

MOBILIZING LEARNING: MOBILE WEB 2.0 SCENARIOS IN TERTIARY EDUCATION.

T. Cochrane, R. Bateman, P. Cliffin, J. Gardner, I. Henderson, S. Holloway

Unitec (NEW ZEALAND)

tcochrane@unitec.ac.nz, rbateman@unitec.ac.nz, pcliffin@unitec.ac.nz, jgardner@unitec.ac.nz, ihenderson@unitec.ac.nz, sholloway@unitec.ac.nz

Abstract

Based upon three years of mobile learning (mlearning) projects, a major implementation project has been developed for integrating the use of mobile web 2.0 tools across a variety of departments and courses in a tertiary education environment. A participatory action research methodology guides and informs the project. The project is based upon an explicit social constructivist pedagogy, focusing on student collaboration, and the sharing and critique of student-generated content using freely available web 2.0 services. These include blogs, social networks, location aware (geotagged) image and video sharing, instant messaging, microblogging etc... Students and lecturers are provided with either an appropriate smartphone and/or a 3G capable netbook to use as their own for the duration of the project. Keys to the projects success are the level of pedagogical and technical support, and the level of integration of the tools into the courses – including assessment and lecturer modelling of the use of the tools. The projects are supported by an intentional community of practice model, with the researcher taking on the role of the “technology steward”. The paper outlines three different scenarios illustrating how this course integration is being achieved, establishing a transferable model of mobile web 2.0 integration and implementation. 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.

Keywords - Web 2.0. mlearning, social constructivism.

1 INTRODUCTION

The case studies in this paper are part of a research project that has spanned 2006 to 2009, beginning with two mobile learning (mlearning) projects using wireless enabled PDAs (Personal Digital Assistants) in 2006, followed by an initial smartphone project in 2007. Building on the findings of these projects, five small (each involving between 6 and 10 students and their lecturers) mlearning projects were implemented and evaluated during 2008 (Cochrane, 2008b). 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: e.g. <http://www.youtube.com/watch?v=8Eh5ktXMji8>

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 a social constructivist pedagogy. The three case studies herein are part of this wider 2009 project.

1.1 Defining mobile web2.0

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). Web 2.0 (O'Reilly, 2005), or 'social software' tools, share many synergies with social constructivist learning pedagogies. 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), in particular WiFi (wireless ethernet) and 3G (third generation mobile 'broadband') enabled smartphones, and 3G enabled netbooks. Figure 1 below is a concept map developed to graphically illustrate the links between multiple learning contexts, and the web 2.0 technologies that the smartphones afford.

