ALT-C Proceedings

Authors

Thomas Cochrane
Roger Bateman

Address for correspondence

Te Puna Ako, Unitec New Zealand, tcochrane@unitec.ac.nz
Department of Design, Unitec New Zealand, rbateman@unitec.ac.nz

<START NEW PAGE>

Strategies for mlearning Integration: Evaluating a Case Study of Staging and Scaffolding mlearning Integration across a Three-Year Bachelor's Degree

Abstract
This paper outlines the third iteration of integrating mobile web 2.0 within a Bachelors level course. An analysis and comparison of the impact of mobile web 2.0 across all three years of the 2009 course enables the development of implementation strategies that can be used to integrate mlearning into other tertiary courses, and inform the design of further Product Design mlearning integration iterations.

1.   Introduction
The integration of mlearning across the 2009 Bachelor of Product Design programme was the result of the third iteration and refinement of a participatory action research project investigating the potential of mobile web 2.0 in tertiary education. What began as an investigation of the affordances of web 2.0 in 2007 developed into a mobile web 2.0 proof of concept project within the third year of the Bachelor of Product Design in 2008, then quickly spread to projects within the first and second year of the programme in semester2 of 2008. The success of these projects led to the integration of mobile web 2.0 technologies (based on an explicit social constructivist pedagogy) across all three years of the programme in 2009 (http://www.youtube.com/watch?v=8Eh5ktXMji8). The aforementioned projects formed one case study of a wider mlearning research project spanning 2007 to 2009 involving multiple course contexts. The research questions were:

- What are the key factors when integrating Wireless Mobile Devices (WMDs) within tertiary education courses?

- What challenges/advantages to established pedagogies do these disruptive technologies present?

- To what extent can 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?

Pre-trial surveys captured the participants' previous mobile web 2.0 experiences. Throughout the duration of the project lecturers and students then attended a weekly community of practice (COP) to investigate and support the integration of mobile web 2.0 tools into their courses. Participant feedback was captured via their online web 2.0 sites, including a blog/eportfolio. A post-trial survey and focus group discussion were also used to capture participant feedback.

During 2008 participating lecturers noted that the integration of mobile web 2.0 within the course significantly engaged students and provided the basis for a flexible, context independent learning environment. On that basis the Product Design lecturers, along with the help of the researcher (the technology steward (Wenger, White, & Smith, 2009; Wenger, White, Smith, & Spa, 2005)), planned the integration of mobile web 2.0 tools across all three years of the course for all Product Design students and lecturers in 2009. While it was believed that a student-owned smartphone model was the best ultimate approach, it was decided to further the seeding of mobile web 2.0 into the programme by providing students with institutionally loaned smartphones. The cost of both the smartphones and mobile data dropped significantly during 2008 and 2009, and a variety of student-owned funding models will be explored for 2010 and onwards.

Focus group feedback from participating students in 2008 indicated that the coverage of mobile web 2.0 affordances during the 2008 COPs was too broad, presenting a high cognitive load for the students. Students were overwhelmed by the options available in the timeframe provided, and would have preferred to have focused on fewer affordances, and to have used them well. Therefore specific mobile affordances were chosen and utilised as a focus in the 2009 Product Design course (See Table 1, the tinyurls reference Educause "7 things" series of articles on each technology). Students' core activity was situated around a reflective blog (http://www.vox.com) that was accessible via mobile devices, and provided a key source of participant reflections. Students' Vox Blogs were planned to become reflective journals of their design processes and learning throughout the year, as well as building up a showcase (eportfolio) of their Product Design capabilities.   In particular the use of Vox Blogs was expected to increase students abilities to:

- Become critical reflective thinkers as well as creative designers
- Collaborate, communicate and convey ideas
- To work with new technologies as part of the process (mobile web 2.0 being core in enabling this).

Table 1. Affordances of smartphones mapped to social constructivist activities.

Activity	Overview	Examples	Pedagogy
Video Streaming	Record and share live events	Flixwagon, Qik http://www.qik.com	Real-time Event, data and resource capturing and collaboration.
Geo tagging	Geotag original photos, geolocate events on Google Maps	Flickr, Twitter, Google Maps http://tinyurl.com/5a85yh	Enable rich data sharing.
Micro-blogging	Post short updates and collaborate using micro-blogging services	Twitter http://tinyurl.com/2j5sz3	Asynchronous communication, collaboration and support.
Txt notifications	Course notices and support	Txttools plug-in for Moodle and Blackboard	Scaffolding, learning and administrative support

Activity	Overview	Examples	Pedagogy
Direct screen sharing	Video out to video projector, or large screen TV	Microvision Show http://tinyurl.com/celgot	Student presentations, peer and lecturer critique.
Social Networking	Collaborate in groups using social networking tools	Vox groups, Ning, peer and lecturer comments on Blog and media posts http://tinyurl.com/4uz6rj	Formative peer and lecturer feedback.

