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Integrating Mobile Web 2.0 within Tertiary Education.

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Based on three years of innovative pedagogical development and guided by a participatory action research methodology, this paper outlines an approach to integrating mobile web 2.0 within a tertiary education course, based on a social constructivist pedagogy. The goal is to facilitate a student-centred, collaborative, flexible, context-bridging learning environment that empowers students as content producers and learning context generators, guided by lecturers who effectively model the use of the technology. We illustrate how the introduction of mobile web 2.0 has disrupted the underlying pedagogy of the course from a traditional Attelier model (face-to-face apprenticeship model), and has been successfully transformed into a context independent social constructivist model. Two mobile web 2.0 learning scenarios are outlined, including; a sustainable house design project (involving the collaboration of four departments in three faculties and three diverse groups of students), and the implementation of a weekly 'nomadic studio session'. Students and lecturers use the latest generation of smartphones to collaborate, communicate, capture and share critical and reflective learning events. Students and lecturers use mobile friendly web 2.0 tools to create this environment, including: blogs, social networks, location aware (geotagged) image and video sharing, instant messaging, microblogging etc… Feedback from students and lecturers has been extremely positive, and the course is being used as a model of implementing mobile web 2.0 throughout the institution.

1. Introduction (1page)

1.1 Mobile Web 2.0

The term web 2.0 was coined in 2005 (O'Reilly, 2005) as a way of characterizing the emerging interactive, user-centred web based tools that were revolutionizing the way the Internet was conceptualized and used. These tools include: blogs, wiki's, image-sharing (e.g. Flickr), video-sharing (e.g. YouTube), podcasting etc… 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 (web 2.0 services that are formatted for use with mobile devices) and wireless mobile devices (or WMDs) (Cochrane & Bateman, 2009)

1.2 Pedagogy

The underpinning pedagogy chosen for the project is social constructivism, focusing upon students recording and documenting their learning collaboratively across multiple contexts using mobile web 2.0 tools. This is illustrated by a mobile web 2.0 concept map, created by the researcher, that can be viewed online at:
http://ltxserver.unitec.ac.nz/~thom/MobileWeb2/mobileweb2concept2.htm.
An identified critical success factor for integrating mobile web 2.0 within tertiary education courses is: the level of pedagogical integration of the technology into the course criteria and assessment. Herrington's (Herrington & Herrington, 2007) nine critical success factors in establishing authentic learning environments include:
1. authentic contexts that reflect the way the knowledge will be used in real-life
2. authentic activities that are complex, ill-defined problems and investigations
3. authentic assessment that reflect the way knowledge is asses in real life
Laurillard also backs this up: "M-learning technologies offer exciting new opportunities for teachers to place learners in challenging active learning environments, making their own contributions, sharing ideas, exploring, investigating, experimenting, discussing, but they cannot be left unguided and unsupported. To

get the best from the experience the complexity of the learning design must be rich enough to match those rich environments" (Laurillard, 2007) (p174).

1.3 Research Methodology

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.

1.4 Research Questions and Data Collection

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.

2. Product Design Case Study (3/4 Page)

### 21	Situating the Research

The Bachelor of Product Design is a level seven programme of 360 credits over three years of full time study. The programme was launched in 2003 and was borne out of a Bachelor of Design which had its roots in a traditional approach to design studio teaching that favored the Atelier Method (2008) or 'private method' of instruction where an individual staff member works with a small group of students to progressively train them. Art and design education frequently argues that the Atelier Method - the studio environment, mirrors the 'real world', however the intellectual landscape of the twenty first century made up of emergent organizations, open source development and networked innovation, rises from new and constantly changing human connections. The landscape of work environments is also changing to strengthen these connections and give people more variety and choice in where to work and how to work. Technology and the internet allows constant access and wider access than ever before. The standard Atelier Method or studio teaching environment of one communal space and one timetable is unlikely to offer the best support and learning opportunities for todays creative students; it does not mirror the 'real contemporary world'. Over the last 2 years, the introduction of mobile web2.0 tools into the Bachelor of Product Design has facilitated significant flexibility for students allowing them to stay connected, share their ideas widely, participate in world wide creative communities and choose to work in virtually any context on and off campus.

### 22	Previous Research

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. 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.