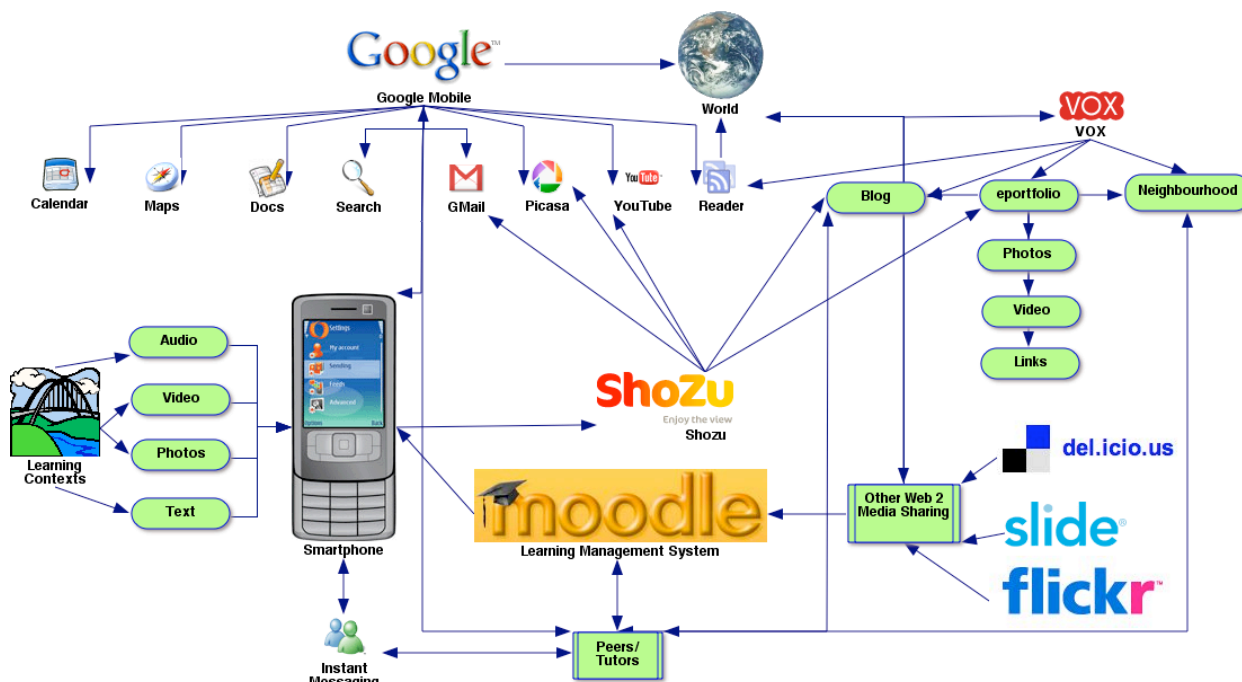


Fig. 1. MLearning concept map.

1.2 Research methodology

This 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.

A. Research Questions

- What are the key factors in integrating Wireless Mobile Devices (WMDs) within tertiary education courses?
- What challenges/advantages to established pedagogies do these disruptive technologies present?
- 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?
- To what extent can WMDs be used to harness the potential of current and emerging social constructivist e-learning tools?

B. Data gathering consisted of:

- Pre-trial surveys of lecturers and students, to establish current practice and expertise
- Post-trial surveys and focus groups, to measure the impact of the wireless mobile computing environment, and the implementation of the guidelines.
- Lecturer and student reflections via their own blogs during the trial.

1.3 Situating the research

Limited space precludes a comprehensive overview of other mlearning research, but the approach taken within this research project is unique. The emphasis is on using freely available smartphones and web 2.0 tools that require minimal technical knowledge to appropriate within tertiary education, creating transferable mlearning scenarios for multiple contexts. A list of current mlearning projects can be found on the International Association for Mobile Learning website (2008). The closest work to that being undertaken in this research project would be the work of Chan (2007) and recent mlearning projects at the University of Wollongong (A Herrington, 2008; J. Herrington *et al.*, 2008).

1.4 Critical success factors

Based on the experiences gathered from the previous eight mobile learning trials over the last three years (Cochrane, 2008a) 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 (Anthony 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.

These success factors were identified across several mobile web 2.0 projects by:

- 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.

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. The following three mlearning case studies illustrate examples of this integration within three different tertiary course contexts, using a variety of different wireless mobile devices (WMDs).

1.5 Mobile affordances

The core activity of each of the projects is the creation and maintenance of a reflective Blog as part of a course group project, effectively creating student eportfolios. However the smartphone or netbook can be used to enhance almost any aspect of the course, as was illustrated by the range of activities used in the 2007/2008 projects. Several affordances of the new generation of smartphones are focused on in the 2009 projects (an outline of these projects and the proposed mobile affordances are available online at http://docs.google.com/Doc?id=dchr4rgg_3d5wv977k&hl=en_GB). These affordances facilitate student created content and formative lecturer and peer feedback.

1.6 2009 Mlearning projects overview

The projects are guided and supported by weekly "technology sessions" (Communities of Practice, or COP) facilitated by a 'technology steward' (Wenger *et al.*, 2005) investigating the potential of mobile web 2.0 technologies for integration within each course. The COPs are a collaborative partnership between the researcher (as the 'technology steward'), the course lecturers, and their students. The

mlearning projects prior to 2009 had comprised small groups of students from select courses that volunteered to participate in the projects, while the breadth of funding secured for the 2009 projects enabled all students in each course to voluntarily participate if they chose. All participants (both lecturers and students) are provided with either (and in some cases both) an appropriate smartphone or 3G enabled netbook for the duration of their courses in 2009.

The following sections outline three illustrative mobile web 2.0 case studies:

1. A collaborative sustainable house design project between a third year Product Design course and a second year Landscape Design course. The Ning (<http://www.ning.com>) social network is used to facilitate collaboration between the two different courses (<http://designprojects.ning.com>).
 - Product Design students using Nokia N95 smartphones and folding Bluetooth keyboards to capture and share design ideas and reflections on design via the use of an online blog/portfolio.
 - Landscape Design students using 3G enabled netbooks to facilitate the development of a collaborative design process via Ning forums, and online media sharing sites such as Flickr (<http://www.flickr.com>) and YouTube (<http://www.youtube.com>).
2. Contemporary Music students using iPhones as tools to record and share environmental sounds from a variety of off-campus contexts, as well as creating online profiles on Vox (<http://www.vox.com>) and MySpace (<http://www.myspace.com>), evaluating the use of new technologies for music generation, sharing, marketing, and distribution.