In order to achieve an explicit move to a social constructivist learning environment using mobile web 2.0 tools in 2009, a staged, and scaffolded approach was adopted. The 2009 project implementation was influenced by reflections upon the 2007 and 2008 mlearning projects, and also the recent conceptualizations of mlearning around the emergence of new learning theories based broadly upon social constructivist foundations. These included: Authentic learning (J. Herrington, Mantei, Herrington, Olney, & Ferry, 2008), Pedagogy 2.0 (Catherine McLoughlin & Mark Lee, 2008), Learner Generated Contexts and the Pedagogy, Andragogy, Heutagogy (PAH) continuum (Luckin, et al., 2008). The planned staged approach therefore allowed the bridging of the PAH continuum (Table 2), and the embedding of mobile web 2.0 affordances that support each stage.

Table 2: The PAH continuum, from Luckin et al (2008, p. 10).

	Pedagogy	Andragogy	Heutagogy
Locus of Control	Teacher	Learner	Learner
Educational sector	Schools	Adult education	Doctoral research
Cognition Level	Cognitive	Metacognitive	Epistemic
Knowledge Production Context	Subject understanding	Process negotiation	Context shaping

The integration of mlearning (mobile web 2.0) across the three years of the Bachelor of Product Design programme in 2009 was structured as follows in Table 3, 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 3: Scaffolding the rollout of mobile web 2.0 throughout the Product Design course.

Implementation Stage	Web 2.0 Tools	MLearning Tools	Course Timeframe and focus	PAH alignment
Level 1	Social Collaboration with peers and lecturer.	Introduction of netbooks and establishment of basic web 2.0 sites	Semester1, Year1 Blogging	Pedagogy
Level 2	Student generated content.	Netbook plus mid-range smartphone (Nokia XM5800)	Semester2, Year1 Student Vodcasts, geotagging, moblogging	From Pedagogy to Andragogy

Implementation Stage	Web 2.0 Tools	MLearning Tools	Course Timeframe and focus	PAH alignment
Level 3	Social collaboration with peers and external 'clients'. Context Aware	Student-owned laptop plus mid-range smartphone (Nokia XM5800)	Year2 Social networking, Mobile Codes, Geolocation	Andragogy
Level 4	Context Independent. Student generated contexts.	Student-owned laptop plus high-end smartphone (Nokia N97)	Year3 Microblogging, facilitation of 'virtual studio', location recording	From Andragogy to Heutagogy

2.   Bachelor of Product Design 2009 mLearning Projects

The entire three years of the Bachelor of Product Design course were included in the 2009 mlearning project, allowing staging of the cognitive and technological learning required to integrate these tools.

First Year Mobile Project

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. Students were supplied with a Dell mini9 3G netbook in semester one, and this was supplemented with the addition of a Nokia Xpressmusic 5800 smartphone at the end of semester one. The course projects are outlined on Google Docs:

- PIC2 Project1 http://docs.google.com/View?id=dchr4rgg_55r5gntvf7
- PIC2 Project2 http://docs.google.com/View?id=dchr4rgg_57c3xj5qg7

Second Year Mobile Project

The focus of the 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 2008 mlearning project. The 2009 project utilised the Nokia Xpressmusic 5800 to facilitate an assessed online Blog/eportfolio documenting and showcase students' design processes, forming the basis of collaborative critique and show-casing with worldwide peers and potential employers or clients. Ning was used as a teacher-facilitated collaborative hub for all the projects. Second semester projects focused on sharing and critiquing projects using Google Docs and Vox Group blogs, using the smartphone to capture and share project progress and presentations. Course outlines are available on Google Docs:

- Gown Design Project http://docs.google.com/View?id=dchr4rgg_47cwtgcwcf
- ManTech Project http://docs.google.com/View?id=dv83r4v_33f89b4fhm

Third Year Mobile Project

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 was a collaborative project with Applied Trades and Landscape Design students. 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. Additionally, communication and collaboration made use of instant messaging, microblogging, and reflective VODCasts during the 'nomadic' (beyond the classroom) studio session. Two of the third year project briefs are available on Google Docs:

