TRANSFORMING PEDAGOGY USING MOBILE WEB 2.0

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ABSTRACT

Blogs, wikis, podcasting, and a host of free, easy to use web 2.0 social software provide opportunities for creating social constructivist learning environments focusing upon student-centred learning and end-user content creation and sharing. Building on this foundation, mobile web 2.0 has emerged as a viable teaching and learning tool, facilitating engaging learning environments that bridge multiple contexts. Today's dual 3G and wifi enabled smartphones provide a ubiquitous connection to mobile web 2.0 social software and the ability to view, create, edit and upload user generated web 2.0 content. This paper outlines how a Product Design course has moved from a traditional studio based learning environment to one using mobile web 2.0 technologies to enhance and engage students in a social constructivist learning paradigm.

1. INTRODUCTION

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… These web 2.0, or 'social software' tools, share many synergies with social constructivist learning pedagogies, facilitating student content creation, and learner generated contexts. Therefore 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 has been termed "pedagogy 2.0".

Pedagogy 2.0 integrates Web 2.0 tools that support knowledge sharing, peer-to-peer networking, and access to a global audience with socioconstructivist learning approaches to facilitate greater learner autonomy, agency, and personalization (McLoughlin & Lee, 2008).

1.1 Mobile Web 2.0

While there have been many attempts to define the unique essence of mobile learning (mlearning), most have either focused on the mobility of the device, the learner, or on the facilitation of informal learning beyond the confines of the classroom (Kukulsa-Hulme & Traxler, 2005; Laurillard, 2007; Sharples *et al.*, 2007; Wali *et al.*, 2008). Mobile learning, as defined by the authors of 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). Mlearning can support and enhance both the face to face and off campus teaching and learning contexts by using the mobile wireless devices as a means to leverage the potential of web 2.0 tools. The WMD'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". 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.

1.2 Research Questions

The research summarized herein is part of a wider research project investigating the potential of mobile web 2.0 for enhancing tertiary education through a series of action research projects in a variety of disciplines. Each project is embedded within a different course and discipline context (Diploma of Contemporary Music, Diploma of Landscape Design, and Bachelor of Product Design), and each project utilizes a different WMD (smartphone: iPhone, Nokia N95, Sonyericsson P1i) with features that are most appropriate to each context. A comparative outline of the four mobile web 2.0 projects can be found in the MLearn 2008 proceedings (Cochrane, 2008a). The variety of learning contexts covered by the project illustrate the transferability of the project's approach to facilitating and supporting mobile web 2.0 in tertiary education. This paper focuses upon the effect of mobile web 2.0 upon the pedagogical development of one of these projects (Third year Bachelor of Product Design), giving the viewpoint of the academic staff involved. A more in depth technical and methodological outline of the project can be found on Google Docs at http://docs.google.com/Doc?id=dchr4rgg_5478zdzbgw&hl=en_GB (Cochrane & Bateman, 2008). Due to limited space these details are not included in this paper.

The wider research questions are:
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. The blog is also an online eportfolio facilitating the collection of rich media resources capturing critical incidents and providing a dynamic journal of student projects and tutor input (both formative and summative).

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, 2008). An action research methodology is used, creating a reflective research environment that continually seeks to improve the student learning outcomes based on regular student and tutor feedback.

This paper focuses on the aspect of pedagogical transformation by asking the academic staff to reflect on four related questions:
1. What potential benefits do you see for mobile web 2.0 to enhance teaching and learning?
2. Have you (so far) seen increased engagement in the course from students when using this technology?
3. What are the key issues for integrating this technology into your courses?
4. In what ways has (or will) your teaching approach changed by using these tools?

Course tutors were asked to reflect on the impact of mobile web 2.0 at several points throughout the trial, and used a variety of media to capture their reflections, including: posts to their blogs, VODCasts (video recordings uploaded to their blogs and YouTube), paper surveys, discussions and brainstorms with the researcher.

2. BACHELOR OF PRODUCT DESIGN (A CASE STUDY)

2.1 Pedagogical Change 2006 to 2008

2.1.1 Bachelor of Product Design Programme

The Bachelor of Product Design is a level seven programme of 360 credits over three years of full time study. The programme is offered on a semester basis and aims to produce students who are equipped with theory and practice to contribute to the effective conception and delivery of robust, new ideas. In order to achieve this, students are required to be conceptually active and broadly informed but also sufficiently pragmatic to accept the importance of a thorough and systematic approach to realisation. 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.