2 MLEARNING SCENARIO1: BACHELOR OF PRODUCT DESIGN

The Bachelor of Product Design is a level five six and seven programme of 360 credits over three years of full time study. The programme was launched in 2003 and was borne out of a Bachelors programme which had its roots in a traditional approach to design studio teaching that favored the Atelier Method 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 has frequently argued that the Atelier Method or 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 2.5 years, the introduction of mobile web 2.0 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.

2.1 The Impact of mlearning in 2008

The 2008 mlearning project allowed for students to be supplied with smartphones (and Bluetooth folding keyboards) and use them as if they owned the device. Students were also supplied with a 1GB data plan for the duration of the course. It was our opinion that programmes need to provide the hardware or make purchase a compulsory course related cost.

The initial stages of the 2008 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 integrated into the students' daily work-flows a significant uptake in engagement in the course was observed.

2.2 Mlearning integration plan for 2009

Throughout the duration of the final year of Product Design, students are required to integrate web 2.0 into their studio practice. To this end, the programme is providing smart phones (Nokia N95) and a weekly community of practice meeting that focuses on understanding and experimenting with web 2.0

tools and technologies. Whereas in 2008 students were given a 1GB data plan for the duration of the course this year they are funding the data and voice connection plans themselves.

A. SHAaC09

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>). Throughout the SHaC09 project, data sharing has been enabled through a range of software applications. Staff and students have made project work and resources available to the rest of the world online, via blogs, wikis and other web 2.0 applications. The following diagram illustrates the range of web 2.0 tools used and the types of interaction between the project members facilitated by these tools.

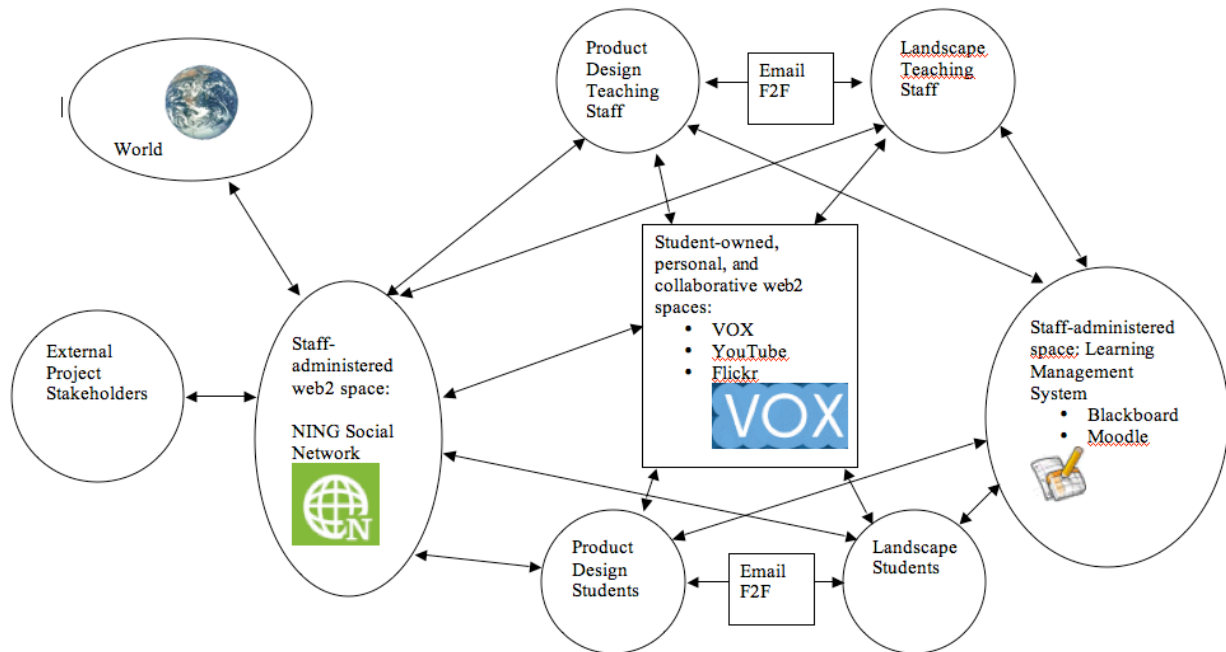


Fig. 2. SHaC09 collaborative project concept map.

Good project management, collaborative working and cross departmental communication were vital to the success of the project. Within the context of SHaC09 departmental specific academic briefs were developed collaboratively by lecturers in the Departments of Design, Landscape Design, Communication and Applied Trades. 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>.

