MOBILE WEB 2.0 INTEGRATION

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ABSTRACT

Web 2.0 tools provide a wide variety of collaboration and communication tools that can be appropriated within education to facilitate student-generated learning contexts and sharing student-generated content as key elements of social constructivist learning environments or Pedagogy 2.0. "Social software allows students to participate in distributed research communities that extend spatially beyond their classroom and school, temporally beyond a particular class session or term, and technologically beyond the tools and resources that the school makes available to the students." (Mejias, 2006, p1). This paper illustrates this by describing and evaluating the impact of the introduction of web 2.0 and mlearning to facilitate student eportfolios within the context of a first year Bachelor of Design and Visual Arts course in New Zealand (Unitec). Core web 2.0 (social software) tools used in establishing students' web 2.0 eportfolios included: Vox, Qik, Picasaweb, Prezi, Google Docs, and YouTube. The participating lecturers and the technology steward also used these web 2.0 tools to collaborate on the design of the project. The paper reflects upon the impact of the participants' previous web 2.0 experience and the use of these tools to facilitate student-generated content and at the same time to act as catalysts for pedagogical change. The project is evaluated within a framework of longitudinal research investigating the impact of mobile web 2.0 on higher education from 2006 to the present.

1. INTRODUCTION

Built on the foundation of four years of participatory action research and implementation of mobile web 2.0 projects (mlearning), this paper outlines the second iteration of an mlearning integration model in the first year of a Bachelor of Design and Visual Arts (Product Design) course in 2010, informed by reflections upon the previous 2008 and 2009 mlearning projects instigated across all three years of the Bachelor of Product Design course at Unitec, involving 125 students and 4 lecturers. The Product Design mlearning projects are situated within an action research project spanning four years and seven different course contexts within the Faculty of Creative Industries and Business, including: Architecture, Performing and Screen Arts, Landscape Design, Product Design, Contemporary Music, Computing and Information Systems, and Accountancy and Finance. The mlearning model was informed and driven by social constructivist pedagogies, using a staged and scaffolded approach to transform the learning environment from lecturer-centred (pedagogy) to student-centred (andragogy), while maintaining the critical pedagogical guidance of the lecturer (Laurillard, 2007). Analysis and reflection on the previous mobile web 2.0 projects within the Product Design course led to the integration of mobile web 2.0 tools within the curriculum via a three-stage adoption across the three years of the Product Design degree. The first year implementation focused on the first stage in this transformation, facilitating student-generated content and collaboration. A paper that would typically have been delivered in a traditional paper-based mode was developed by the lecturer in collaboration with the researcher in 2009 to model and embed the use of mobile web 2.0 tools facilitating a social constructivist learning environment. Examples of assessment alignment and integration of the mobile web 2.0 tools within the first year course are outlined in an earlier paper (Cochrane and Bateman, 2010a).

The goal of the mlearning integration into the course 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. Students and lecturers leverage the unique affordances of mobile web 2.0 tools to create an online digital identity, begin developing an eportfolio, and establish the basis of a life-long international peer and professional support network, including: blogs, social networks, location aware (geotagged) image and video sharing, instant messaging, microblogging, and augmented reality. This effectively bridges the the formal learning environment of the Design Studio and the informal learning environments of situated authentic practice.