The standard studio environment of one communal space and one timetable is unlikely to offer the best support and learning opportunities for creative students. Design students probably more than other students are known to work at different paces and often redesign their projects just before the assignment is due to be handed in. Some students need to work with music playing whilst others require complete silence. Some students work in the afternoons whilst others prefer the mornings. The introduction of mobile wewb2.0 tools has facilitated significant flexibility for students to choose to work in virtually any context on and off campus.

2.1.2 Collaboration

The complexity of contemporary society is such that individual disciplines can no longer claim exclusive ownership of certain bodies of knowledge or areas of practice. Societies, organisations and individuals are progressively acknowledging the importance of collaborative endeavour. Specialists remain, but require additional knowledge, education and skills to allow them to work effectively as part of interdisciplinary teams.

The structure of the Bachelor of Product Design programme promotes the interconnectivity of core disciplines that are essential in design, development and innovation. The programme encourages students to view design holistically and acknowledge the contribution that the core disciplines make to the process

The Bachelor of Product Design has a structure that is based around the principle of interconnectivity between core disciplines as essential elements of design, development and innovation. Key goals of the programme include: the gathering of knowledge; facilitating and implementing creativity; the development of essential skills including collaboration and communication; and the identification of personal strategies and interests. A social constructivist pedagogy facilitated via mobile web 2.0 has close synergy and benefits for facilitating this collaboration.

2.1.3 Methods of Programme Delivery

Whereas the first and second years courses are characterised by elective courses, core courses and staff devised projects, the third and final year is predominantly self-directed. Students begin the year by choosing their projects from a set of open frameworks. The later part of the first semester and all of the second semester is taken up with a self-devised and self-directed 'major project'.

One of the distinctive features of the Programme is it's learning structure that seeks to foster 'an environment of self-conscious reflection and analysis to ensure that student's critical and analytical skills mature appropriately' (Programme Document).

The student's learning requires the student to speculate, question, and reflect on his or her own and design industries' practice. This presupposes that design students have the ability to reflect and think critically about what they are doing. Historically students have reflected on their work and documented their reflections via sketches, reports and during tutorials with individual staff members. Importantly, in a bid to improve their own performance, we have noted that design students are becoming more interested in understanding design,

however, documenting iterative project developments remains difficult for most undergraduate product design students.

Over the last three years, we have been progressively devising and integrating methods to assist students to gather enough knowledge together to thoroughly reflect on the design processes they employ. A considerable part of designing has to do with integration, with combining the needs of all the stakeholders into a design that addresses all aspects of the product (Kees Dorst, 2003, p84) As a result of this, a major task for the tutor then becomes teaching and facilitating the students learning of the process of integration.

Teaching staff annually face the problems of facilitating live projects where students work with external clients. We argue that to achieve successful integration within live projects, students must communicate their ideas and developments clearly and regularly with their tutor, client and peers in a student-centred collaboration methodology rather than a traditional instructivist teacher-centred methodology. Communicating clearly to others is a necessary aspect of studying design. But as Stuart Mealing (2000, p15) reminds us: even more important (than the need to communicate to others) is the need to be able to communicate clearly to oneself as part of the internal feedback process of problem solving and, in addition, because natural language is a necessary step towards understanding abstract concepts.

2.1.4 Introduction of web 2.0 technologies and tools

Research shows us that there are "far more dyslexic Art and Design students than we ever realized" (Hercules, 2001) and that dyslexia raises many issues for studio- based teaching methodologies. It was hoped that by choosing to utilize a range of mobile web 2.0 tools and software with the Bachelor of Product Design students along with a range of assessment criteria including PODcasting and VODcasting, those students who underperformed due to literacy problems would find a 'natural' way to blog their projects. This was achieved by modifying the core assessment of the third year programme that focuses upon three student defined product designs throughout the entire year.

The third year major assignment has been modified each year between 2006-2008 to assist students to grasp and understand the complexity of the design process, facilitate social constructivist learning and improve the level of integration within student projects. The full assignment outline is available for viewing on Google Docs (Bateman & Cochrane, 2008), included here are the details of deliverables that have changed between 2006 and 2008.

Table 1. Third year Bachelor of Product Design major assignment changes.