B. Product Design and ShaC09

Product Design students have been working in one of 5 groups each of which is focusing on a specific SHaC09 design challenge. Students have been required to carry out aspects of research in their group, sharing information via group meetings and web 2.0 tools.

C. Nomadic Studio Session.

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). Moving further away from the Atelier Method and building upon the work carried out in 2008 our research focus for 2009 is focused on the seamless 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. In the second semester of 2009 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.

During the 'nomadic' studio session students will be expected to:

- Be online via MSN or following their tutor & classmates on Twitter
- Make at least one relevant Blog post summarising their work
- 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...

2.3 Reflections on the implementation of mlearning so far

The progressive 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 use of Web 2.0 technologies has literally become an everyday occurrence in the Bachelor of Product Design. At present all three years of the programme are engaged in a different project using different types of WMDs. The first semester design project brief given to the 3rd years students requires them to blog on a regular basis. Some students have not willingly taken part in the blogging aspect of their project and we have noted that some of those who do not wish to participate make this decision because of a general lack of interest and self-confidence. We have found that by providing a regular COP run by a technology steward, 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.

Lecturer and student feedback on the project are available on YouTube:

- Lecturer feedback: http://www.youtube.com/watch?v=mmTI7F_2tiU
- Student feedback: <http://www.youtube.com/watch?v=X1Sb-tvXrvA>

"I have taken the opportunity to embrace technology that I haven't yet experienced. The Nokia N95 has so many functions and features that can assist and help enrich my project. I have already had benefits in time management in using the Web 0.2 functions and only having to carry with me one product as opposed to 1 camera, 2 cellphone, 3 MP3 player, 4 Laptop (email, surf net)!" (Third year Product Design Student 2009 Vox blog post).

The 2008 and first semester 2009 MLearning project within the Bachelor of Product Design highlighted several key issues.

- The project has illustrated the potential to create increased student engagement via an MLearning environment.
- Higher levels of student reflection and critique were achieved compared to that previously seen with more traditional assessment procedures.
- Anywhere, anytime learning (context independent and context bridging) has been facilitated and made use of in unforeseen scenarios.
- Tutor engagement with the technology is essential for students to value its use and to gain an understanding of its pedagogical usefulness beyond social activities.
- The integration of the mobile web 2.0 technologies into the assessment (Both formative and summative) is critical for student motivation.
- 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. Various models for achieving this sustainability are being brainstormed for the future of this project.
- 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 MLEARNING SCENARIO2: DIPLOMA OF LANDSCAPE DESIGN

The Diploma in Landscape Design is a two-year level five programme of 240 credits. Last year the programme was re-written to better reflect the changes in teaching practice which have been

developed during the programmes's ten-year history. These changes further embrace student - centred learning models, which aim to engage students more effectively in their learning, tailoring reality- based assessments to demonstrate the knowledge required for effective practice as a landscape designer. E-learning technologies and internet applications provide important tools for landscape professionals in the contemporary world. The mobile web 2.0 project with the Diploma of Landscape Design was born out of a desire to provide flexibility and enable situated learning environments for students who are predominantly part-time, and to create authentic teams of students who work on real-world projects as part of their final year course. The course tutor envisioned mobile web 2.0 tools as potential facilitators of this pedagogy, but required technological and pedagogical support to implement these ideas.

3.1 The Impact of mlearning in 2008

Over the last two years Mobile Web 2 devices have been trialled to extend students access to social networking tools to support communities of practice around particular projects. The first was for a Negotiated Study course where students designed and built an exhibition garden for the Ellerslie Flower Show. The second was to integrate the moblogging project within an elective field trip to Japan. Significant benefits in student collaboration and reflection via the use of E portfolio assessment were gained in this project.

3.2 Mlearning integration plan for 2009

This year in the second year landscape design course, experimentation into the efficacy of e-learning technology for group research projects for the SHaC09 sustainable house project was undertaken. This was a collaborative project with students and staff from Product Design and with the support of Thom Cochrane from Te Puna AKO as the 'technology steward' for the project. The intent with this project was to provide a combination of mobile devices, including smart phones and netbook computers for each student to enable them to post entries in a mobile environment. The project intention was to begin with the provision of 3G and WiFi capable netbooks for all of the students in the course during semester one, facilitating the setup and establishment of their online web 2.0 eportfolios, followed by the introduction of smartphones for bridging anytime anywhere learning contexts in semester two. Due to delays with the supply of the devices, the personalised mobile aspect of the project was compromised. However the delay in the arrival of the netbooks was mitigated by the use of a loan set of wireless laptops when the students met face-to-face weekly to engage in tutorials and individual and group posting sessions, with additional posting throughout the week.