1.1 Transforming Pedagogy with Mobile Web 2.0

2010 was the second iteration of integrating mobile web 2.0 across the BDVA (Product Design) course using a staged, and scaffolded approach. The 2010 project implementation was influenced by reflections upon the 2008 and 2009 mlearning projects, and also the recent conceptualizations of mlearning around the emergence of new learning frameworks based broadly upon social constructivist foundations. These included: Authentic learning (Herrington et al., 2008), Pedagogy 2.0 (McLoughlin and Lee, 2008a), Learner Generated Contexts and the Pedagogy, Andragogy, Heutagogy (PAH) continuum (Luckin et al., 2010). Luckin et al (2010) propose the concept of Learner Generated Contexts (LGC) as a potential framework for technology based learning founded on the Vygotskian concept of 'Obuchenie' that encompasses both teaching and learning. Though not explicitly limited to mobile learning, the concept focuses upon learning within learners' own environments that new technologies facilitate. 'Obuchenie' blurs the distinction between teaching and learning, creating a two-way dyadic interaction within the Zone of Peripheral Development (Vygotsky, 1978). Luckin et al (2010) see a reconceptualisation of the level of influence the teacher plays in these contexts, and attempt to breakdown the boundaries between learning and teaching implied in the PAH continuum (Pedagogy – Andragogy – Heutagogy) where heutagogy (student-directed learning) is typically reserved for doctoral studies. The planned staged approach therefore allowed the bridging of the PAH continuum within a Bachelor's level programme, and the embedding of mobile web 2.0 affordances that support each stage.

1.2 Implementation Model

The integration of mlearning (mobile web 2.0) across the three years of the Bachelor of Product Design programme in 2010 was structured as follows in Table 1, creating a progression from pedagogy (lecturer-directed) in first year facilitated by the introduction of web 2.0, to heutagogy (student-directed) in the third year facilitated by the unique affordances of mobile web 2.0 to create student-generated contexts.

Table 1: Mapping the PAH continuum to a staged and scaffolded course integration of mobile web 2.0.

Stage	Web 2.0 Tools	MLearning Tools	Course Timeframe	PAH alignment
Level 1	Social Collaboration with peers and lecturer. Establishment of student generated content.	Use of student-owned netbook or mid-range smartphone, LMS and web2.0 sites	1 year Certificate programmes, or first year of longer programmes	Pedagogy (Lecturer directed and modeled)
Level 2	Social collaboration with peers and 'authentic environments'. Context Aware	Student-owned laptop and/or mid-range smartphone	Second year of two year or longer programmes	From Pedagogy to Andragogy (Students become the content creators within authentic environments)
Level 3	Context Bridging. Student generated contexts.	Student-owned laptop and/or high-end smartphone	Third year of programme	From Andragogy to Heutagogy (Students become independent learners within authentic environments)

As table 1 illustrates, the first year of the course maps the first stage mlearning project, focusing primarily on students establishing and personalizing the use of core web 2.0 tools and then moving towards the use of mobile specific affordances in second year, adding context bridging and context aware dimensions to the learning environment. The focus for the first year is foundational, using student-owned laptops or netbooks and student-owned cameraphones to establish students' web 2.0 e-portfolios which is then built upon in the students' second year of the course.

1.3 Critical Success factors

Based on the experiences gathered from the fifteen mobile learning projects between 2006 and 2009 the researcher identified several pedagogical critical success factors as emergent themes for mobile web 2.0 integration (Cochrane, 2010a, Cochrane, 2010b). These success factors were identified across the mobile web 2.0 projects by evaluating the following:
- The level of student engagement and satisfaction achieved – as evidenced in evaluative surveys and focus group feedback.
- The level of moblogging (mobile blogging) achieved by students in the courses.
- Lecturer reflective feedback.
- Researcher observations as participant in the supporting communities of practice established for each project.

The case studies identified the following critical success factors:

1. The pedagogical integration of the technology into the course and assessment.
2. Lecturer modeling of the pedagogical use of the tools.
3. Creating a supportive learning community
4. Appropriate choice of mobile devices and web 2.0 social software.
5. Technological and pedagogical support.
6. Creating sustained interaction that facilitates the development of ontological shifts, both for the lecturers and the students.

The identified critical success factors informed the implementation of the second full mobile web 2.0 integration within the Product Design course in 2010.