2.3 2009 Outline

The mobile web 2.0 projects within the Bachelor of Product Design course have been the most successful of the six trials, and will be used as a 'flagship' to illustrate the potential to the rest of the institution. In 2009 the mobile web 2.0 projects within the Bachelor of Product Design are moving to complete integration right across all three years of the course.

3. Example Mobile Web 2.0 Scenarios (2 pages)

3.1 Mobile Affordances

Specific mobile affordances will be utilised as part of the third year Product Design course (See Table 1, the tinyurls reference Educause "7 things" series of articles on each technology). Students' core activity will be situated around a reflective blog that is accessible via mobile. Students' VOX Blogs will become reflective journals of their design processes and learning throughout the year, as well as building up a showcase of their Design capabilities: e.g.

* their ability to critique as well as be creative
* their ability to communicate, collaborate and convey ideas
* their ability to work with new technologies as part of the process (mobile web 2.0 will be core in enabling this).

   VOX groups and tags will be used for specific group/team projects throughout the year: e.g. there will be a Vox Shac09 group that will facilitate sharing and communication between the four departments involved in the project. A Ning (online social network) group will be used for discussing and collaborating on a wider national/international basis around the project. Students Vox blogs will also become a 'hub' for aggregating (Collating) web 20 media from other sites such as Flixwagon, Qik, YouTube, Flickr, Picasa, etc...

Table 1 Affordances of smartphones mapped to social constructivist activities.

Activity	Overview	Examples	Pedagogy
Video Streaming	Record and share live events	Flixwagon, Qik	
Geo tagging	Geo-tagg original photos, geolocate events on Google Maps	Flickr, Twitter, Google Maps	
Micro-blogging	Post short updates and collaborate using micro-blogging services	Twitter	
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, or large screen TV	Microvision Show http://tinyurl.com/celgot
Social Networking	Collaborate in groups using social networking tools	Vox groups, Ning, peer and lecturer comments on Blog and media posts

The built-in microphone of smartphones can be used to record audio and then upload that audio file to an online Blog or other web 2.0 site that supports audio. This uploaded audio recording could then form the basis of an ongoing PODCast show. PODCasting is a popular form of audio recording that has an associated RSS feed for subscribing to new audio recordings. Students could record themselves reflecting or reporting on their progress in an assignment or project, or they could record an interview with an expert in the field etc...

Almost all smartphones now include a built-in camera that is capable of capturing still images and video. Most smartphones also include a built-in GPS (Global Positioning Service) that works via satellites to provide longitude and latitude information for geo-tagging and geo-location. This facilitates Geo-tagging original photos, and the ability to geolocate events on Google Maps, adding a location dimension to captured images and video. Web 2.0 services that support geotagged photos include Flickr and Vox.

The built-in camera on smartphones can record video and audio at up to almost DVD quality. This facilitates students recording events, interviews, and reflections with a visual dimension, and sharing these online via a variety of mobile friendly video sites such as YouTube. Video streaming applications such as Qik and Flixwagon allow real-time sharing of video directly from smartphones to these web-based services. Qik and Flixwagon then archive the video stream for later viewing, sharing and commenting. Additionally video streaming sites integrate with other mobile web 2.0 technologies such as Twitter - creating an automatic announcement on Twitter regarding a live video stream that a student's Twitter followers could then watch in almost real-time. Qik and Flixwagon also feature the ability to forward video streams to a users YouTube account for sharing on that service as well. Qik supports the association of geolocation data with video streams, providing a Google Maps link to the actual location of the recorded event.

Microblogging is a cross between sms texting, blogging, and instant messaging. Microblogging is an asynchronous, collaborative communication technology, suited to use on mobile devices. The most popular microblogging service is currently Twitter.

3.2 SHAC09

The Sustainable Habitat Challenge (ShaC09) is a national competition in the form of a collaborative project for teams around New Zealand to design, develop, and build sustainable housing in their local community (http://www.shac.org.nz). Unitec is well positioned to accept such a challenge due to the strength and capabilities residing in the Departments of Design, Landscape, Applied Trades and Communication (UATI) however due to the breadth of the Shac09 challenges it was identified early on that good project management, collaborative working and cross departmental communication would be vital to the success of the project. Overall responsibility and project management for the construction of the house lies with staff in the Unitec Applied Trades Institute and Unitec's Research Office. Subject specific academic briefs have been developed collaboratively by Department lecturers in the Departments of Design, Landscape and UATI. Web 2.0 tools including Vox, Ning and Flickr were used to develop the briefs and supplement in person meetings during the writing stage. As an example, a Shac09 building site introduction is available at: http://www.flixwagon.com/watch/1537511.