A. Landscape Design and SHaC09

Students in the Diploma in Landscape Design were given a studio brief to design the garden for the Unitec entry to the Sustainable Habitat Challenge – SHaC09, <http://www.shac.org.nz>.

B. Description of M-learning component:

Collaboration between multiple student teams was an important aspect of the SHaC09 project, particularly so in the preliminary research phase. Collaboration was achieved through group work in this class, and via communication with project participants in the other departments. Web 2.0 was employed to permit real-time updating of research data and progress and to enable speedy acquisition and build-up of relevant information. Effective collaboration and the use of the communication technology for on-line journaling contributed to student grades. Academic staff surveyed the class at the beginning of the project to gauge an appropriate level of engagement in Web 2.0 tools and technology.

During their completion of the SHaC09 tasks, Landscape students were asked to research into sustainable technologies suitable for residential houses and gardens and based on six distinct areas; water, waste, landscape materials, renewable energy production and plants (for mitigation and food production). Students recorded their findings and discussed them on-line, with a summary statement produced at the end of the process –<http://designprojects.ning.com/forum/topics/landscape-research-summaries>. The research phase of the SHaC09 project was facilitated by a weekly 1-2 hour Web 2.0 COP.

3.3 Reflections on the implementation of mlearning so far

A. *Benefits:*

- Flexibility of learning space and time.
- Participation / Engagement:
- Multidisciplinary collaboration
- Group Work benefits

The Web 2.0 aspect of the SHaC09 project meant that students could engage with each other in their group projects through documenting and contributing to research updates on the project Ning site at any time and from any place. The set up of the weekly support COP, the physically COP space and the 1-2 hour duration of the COP seemed to prove significant in the success of the project. The COP was held in an open space adjacent to a café, and at the beginning of the usual timetabled design studio session. Students were very enthusiastic about this, with full attendance at every session. The novelty of the group learning space, the learning of new e-learning skills and the collaboration and interaction made possible by the Ning site proved to be a successful combination.

Participation in blogging and engagement with the research activity seemed to be more consistent across all students than a typical discussion mode in the standard classroom. There appears to be a democratising influence when the communication is not face-to-face and is rather more 'anonymous' and therefore less intimidating. Our previous experiences had shown that the integration of the mobile web 2.0 technologies into the assessment is critical for student motivation. All students participated in the group project postings, and all groups successfully produced useful research summaries for other groups to access. This success was most likely due to the link to assessment criteria.

The use of Web 2.0 supported the multi-disciplinary dimension of the SHaC09 project as it allowed students for the different schools to read, comment and discuss online. Co-operation between groups and the sharing of information occurred even when timetables were not compatible or teaching spaces unavailable or inadequate. However in our case, some face-to-face engagement of the interdisciplinary (interdepartmental) groups increased the exchange in cyberspace. Those who did not experience this were less likely to co-operate in the blogging between groups. There were some lively exchanges between students and staff in the departments of Landscape and Product Design, notably about eco-decking and the merits of different modes of clothes drying.

Flexibility and connectivity were very significant aids to the success of the group work outcomes. In three weeks the students were able to document a significant body of research on sustainable technologies and provide succinct summaries for other groups to refer to for their subsequent design process. The students were more enthusiastic about group work than in previous models as they found out-of-class communication greatly aided by Web 2.0 technology.

B. *Challenges:*

- Learning the technology
- Studio project redesign
- Levels of student reflection
- Hosting site
- Quality of communication
- Access and pedagogy
- Tutor engagement

Learning the technology can take time, depending on the prior experience of the students. As such it can impact on the time available in the contact learning environment. Planning for this time within the course is imperative.

In order to accommodate the use of e-learning technologies the design brief and teaching activities must be carefully planned. Care needs to be taken to ensure the e-learning technologies are relevant to the task at hand and to the particular learning environment as a whole. That is, the technologies need to be understood as tools with particular capabilities. Without prior knowledge, initially this is rather difficult to assess, and it is likely to take some trial and error to develop.

Although the participation and research outcomes were well achieved, the levels of design reflection were not high. This will prompt further refinement of the design brief to develop closer integration of the blogs into the reflective design phase, in terms of both studio session planning and assessments. Individual blogs will be trialled for this purpose in future.