2. 2010 MOBILE WEB 2.0 PROJECT

In the previous Product Design mlearning projects (2008 and 2009) students and lecturers were provided with institutionally owned WMDs. In 2009 these included a WiFi and 3G capable netbook for the first semester (Dell Mini9). At the end of the first semester the students and lecturers were also provided with a WiFi and 3G capable smartphone that integrated a 3.2MP (megapixel) camera, video recording, GPS, touchscreen for text input, and multitasking operating system for a variety of Symbian based applications. Students and lecturers were encouraged to personalise the use of these mobile devices and treat them as if they owned them for the duration of the year. The goal was to provide proof of concept of the impact of the integration of mobile web 2.0 into the course, before moving to a student-owned WMD implementation.

2.1 Student Owned WMDs

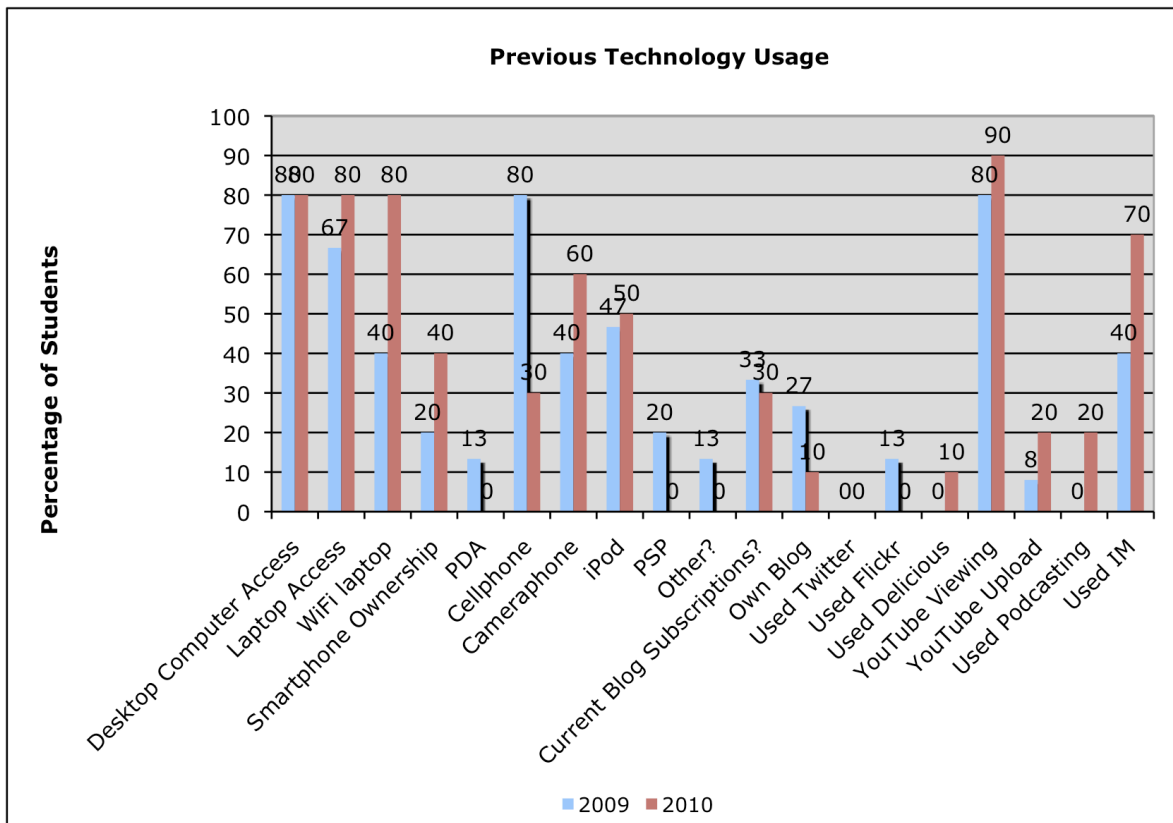The 2010 project began with a survey of the students' previous technology usage and ownership.

Figure 1: Comparaison of students' previous technology usage 2009-2010.