- Shac09 Project Brief http://docs.google.com/View?id=dchr4rgg_44f4v8kccx
- NPC Project Semester2 http://docs.google.com/View?id=dv83r4v_8ddxfbkfg

3. Discussion

A comparative analysis of student activity and feedback across the three year-groups of the course provides a basis for critiquing the success of the staged implementation of mlearning integration into the course in 2009. A comparison of the three mobile usage surveys indicates significant average smartphone use differences between the three years of the course. The first year project's main focus was upon developing students use and integration of web 2.0 tools (facilitated by the netbook and the smartphone), rather than upon the unique affordances of the smartphone, this being the focus of the second and third year projects. Thus while the first year students experimented with the unique multimedia affordances of the smartphones they did not (in general) as a group socialize the everyday use of these unique affordances into their course. The use of the unique affordances of the smartphones was encouraged, but was optional in their projects. The structured nature of the first year projects followed a more teacher-directed pedagogical learning environment than the second and third years.

The second year students, in general, socially rejected the unique affordances of the XM5800 smartphone and tended to revert to standard use of the phone, with the exception of image and video blogging that were used for facilitating student-generated content. This was because many of the second year students found the XM5800 too complicated for these general activities. While the unique affordances of the smartphone were introduced by the technology steward (researcher) they were not modeled by the second year lecturer within authentic contexts, and therefore students struggled to conceptualise the use of these affordances within their course. Most of the second year students expressed their engagement with the mlearning project, but rejected the XM5800 as a device. Their feedback indicated that they preferred the previous 2008 mlearning project use of the iPhone 3G when they were first year students. "The Nokia's UI was so bad and non-intuitive that I didn't use the phone as much as I wanted to – I really like the whole idea – just not this phone" (example second year student feedback). Interestingly many of the students in the other second semester mlearning projects (Architecture and Performing and Screen Arts) expressed deep personal appropriation of the XM5800, with most reluctantly returning the device at the end of their 2009 projects. The social non-appropriation of the XM5800 by one or two vocal students appears to have been very influential in the second year Product Design project. This

illustrates the influence of the social construction of technology (Bijker, 1995) on technology appropriation.

In contrast the third year students appropriated the multimedia and communications capabilities of the N95 and N97, using a wide range of mobile web 2.0 affordances including instant messaging, Twitter, and QR Codes. The GPS and maps integration of the smartphones was also highly rated by the students, but used most frequently by third year students. The third year students maximized the use of the unique affordances of the smartphones within authentic contexts provided by their unstructured final year design projects which followed the development of a heutagogical learning environment modeled by the course lecturer (Cook, Bradley, Lance, Smith, & Haynes, 2007; Cook, Pachler, & Bradley, 2008; Luckin, et al., 2008).

The mlearning integration within the course was scaffolded by the use of an intentional community of practice (COP) model (Langelier, 2005) comprising weekly support sessions involving the course lecturers, the researcher (as the technology steward) and the course students. The face-to-face weekly mlearning COP support sessions were highly valued by the first and third year students and lecturers, forming the basis of a significant learning community around the mlearning projects. However, unlike the first and third year projects, the second year lecturer did not place as much value on the weekly COP sessions, often postponing them, double-booking with guest lecturer sessions, or simply forgetting about them and did not regularly attend the COPs himself, leading to weak learning community formation around the mlearning project in the second year.

3.1 Student Feedback

The final student surveys and focus group questions provided further data on student feedback on the three 2009 Product Design mlearning projects. Table 4 below summarises and compares student feedback in the form of answers to the final student survey questions.

The feedback from the third year students was overwhelmingly positive, indicating that the mlearning integration into their course was perceived as very beneficial in almost all areas. The majority of first year students enjoyed the mobile web 2.0 projects, with none finding it a disagreeable experience. Though largely negative about the smartphone used in the project, more than 90% of the second year students found the experience fun. Most first and second year students appropriated the personal use of the smartphones but did not use their unique affordances to enhance group collaboration and communication, particularly with their lecturers who had not supplied their phone numbers or utilized instant messaging or Twitter to facilitate communication with their students. Very little formative feedback was posted as comments to students' blogs by the second year lecturers. In contrast the first and third year lecturers actively participated on the student blogs. Additionally, several of the third year students utilized instant messaging and Twitter on their smartphones to stay in constant communication and collaboration with their lecturer, the researcher, and their student peers, facilitating a context independent learning community that the second year students did not experience.