Ning proved to be a useful hosting site allowing students and staff to blog, contribute to discussion fora, upload photos, videos and text files. However the many layers of posting opportunities made it difficult to review the participation of each individual students. For future collaborative projects it may be advantageous for a more generic hosting page not specifically identified to any of the particular groups. This would enhance the collaborative environment.

Timely access to the web 2.0 mobile devices and connectivity are key to success, as are technology support coupled with sound pedagogy.

Modeling seems to be a necessary aspect to the success of student engagement and how it occurs or the direction it takes. In addition, some discussions need to be stimulated or reignited to be kept alive or deserve some response or redirection. To engage at this level can be very time-consuming for tutors, given that there are multiple entry points for postings.

For the future staff in the Diploma of Landscape Design will continue the integration of the mobile web 2 component in selected projects.

4 MLEARNING SCENARIO3: DIPLOMA OF CONTEMPORARY MUSIC

The Diploma is a 240-credit Level 5 programme (equivalent to first year University), made up of fifteen compulsory courses at levels 4 and 5, usually taken over two years of full time study. Its unique elements include a focus on the local community, a broad overview of music performance, theory, composition, and technology within a relatively broad scope of musical styles (from classical to contemporary). Traditionally music education focuses upon a pedagogical model that is similar to apprenticeship, with an expert teacher/performer providing mainly one-on-one training and guidance to the student. However the course curriculum was written to allow for the embedding of new technologies with a focus on student-centred, social constructivist pedagogies, and group performance. Within the creative and collaborative courses there is a wide range of style choice in the projects. The programme was launched in 2007. Compared to national statistics, the region is under-represented in tertiary education achievement, therefore many students enrolled in the course are classed as under-achievers or second-chance tertiary students. The use of mobile web 2.0 technologies within the course has been investigated for pedagogical reasons (to facilitate the move from traditional instructivist pedagogies to social constructivism), as well as a way to establish the programme as innovative and engaging to students.

4.1 The impact of mlearning in 2008

Contestable funding for innovation in programme delivery was made available for 2008, and a proposal from the researcher for funding to implement mobile web 2.0 within the programme was accepted. This allowed for the purchase (in February 2008) of a class set of iPod touch's, and funding to purchase a class set of 3G iPhones when they became available in New Zealand in July 2008. A trial project to investigate the potential of these mobile devices couples with mobile-friendly web 2.0 tools was established with a group of student and staff volunteers from across the course. A compilation of 2008 student reflections as VODcasts (Online video recordings) is available on YouTube: <http://nz.youtube.com/watch?v=0lt5XUfvOj>.

During 2008, no assessment tasks were directly related to the use of the iPhones or iPod Touchs, and this resulted in varying commitment to the project by the students. While all iPhone recipients regularly used the device, there was limited use for directly course-related activities. This could suggest that the students had not been convinced of the potential for the iPhones and associated activities to be useful in their learning. It also suggested that students are more likely to respond to tasks for which they receive credit. It became clear that the iPhone project needed to be embedded in a course, with clearly related assessment tasks, for the students to participate more fully in it. In particular 2009 projects were designed to investigate the use of MySpace, student created podcasts, and microblogging as authentic mobile learning environments within the context of music delivery, promotion and critique

4.2 Mlearning integration plan for 2009

Mlearning has been integrated into the Web Technologies paper (PASA5011) for the second year of the course. All students in the paper are issued with iPhones for use within the course throughout 2009, and are also encouraged to personalise the use of the iPhone into their daily routines. Internet access is available for free via the campus WiFi network, but students and staff are responsible for any voice and 3G data costs incurred. Several assessed projects within the course involve the direct use of the iPhone and web 2.0 tools, e.g:

PASA5011 Music Technology and the Web: Recording Project (20%)

Using the iPhone with an audio recording application (or another approved device), record a series of environmental sounds, and use these to create a piece of 'organised sound' in Logic Pro. Your work should be at least 3 minutes long.

You must produce the following:

- Your piece of 'organised sound', saved as both an audio file and a Logic Pro project.
- A compilation of your source material, with audio commentary on each sample, saved as both an audio file and a Logic Pro project.
- A series of geo-tagged pictures, posted to your VOX blog (or through other approved means), identifying the locations of your source recordings.
- Blog postings outlining the progress on your work, including at least one video.
- A written outline of the steps you undertook in creating the work, a discussion of any technical and artistic difficulties you faced, and an explanation of what you were trying to do in your composition.

