish and present case studies based on project implementation	End of Semester 2 2009 and Semester 1 2010	Conference, Journal publications and symposia presentations
Institutional strategy	2010	A new approach to enabling learning and teaching.

The core activity of the project is the creation and maintenance of a reflective Blog as part of a course group project. However the smartphone can be used to enhance almost any aspect of the course, and was illustrated by the range of activities used in the 2007/2008 projects. Several affordances of the new generation of smartphones will be focused on in the 2008 projects as shown below in Table 2. These affordances will facilitate formative lecturer and peer feedback during the projects. The included URLs reference the Educause "7 reasons" series of articles (http://connect.educause.edu/Library/ELI/7ThingsYouShouldKnowAbout/), providing an educational perspective on the importance of these emerging technologies.

Table 2: Affordances of smartphones mapped to social constructivist activities.

Activity	Overview	Examples	Pedagogy
Video Streaming	Record and share live events	Flixwagon, Qik http://www.qik.com	Real-time Event, data and resource capturing and collaboration.
Geo tagging	Geo-tagg original photos, geolocate events on Google Maps	Flickr, Twitter, Google Maps http://tinyurl.com/5a85yh	Enable rich data sharing.
Micro-blogging	Post short updates and collaborate using micro-blogging services	Twitter http://tinyurl.com/2j5sz3	Asynchronous communication, collaboration and support.
Txt notifications	Course notices and support	Txttools plugin for Moodle and Blackboard	Scaffolding, learning and administrative support
Direct screen sharing	Video out to video projector, pico projector or large screen TV	Microvision Show http://tinyurl.com/celgot	Student presentations, peer and lecturer critique.
Social Networking	Collaborate in groups using social networking tools	Vox groups, Ning, peer and lecturer comments on Blog and media posts http://tinyurl.com/4uz6rj	Formative peer and lecturer feedback.

Smartphone Evaluation Rubric:
One of the identified critical success factors is the appropriate choice of technology, including the mobile device used, in each different context. In order to facilitate this, a simple rubric has been created for comparative rating of several current and soon to be available smartphones according to their match with sixteen affordances for mlearning and mobile web 2.0. An example rubric evaluation is given below in Tables 3 and 4. This uses a rating via 'unweighted' affordances – i.e. for some projects particular affordances will be more important than others, and therefore should be given higher than equal rating factors. The ranking of affordances (0 to 3) is of course relatively subjective, but is based on the experiences of previous projects.

Affordances (Ranked 0 (NA), 1 poor, 2 good, 3 excellent):

1. Image capture
2. Video capture
3. Video streaming
4. Mobile Web
5. Text entry for mobile blogging and email
6. GPS for geotagging and geolocation services
7. Touch screen for ease of navigation
8. Third party applications
9. Ease of use (User Interface)
10. 3G Data connection speed
11. WiFi for free internet access at Unitec
12. Cost of the device
13. Current availability of device in New Zealand
14. Screen size
15. Screen and video out for connection to TV or projector
16. Portability (Size, weight, is a separate folding bluetooth keyboard required?)

Table 3: Rubric for ranking the affordances of example smartphones for mobile web 2.0.

	Smartphone								
Affordance	**iPhone**	**G1**	**Palm Pre**	**N97**	**E90**	**N95 + kbd**	**5800 XM**	**P1i**	**C905 + kbd**
1. Image capture	1	2	2	3	2	3	2	2	3
2. Video capture	1	0	2	3	3	3	3	1	1
3. Video streaming	1	0	2	3	3	3	3	1	1
4. Mobile Web	3	3	3	2	2	1	2	1	1
5. Text entry	3	2	3	3	3	3	2	2	2
6. GPS	3	3	3	3	3	2	2	0	3
7. Touch screen	3	2	3	3	0	0	2	2	0
8. Apps	3	2	2	2	3	3	2	1	1
9. UI	3	2	3	2	2	2	2	1	3
10. 3G	3	3	3	3	3	3	3	1	3
11. WiFi	3	3	3	3	3	3	3	3	3
12. Cost	2	1	2	1	1	3	2	3	2
13. Availability	3	1	0	0	3	3	1	3	3
14. Screen size	3	3	3	3	3	1	3	1	1
15. Video Out	2	3	3	3	0	3	3	0	3
16. Portability	3	2	2	2	1	1	3	3	3
Score	**40**	**32**	**39**	**39**	**35**	**37**	**38**	**25**	**33**

Table 4: Strengths and weaknesses of a range of smartphones.