Assignment Iteration	Deliverables
2006	• A 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 wireframes / proof-of-concept working models, etc. • All drawings, sketches and CAD models.
2007	• A 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 project plan for Part Two of the Major Project • A blog that runs throughout your major project. You should post to your Blog regularly • Use your blog to collate project information and reflect on your design process. Also regularly comment on each other's blog posts – providing critique, feedback, and links to appropriate resources.
2008	• A 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 project plan for Part Two of the Major Project • A VOX blog/eportfolio that runs throughout this phase and the rest of the year. You should post to your Blog at least weekly (preferably daily).

	1. 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: 2. An audio Podcast 3. A Video VODCast 4. Uploaded images (include geotags if possible – i.e. Google Maps links of image locations) 5. Text posts (Reflection, critique, process, summary, comments…) 6. Links to Web2 multimedia site original content (e.g. create your own accounts on YouTube, Flickr, Google Docs, Slide.com etc…) 7. Use shared Google Calendars for course events/dates. • Electronic communication will be via GMail, MSN Messenger and RSS feeds (e.g. via Google Reader or Newsgator).

2.2 Mobile Web2.0 Trials

2.2.1 Designing the Trials

In 2006 a mobile learning trial was implemented within one project of the third year of the Bachelor of Product Design programme using Palm WiFi PDAs and social software such as Blogger.com and instant messaging (Cochrane, 2006). There was little course integration, limited buy-in from course tutors, limited campus wifi coverage, and results effectively illustrated how not to approach mlearning! At the same time the researcher was developing a community of practice model for educational technology literacy in tertiary academics (Cochrane & Kligyte, 2007). Reflections on these experiences merged to form the foundational concepts underpinning the current research into mobile learning (Cochrane, 2007a, 2007b, 2007c). The 2006 trials were also used to develop and test the research questions and data collection instruments. In 2007 the course tutor integrated the optional use of web 2.00 tools such as blogging (via Wordpress) into the third year course using student-owned laptops and desktops. Starting in February 2008, a more explicit and integrated approach to mobile web 2.0 within the third year course was established. 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 (using http://www.vox.com) are used to record and reflect on their design processes, and are made available to the client for comment and interaction. Two teaching staff and nine randomly selected students 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.

2.2.2 Scaffolding the Learners

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 project is a collaborative project between the 'technology steward', the course tutors, and the students on the course. The institution's Learning Management System (LMS) to provide scaffolding and support for both tutors and students. Tutors are encouraged to model the use and integration of mobile web 2.0 in their own daily work-flows and to provide regular formative feedback to students via posts on their blogs and other media. There is an interactive online concept map illustrating this model 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).

3. DISCUSSION

The following provide a snapshot of some of the teaching staff reflections on the impact of mobile web 2.0 on the course and the students.

3.1 Teaching Staff Reflections on the Impact of Mobile Web 2.0

3.1.1 What Potential Benefits do you see for Mobile Web 2.0 Technologies to Enhance Teaching and Learning?

The integration of mobile web 2.0 has facilitated a shift away from the default Atelier 'private method' of instruction to a new more fluid and dynamic pedagogical method. This project has deliberately disrupted the timetabled instructivist studio learning that is frequently used and placed the student group in a social constructivist framework.

The chief benefits we have noted are:

1. Increased interaction, problem solving and sharing between students, increased interactivity in general – this has come in the forms of: encouragement, sharing of data and content, passing on of online material and the 'hey you should know about this' comments.
2. Increased interaction from external commentators – especially when working on live projects. Clients have been able to track projects in the making and steer students if need be. At final presentations clients have followed the projects over the duration of the assignment and can closer comment on the projects outcomes and validity.
3. The development of student reflective journals. The Blogs have effectively become online reflective rich media journals. Keeping an overview of a design project is difficult. Valuable time is taken up when standing back and assessing the state of the project. Reflecting on project work is difficult as the designer is often engulfed in the project. By introducing blogs to the students and requiring them to blog daily, we have created 'natural' times when a brief overview of the design project can be created in a readily accessible and exciting form. This overview can serve to keep the project on track and act as a 'call' for comments from peers and staff.
4. Designers often find it difficult to document their processes and methodologies and as a result of this find it hard to remember how they got to the end result. This project has created a 'bread crumb' trail that students can go back to both during and after the project to check their working methods (staff can do this with their work too).