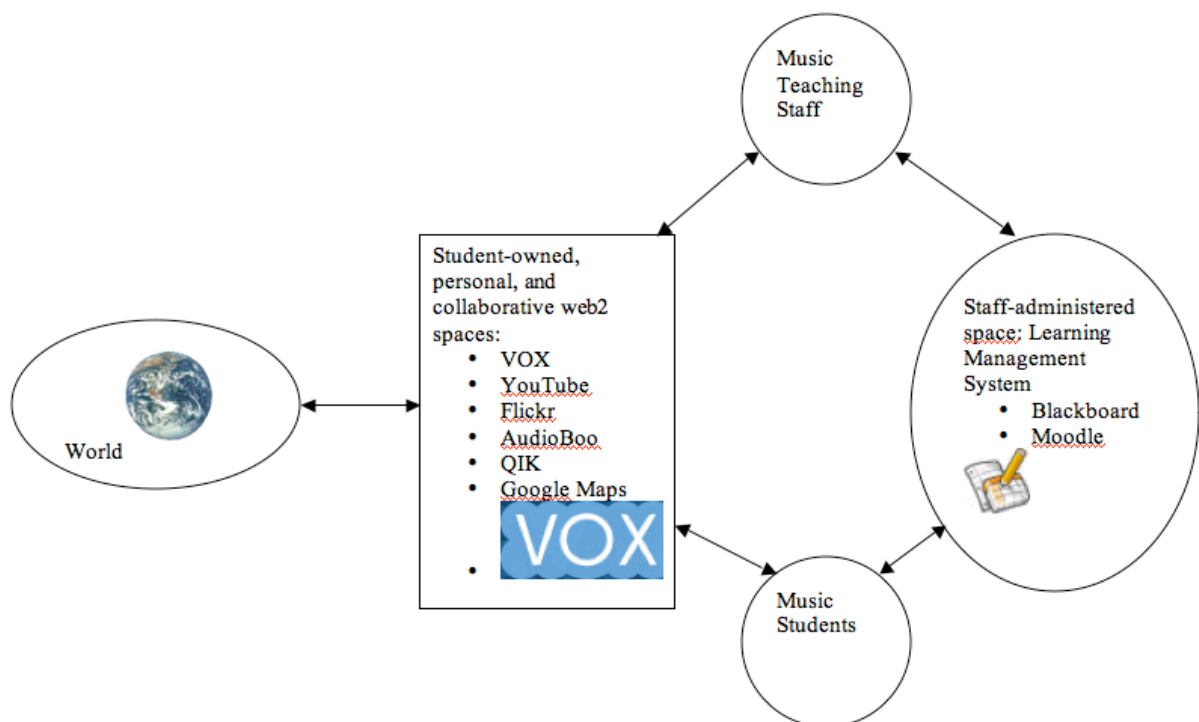


Fig. 3. PASA 5011 mobile recording project concept map.

The mlearning integration is supported by a weekly community of practice between the students, tutors, and the researcher (as the technology steward for the project). Technological and tutorial support is also provided via the Blackboard Learning Management System (LMS) and a regularly updated wiki page. (<http://ctliwiki.unitec.ac.nz/index.php/lphoneTutorials>).

Another assessed project (30% of the course) will involve the use of the iPhone within setting up a MySpace profile for each student, uploading samples of their original music compositions, and promotional material.

4.3 Reflections on the implementation of MLearning so far

There have been unforeseen setup issues that have been creatively overcome, e.g. the activation of the iPhones via an online iTunes account that requires the user to have a credit card account. Many of the Music students did not have credit card accounts, a workaround had to be found. However, no technological issues have so far proven insurmountable.

Students have been highly motivated and engaged by the project, finding creative ways to meet the project requirements, and they have established a more collaborative learning environment than before the implementation of the mlearning project.

"Today will be the first day that I've had the iPhone it's been good so far, my kids know their way around it better than me lol.... today we were given a crash course on how to upload videos from iK and Cyrcorder. Too much... give me a few more days and I will be a master". (Contemporary Music Student1).