Smartphone	**Affordance Rank**	**Advantages**	**Disadvantages**
Apple iPhone	40	UI, Web2, apps	Jailbreak, camera
Nokia N97	39	Specs, all-in-one, vid out	Cost, unavailable
Palm Pre	39	UI, Web2	Unavailable, Cost? Apps?
Nokia 5800XM	38	Size, Cost, all-rounder, vid out	Camera, plastic
Nokia N95 + kbd	37	Cost, vid out, apps	Screen, ext KBD
Nokia E90	35	Screen, built-in kbd, apps	Size, non touch, no vid out, limited Multimedia
Sonyericsson C905	33	Vid out, simplicity, still camera	Non smartphone, no KBD, non touch, screen size
Google G1	32	Google integration, OS	Cost, apps, no vid record yet
Sonyericsson P1i	25	Cost, handwriting	UI, no vid out, screen size, UMTS

The Nokia N97 and Palm Pre would both rank higher than the iPhone if they were currently available in New Zealand. Windows mobile and Blackberry devices are excluded by choice. The researcher is interested in devices that students will want to own and use, rather than 'business' focused devices. Additionally, the smartphone market is dominated by Nokia, followed by Sonyericsson, Apple,

Samsung, Motorolla, with various Windows Mobile devices account for approximately 14% of the smartphone market.

2009 Mobile Project Outlines:
Twelve mobile web 2.0 propjects are planned for 2009, involving a range of disciplines, levels, and learning contexts. Below (Table 5 & 6) are outlines of two indicative mobile projects.

Table 5: Outline of BDesign Third Year mobile project.

Course: Bachelor of Product Design, third year class	
Participants	• 24 students • 2 Course Lecturers • Technology Steward (Thom Cochrane – CTLI)
Mobile Technology	Nokia N95 WiFi smartphone (to be upgraded to N97 in Semester2), Bluetooth folding keyboard, participants responsible for 3G data, voice & txt.
Pedagogical Focus	The third year course is based around a Studio Design model where students undertake three design projects throughout the year, one of which is substantial. The project involves documenting the research and design of these products throughout the year, including working with a client company in small design teams. The first project is a collaborative project with UATI and Landscape Design students. The mobile web 2.0 technology will also be used to establish a weekly 'nomadic' studio session with staff and students focusing on context bridging and full intergration of moblogging into course projects.
Community of Practice	Weekly throughout the entire course
Support LMS	Moodle
Deliverables	An assessed online Blog/eportfolio documenting and showcasing students' design processes and forming the basis of a collaborative hub with worldwide peers and potential employers/clients. And the weekly use of instant messaging, microblogging, and VODCasts during the 'nomadic' studio session.
Timeframe	March 2009 through to November 2009.

Table 6: Outline of SPASA mobile project.

Course: Bachelor of Performing and Screen Arts	
Participants	• 60 to 70 students • 4 Course Lecturers • Technology Steward (Thom Cochrane – CTLI)
Mobile Technology	Nokia XpressMusic 5800 WiFi smartphone (or similar), participants responsible for 3G data, voice and txt.
Pedagogical Focus	TBD – e.g. Students capture, critique and share performances. Students investigate the current and future uses of web 2.0 technologies in performing arts production and distribution. Students research and report on various technologies using a weekly podcast/vodcast that is peer critiqued by students on a similar course at a different institution.
Community of Practice	Weekly throughout the entire course
Support LMS	Blackboard
Deliverables	An assessed online Blog/eportfolio documenting and showcasing students' design processes and forming the basis of a collaborative hub with worldwide peers and potential employers/clients. And the weekly use of instant messaging, microblogging, and VODCasts for communication and collaboration.
Timeframe	March 2009 through to July 2009 with Lecturers. Student projects begin Semester2 2009.

CONCLUSIONS:

This paper presents the exciting evolution of mobile web 2.0 projects from small pilots to a large-scale roll-out based on an emergent implementation model. The variety of discipline and learning contexts involved illustrate the potential of this implementation model to be used widely in tertiary education that is underpinned by a social constructivist pedagogy, and bridges the formal and informal learning contexts. Results of these projects will be evaluated and reported at the end of 2009.

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