Figure 1 shows a comparison between the 2009 and 2010 students' previous technology usage, indicating that the 2010 students began the course with 80% wireless laptop ownership, and 90% cameraphone access (with 40% of these classed as 'smartphones'). Therefore the 2010 first year Product Design mlearning project focused on supporting student-owned WMDs rather than the institutionally-loaned model used in 2008 and 2009. In 2010 only students without their own wireless laptop/netbook were loaned a netbook for the duration of the course.

2.2 2010 Mlearning Project Outlines

While this paper concentrates on the impact of the integration of mlearning within the first year of the BDVA (Product Design) course, a brief overview of all three years of the 2010 course contextualizes the staged PAH alignment facilitated by mobile web 2.0 across the entire course.

2.2.1 Year 1: Facilitating Student-Generated Content

The first year project was designed to lay a foundation for the mobile web 2.0 projects to build upon in the second and third year of the course. The pedagogical focus was thus more teacher-directed (pedagogy). The first year project integrated blogging, followed by moblogging (mobile blogging) into the course. Scaffolding the introduction of web 2.0 and mobile web 2.0 tools into the students learning experience to facilitate the beginnings of their online eportfolio and introduction to the educational use of social networking for collaboration. The core assessment involved an online Blog/eportfolio documenting and showcasing students' design processes and forming the basis of the beginnings of a collaborative hub with their class peers.

2.2.2 Year 2: Integration of Mobile Affordances

The focus of this second year project was on a move from pedagogy to andragogy, building on the students' first year mobile web 2.0 experience, integrating moblogging, social networking, and student-generated content into the course, facilitating more in-depth collaboration and peer critique. The majority of these students' had established an online eportfolio in the previous 2009 mlearning project. An International collaborative project was established between Ireland, New Zealand and Chile Product Design courses for semester1 2010. Twitter was used as an asynchronous communications tool bridging the 13 hour time difference between Ireland and NZ. The 2010 New Zealand-based project participants were supplied with Nokia N97 smartphones (two students opted to use their own iPhones instead) to facilitate an assessed online Blog/eportfolio documenting and showcasing student's design processes, forming the basis of collaborative critique and sharing with worldwide peers and potential employers or clients. Ning was used as a lecturer-facilitated collaborative hub for all the teams involved in the project.

2.2.3   Year 3: Facilitating Student-Generated Contexts

The third year mlearning project focused upon the unique affordances of mobile web 2.0 to create context-bridging learning environments that facilitated a move from Andragogy to student-generated projects and student-generated contexts (Heutagogy). Students and lecturers were supplied with Nokia N95 smartphones and upgraded to the Nokia N97 in Semester two. 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 and developed by the students themselves, with the guidance of their lecturers. The project involved 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 Photography and Interior Design students. Mobile web 2.0 technology is used to document the student team progress. The semester1 project investigates how mobile and augmented reality applications can enhance visitor experiences at an Historic House (Highwik House) in central Auckland. The mobile web 2.0 technologies were also used to establish a weekly 'nomadic' studio session with staff and students focusing on context bridging and full integration of moblogging into course projects. Students were required to maintain an online Blog/eportfolio documenting and showcasing their design processes and forming the basis of a collaborative hub with worldwide peers and potential employers/clients.

3.   DISCUSSION

This section provides indicative lecturer and student feedback on the impact of the integration of mlearning into the 2010 Product Design course, and briefly discusses the 2010 mlearning project in light of the identified critical success factors.

3.1.   Lecturer Reflections

Designing successful products requires both high level of research and communication. A common agreement on the use of the right technology for communication is imperative for a decision-making process. We wanted to keep the technology as simple as possible for the students to engage and collaborate without losing their primary focus on the Design process and the Product Development cycle. The establishment of the use of VOX in the first year allowed the students to upload images, videos, presentations, and hold discussion and engage in a collaborative. This (blog) became an extension to the physical studio, enhancing student Peer to peer engagement: a shift in culture. For the lecturers it was used to show case students' design process and maintain a simple comprehensive view for formative feedback and marking purposes. This provided a base for a second year where further use of communication tools such as twitter to add a wider dimension. This was demonstrated from the current second year project in the International Design Collaboration with Limerick University in Ireland. Twitter was a significant tool in this project, it was used primarily to allow for asynchronous collaboration between all stakeholders and helped students and lecturers to connect across time and space and share relevant information. However it was soon apparent that twitter had more potential in term of building and engaging in learning communities. The other great advantage of using Twitter is that it can be used with any Internet-connected device or any mobile devices via SMS. So it's a very cost-effective way for students and lecturers to communicate between different time-zones and