5 DISCUSSION

The three case studies overviewed herein serve to illustrate the flexibility of mobile web 2.0 scenarios within tertiary education, providing examples of the integration of mlearning within three different discipline contexts. In comparison to previous mlearning projects instigated at Unitec since 2006, the 2009 projects have so far demonstrated higher student engagement within each respective course, and more effective collaborative learning environments than more traditional group work activities. The use of social networking sites such as Ning can significantly enhance the level of peer to peer collaboration and learning especially where cross disciplinary and multi stakeholder projects are concerned. Furthermore, the use of mobile Web 2.0 technologies helps to focus students on a shared interest as a material consideration: the community of interest becomes the over-riding factor. The level of integration of the technologies within each course is a key, and involves the use and modeling of the technologies by the course lecturers. As the lecturers have become familiar with the affordances of mobile web 2.0 technologies over the past 2-3 years, and they have become more comfortable using these technologies on a daily basis, they have been able to better conceptualise how to integrate these technologies into the course curriculum and assessment. More traditional assessment activities have been translated and transformed into more engaging social constructivist activities facilitated via mobile web 2.0. Students are generally keen to use these technologies, and with their integration into the course assessment criteria they value these technologies beyond the novelty factor. The use of embedded technology support via an intentional community of practice model has proven very successful in both supporting the lecturers, and scaffolding the students in their appropriation of the technologies. A clear, explicit foundational pedagogy based on social constructivism guides the choice of technologies and the ways in which they are utilised within each course - focusing upon student created content, reflection, sharing and critique. The projects have been made manageable by the supply of a specified smartphone or netbook for each course, keeping the technological support requirements to a minimum. However, it is believed that the best long-term scenario is to move to student-owned devices, and just as many institutions specify set requirements for laptops for courses, the same would apply for student-owned wireless mobile devices such as smartphones.

6 CONCLUSIONS

Today's learners exist in a digital age. This implies access to, and use of, a range of Social Web tools and software that provide gateways to a multiplicity of interactive resources for information, entertainment and, not least, communication. (JISC, 2009)

Over the last two and a half years the researchers working on the integration of mobile web 2.0 technologies into selected Unitec courses and programmes have found the trials to be very successful. As our case studies show the student and lecturer experience within the programmes have been enhanced through the facilitation of a social constructivist environment that bridges multiple

contexts and significant changes in pedagogical approach and levels of student engagement have been realised.

Our key findings show:

- Successful implementation of mobile web 2.0 projects require careful, planned integration into the course curriculum and assessment.
- To support students in Web 2.0 teaching and learning, staff need to become proficient users of an appropriate range of Web 2.0 tools and technologies, the teaching of which must be incorporated into ongoing training and professional development programmes

References

- [1] Chan, S. (2007, 19 February). *Mlearning and the workplace learner: Integrating mlearning eportfolios with moodle*. Paper presented at the Conference on Mobile Learning technologies and Applications (MOLTA), Massey University, Auckland, New Zealand.
- [2] Cochrane, T. (2008a, 8-10 October). *Designing mobile learning environments: Mobile trials at unitec 2008*. Paper presented at the MLearn08: The bridge from text to context, University of Wolverhampton, School of Computing and IT.
- [3] Cochrane, T. (2008b, 1 - 4 December). *Mobile web2.0 the new frontier*. Paper presented at the ASCILITE 2008, Deakin University, Melbourne, Australia.
- [4] Herrington, A. (2008, 1 - 4 December). *Adult educators' authentic use of smartphones to create digital teaching resources*. Paper presented at the ASCILITE 2008, Deakin University, Melbourne, Australia.
- [5] Herrington, A., & Herrington, J. (2007). *Authentic mobile learning in higher education*. Paper presented at the AARE 2007 International Educational Research Conference, Fremantle, Australia.
- [6] Herrington, A., & Herrington, J. (Eds.). (2006). *Authentic learning environments in higher education*. Hershy: Information Science Publishing.
- [7] Herrington, J., Mantei, J., Herrington, A., Olney, I., & Ferry, B. (2008, 1 - 4 December). *New technologies, new pedagogies: Mobile technologies and new ways of teaching and learning*. Paper presented at the ASCILITE 2008, Deakin University, Melbourne, Australia.
- [8] International Association for Mobile Learning. (2008). Mobile learning projects. Retrieved December, 2008, from <http://mlearning.noie-kaleidoscope.org/projects/>
- [9] JISC. (2009). *Higher education in a web 2.0 world* (<http://www.jisc.ac.uk/publications/documents/heweb2.aspx>): JISC.
- [10] McLoughlin, C., & Lee, M. J. W. (2008). Future learning landscapes: Transforming pedagogy through social software. *Innovate: Journal of Online Education*, 4(5).
- [11] O'Reilly, T. (2005). What is web 2.0: Design patterns and business models for the next generation of software. Retrieved March, 2006, from <http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html>
- [12] Wadsworth, Y. (1998). What is participatory action research? Retrieved May 3, 2002, from <http://www.scu.edu.au/schools/gcm/ar/ari/p-ywadsworth98.html>
- [13] Wenger, E., White, N., Smith, J., & spa, K. R.-. (2005). Technology for communities. Retrieved 14 July, 2006, from <http://technologyforcommunities.com/>