Designing successful products requires both extensive research and a high degree of communication and dialogue. Communication between all the stakeholders in any design projects is needed to identify the possible ramifications or potential consequences of the decision-making process, as well as the opportunities that an innovative endeavour carries. Whether such ramifications emerge due to issues with manufacturing technologies, intellectual property, or simply through conflicts with project timing, an open channel of communication is imperative if all parties are to move forward together. To this end Product design students participating in ShaC09 will need to manage their internal (with Product design staff) and external (with Landscape, Communication and UATI staff) communications rigorously. Traditional modes of communication (in person) will be augmented with the use of mobile web 2.0 technology to enable real-time updating of project progress and issues.

Product Design students will be working in one of 5 Product Design groups each of which is focusing on a specific ShaC09 design challenge however, the final designs they create and present will be arrived at individually and will be individually assessed. Students are required to carry out aspects of research in their group, sharing information via group meetings and web 2.0 tools (see deliverables below)

3.2.1 Project Deliverables for Product Design students working on Shac09:

·   An online report summarising all research undertaken and the key findings and insights.
·   All forms of prototype and test modelling i.e. 3D sketch models / ergonomic models / interface design / proof-of-concept working models, etc.
·   All drawings, sketches and CAD models.
·   A VOX blog/eportfolio that runs throughout this phase and the rest of the year. You should post to your Blog at least every few days (preferably daily).
Use your VOX blog/eportfolio to collate the above, and reflect on your design process. Also regularly comment on each other's VOX blog posts – providing critique, feedback, and links to appropriate resources. Your VOX blog/eportfolio should include the following elements:
·   Audio Podcasts, Video VODCasts
·   Uploaded images (include geotags – i.e. Google Maps links of image locations)
·   Text posts (Reflection, critique, process, summary, comments…)
·   Links to Web2 multimedia site original content (e.g. YouTube, Flickr, Google Docs, Slide.com etc…)
·   Evidence of Google Calendars for events/dates.
·   Evidence of electronic communication via GMail, MSN Messenger and RSS feeds (e.g. via Google Reader or Newsgator).

3.3 Nomadic Studio

This year students will be required to undertake a regular 'nomadic' session where they work away from the studio, but continue collaborating and learning conversations via mobile web 2.0 connectivity. Social software tools can be effectively integrated into both face-to-face and online environments; the most promising settings for a pedagogy that capitalizes on the capabilities of these tools are fully online or blended so that students can engage with peers, instructors, and the community in creating and sharing ideas (McLoughlin, Lee. Future Learning Landscape 2008, p3). Throughout the duration of the final year of Product Design, students will be required to integrate web 2.0 into their studio practice. To this end, the programme will be providing smart phones (Nokia N95) and a weekly community of practice meeting that will focus on understanding and experimenting with web 2.0 tools and technologies. Through out ShaC09, data sharing will be enabled through a range of software applications. Staff and students will make project work and resources available to the rest of the world online, via blogs, wikis and other web 2.0 applications. Moving further away from the Atelier Method environment and building upon the work carried out in 2008 our research focus for 2009 is focussed on the seemless integration of web2.0 into the Bachelor of Product Design as well as augmenting the level of flexibility for students to allow them to choose to work in virtually any context on and off campus.

3.3.1 Framework and criteria for the 'virtual' or 'nomadic' studio session:

During the 'nomadic' studio session students are expected to:
1.   Be online via MSN or following their tutor & classmates on Twitter
2.   Make at least one relevant Blog post summarising their work
3.   Upload some multimedia content capturing what they are doing - e.g. a Qik or Flixwagon videostream, a recorded VODCast, geotag & upload a photo to Flickr etc...

4. Conclusions

The paper serves to outline examples of how mobile web 2.0 technologies can be integrated into a tertiary education context based upon a social constructivist pedagogy. Examples of assessment criteria that align the foundational pedagogy with specific mobile affordances are also given. The result is a rich, student-

centred, context bridging authentic learning environment that could be modified for a variety of discipline contexts.

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