allowed their learning community to grow. The use of VOX, Twitter and other web2.0 tools were very much aligned with the peer to peer learning, typical of these kind of projects.

3.2. Student Reflections

The following is an example of a first year Product Design student's reflections on the integration of mlearning into the course, transcribed from the student's VODCast originally recorded on her cameraphone and uploaded to her Blog.

> So how do I feel about all the technology things that have been thrown at us? At first it was kind of scary, but then I dived into the whole blogging and Twitter thing and I'm actually really enjoying it… I really like using Vox and Twitter in combination with each other. Like if I find a really neat website that I think might be interesting for the rest of the class I'll post it on Twitter instead of making a whole blog about it, and the blog is really cool to share bits and pieces and make formal and informal comments. (First Year BDVA Student, 2010)

This illustrates that although students' previous experience of mobile web 2.0 was limited (Figure 1) and focused on content consumption, they quickly appropriated the student content generation affordances of mobile web 2.0 when this was supported and modeled within an explicitly planned integration into their course, as illustrated in Table 2.

Table 2: Web2.0 Impact on First Year Course.

Web 2.0 Tools	Examples of use and impact on Pedagogy
Vox	Student's mobile eportfolio base, forming a reflective journal collating media supporting their learning & progress. Enabling peer critique & lecturer formative feedback.
Qik	Live video streaming from cameraphones for sharing events and experiences, capturing critical incidents in students' learning journeys.
Picasaweb	Online photo album for sharing photos captured on cameraphones documenting students' design process, decisions, & progress.
Prezi	A collaborative presentation tool facilitating student reflection and metacognition, & used as part of summative assessment events.
Google Docs	Collaborative document editing & sharing facilitating team design processes.
Twitter	Asynchronous communication, collaboration & media sharing beyond the classroom.
YouTube	Visual presentation and sharing of ideas via videos recorded on cameraphones, illustrating students' progress & project outputs, also used as summative events.

3.3. Critical Success Factors

3.3.1. The pedagogical integration of the technology into the course and assessment

Over the course of two years the integration of mobile web 2.0 tools into the Bachelor of Product design programme has been a catalyst for pedagogical change in the programme, facilitating a staged pedagogical integration across the three years of the course that reflects a move from pedagogy (first year) to heutagogy (third year), mapping the pedagogy, andragogy, heutagogy (PAH) continuum proposed by Luckin et al (2010) and McLoughlin and Lee (2008b). As a result of this, a major task for the lecturer then became teaching and facilitating the students learning of the process of integration rather than delivering course content. This presented a marked conceptual shift for many lecturers. The progressive integration of mobile web 2.0 has facilitated a shift away from the default Atelier 'private method' of instruction that the course had previously followed to new more fluid and dynamic pedagogies (J. Herrington, et al., 2009; J Herrington, et al., 2008; Catherine McLoughlin & Mark Lee, 2008). This project has deliberately disrupted (Sharples, 2000, 2001) the timetabled instructivist studio learning that was frequently used and placed the student groups in a social constructivist framework. The use of web 2.0 technologies has literally become an everyday occurrence in the Bachelor of Product Design, as evidenced by all three years of the programme

becoming engaged in a staged development of mlearning projects using different types of WMDs during 2009.