3.1.2 Have you seen Increased Engagement in the Course from Students When Using this Technology?

The initial stages of the project saw a drop off in normal project activity as students explored the mobile web 2.0 tools, including the setting up of the software and hardware and the fun students had exploring the new technology that was available to them. However as the tools became second nature and integrated into the students' daily work-flows a significant uptake in engagement in the course was observed.

The increased engagement came from:

1. A sense of connectivity that is characterised by the immediate access to the Internet, photo sharing, instant messaging (IM), emailing and the usual voice and txt messaging that the smartphones bring. Virtually any space is now transformed into a collaborative learning space. Students often group together looking at online material, send each other files and photos, URLs and other digital information. Mobile video blogging has become a favourite activity and is an effective way to get out of studio information across in a short space of time.
2. The use of mobile web 2.0 provided a sense of current technology being embedded into the learning experience. In comparison, even though virtually all students in the third year course have access to their own laptop computers for use in the studio/class room, this is seen as standard these days. This project has facilitated a culture of mutual support, networking and collaboration among students, which also enhances students' skills in communication with their peers, academics and industry representatives.

3. Evenings see a sharp increase in student posts – often comments on each other's blogs as well as end of day reflective posts.
4. Students' editorial skills have increased due to the constant need to monitor the content of their blogs. A look over almost all of the blogs from the start of the project to today will show significant progression in what the students have learned about editing content and getting ideas across.

3.1.3 What are the Key Issues to Successfully Integrating this Technology into Courses?

1. Assessment and staff participation. We ran a 2007 project that did not carry an assessment weighting and the uptake was lower than for this 2008 project where assessment of the blog was embedded. It makes sense that students want to receive credit for doing something that takes time, focus and commitment.
2. It is vital that staff participate in the blogging process and run their own blogs alongside the student ones. Students want to see that staff are visiting the blogs and commenting on posts as well as offering links to sites where students can pick up information that might assist them with their projects. This doesn't mean staff are required to comment on all posts but reading the blogs is important as students will often ask 'So what did you think of my last post then?'
3. This project allowed students to have the smartphones (and Bluetooth folding keyboards) and use them as if they owned the device, and they were also supplied with a 1GB data plan for the duration of the course. This ensured that participants had the tools they needed to work effectively. Therefore programmes need to provide the hardware or make it a compulsory course purchase to enable access.

3.1.4 In What way has your Teaching Approach Changed by using this Technology and Tools?

1. Breaking down the walls! This encapsulates the thrust of this project.
2. As a result of integrating and assessing mobile blogging technology tools into the programme I have become far more tolerant of students working from different locations, something the class room/studio model struggles to cope with.
3. Putting time aside to read and comment on the content of each student blog is important and time during working hours needs to be allocated for this. By allocating time during the studio/teaching to work on the student blogs late night work at home can be kept to a minimum.
4. 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.

3.2 Plans for mlearning Integration in 2009

The feedback from both students and teaching staff on the 2008 mobile web 2.0 trial within the third year Product Design course has been unanimously positive. Analysis of student mobile web 2.0 use and feedback will be covered in depth in further papers. Tutors have noted that the integration of mobile web 2.0 within the course has significantly engaged students and provided the basis for a flexible, context independent learning environment. Thus academic staff, with the help of the researcher ("technology steward"), are planning on integrating the use of mobile web 2.0 tools across all three years of the course for all students and staff in 2009. While it is believed that a student-owned smartphone model is the best approach, it may take another year of seeding the integration of mobile web 2.0 into the programme before this is fully feasible. The cost of both the smartphones and mobile data have dropped significantly in the last year, and a variety of funding models will be explored for 2009.

4. CONCLUSION

The paper has provided a real world overview of the integration of mobile web 2.0 technologies into a course and gives reflections from the teaching staff involved on the impact of this approach. The symbiotic relationship developed between the academic advisor (technology steward) the academic teaching staff and

the students involved in each of the mobile learning trials has proven a rich environment for harnessing educational technology to design social constructivist learning environments relevant to the needs of these students. Significant changes in pedagogical approach and levels of student engagement have been realised. It is hoped the insights gained will be built upon to form a foundational model to fully embed mobile web 2.0 tools into the entire Bachelor of Product Design curriculum for the future.

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