3.3.2. Lecturer modeling of the pedagogical use of the tools

Tutor engagement with the technology was essential for students to value its use and to gain an understanding of its pedagogical usefulness beyond social activities. "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 their blogs and commenting on posts as well as offering information that might assist them with their projects" (Cochrane and Bateman, 2010b). Therefore the integration of the mobile web 2.0 technologies into the assessment (Both formative and summative) was critical for student motivation, and ensured that the lecturer input and modeling of the tools was recognized as course activity rather than extra work. The integration of mobile web 2.0 facilitated a change in pedagogical approach that needed significant scaffolding for both students and lecturers. This made supporting the project via a community of practice, and sound pedagogical design essential.

3.3.3. Creating a supportive learning community

The Bachelor of Product Design mlearning projects have illustrated the potential to create increased student engagement with the learning environment based around the establishment of an intentional community of practice involving the course lecturers, the course students, and the researcher as a technology steward. Anywhere, anytime learning (context independent and context bridging) was facilitated and made use of in student-generated scenarios. Higher levels of student reflection and critique were achieved compared to that previously seen with more traditional assessment procedures.

3.3.4. Appropriate choice of mobile devices and web 2.0 social software

Access issues must be considered carefully when planning to integrate the use of mobile web 2.0 technologies. The sustainable provision of hardware, software and connectivity (3G data plans and WiFi availability) must be thought through. An initial provision of netbooks and smartphones by the institution in 2008 and 2009 laid the foundation for a refocus upon sustainability by supporting student-owned WMDs in 2010.

3.3.5. Technological and pedagogical support

An initial community of practice (COP) established in the third year of the course during 2008 effectively drew in the other lecturers within the department who were brought into the project from the 'periphery' of the COP. This aligns with Lave and Wenger's (1991) concept of 'legitimate peripheral participation'. This led to the use of mobile web 2.0 tools and supporting COPs being integrated across the entire Bachelor of Product Design course in 2009. The researcher took on the role of a 'technology steward' within the community of practice formed (Wenger et al., 2009, Wenger et al., 2005). This involved advising and supporting the lecturers and students on the pedagogical use of various web 2.0 technologies. A wiki page was created by the researcher for the first year 2010 project, providing a tutorial space scaffolding the technical setup details required.

3.3.6. Creating sustained interaction that facilitates the development of ontological shifts, both for the lecturers and the students

For some students the pedagogical approaches taken in the mobile web 2.0 projects are beyond their prior experience and comfort zones, requiring significant reconceptualisation on their roles as students (Chi and Hausmann, 2003). However, the researcher has observed that providing a regular COP facilitated by a technology steward, and finding an appropriate 'hook', such as showing how the technology can further a particular interest, or make a particular task easier, invariably breaks down any barriers. The sustained engagement of a supporting community of practice provides both a catalyst and a supportive environment facilitating participants' ontological shifts.

4. CONCLUSION

The Product Design mlearning projects have achieved demonstrable progress in course integration, pedagogical reconceptualisation, and development of a staged and scaffolded implementation model for developing learning communities facilitated by intentional communities of practice across each year of the course (Cochrane and Bateman, 2010b). The case study illustrated the potential to stage and scaffold mlearning integration across all three years of a Bachelor level course, based upon establishing an intentional community of practice involving both the students and the lecturers in each year supporting the mlearning projects. The progression of moving teaching from pedagogy to heutagogy (referred to as the PAH continuum by Luckin et al (2010)) was mapped with the progression of mobile web 2.0 course integration from student web 2.0 appropriation in first year (pedagogy) to student mobile facilitated content creation (andragogy), as characterized by Bruns (2007) and JISC (2009), in second year, and finally learner-generated contexts (heutagogy) leveraging the context bridging affordances of mlearning (similar to the recommendations of Luckin et al (2010) and Vavoula (2007)) leveraged in the third year of the course. The 2010 first year mobile web 2.0 case study illustrates the potential to sustainably use the developed implementation model with student-owned WMDs rather than institutionally provided devices as in the 2008-2009 projects.

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