Table 4: Comparative Product Design Student Survey Feedback 2009.

End of project Survey Question	Percentage Student agreement/satisfaction with statement (strongly agree plus agree)		
	Year1	Year2	Year3

End of project Survey Question	Percentage Student agreement/satisfaction with statement (strongly agree plus agree)		
	Year1	Year2	Year3
4. What has been your experience of group work facilitated by Blogs and RSS?	60%	57%	80%
6. It was easy to use the smartphone?	20%	64%	100%
7. This mobile learning experience was fun.	70%	55%	100%
8. Based on my experience during this trial, I would use a smartphone in other courses	50%	65%	100%
9. I would be willing to purchase my own smartphone?	40%	73%	100%
11. In your opinion, does mobile learning increase the quality of learning?	80%	73%	100%
12. Mobile blogging helped create a sense of community (group work)?	60%	82%	80%
13. Accessing your course blog was easy using the mobile device?	40%	46%	100%
14. Mobile learning increases access to education?	50%	64%	100%
15. Communication and feedback from the course tutor/lecturer were made easier?	70%	55%	80%
16. Mobile learning is convenient for communication with other students?	90%	82%	80%

3.3   Blog Analysis

Student blogs were a source of personal and collaborative reflection and critique. While the third year project began in March 2009, the second and first year mobile web 2.0 projects both began in May 2009. As Figure 6 indicates, the mid-year break in June/July saw a drop-off in student activity, particularly with the third year students who followed a much more self-directed learning timetable.
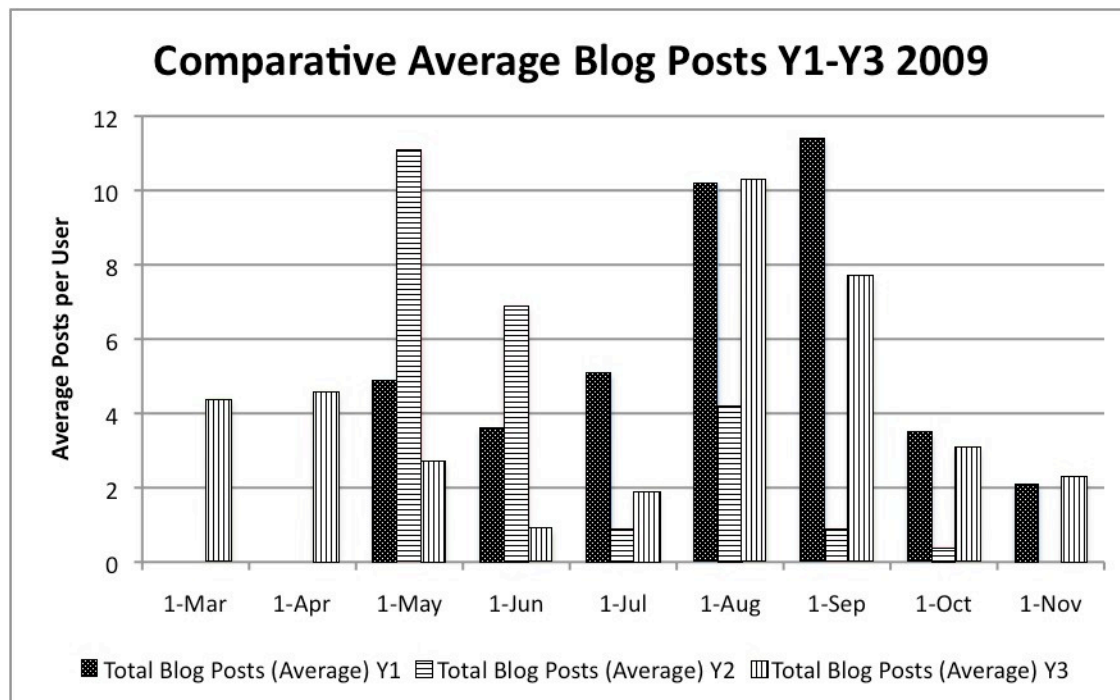
Figure 6: Comparative average blog posts per Product Design student group 2009.

While initially exhibiting significant engagement by the second year students with blogging during the collaborative group 'Gown Design' project in semester one, they quickly lost interest during the second semester. The mlearning and blogging integration into the course lost focus as the second year lecturer failed to capitalize on the integration of mobile web 2.0 into the course in the second semester.
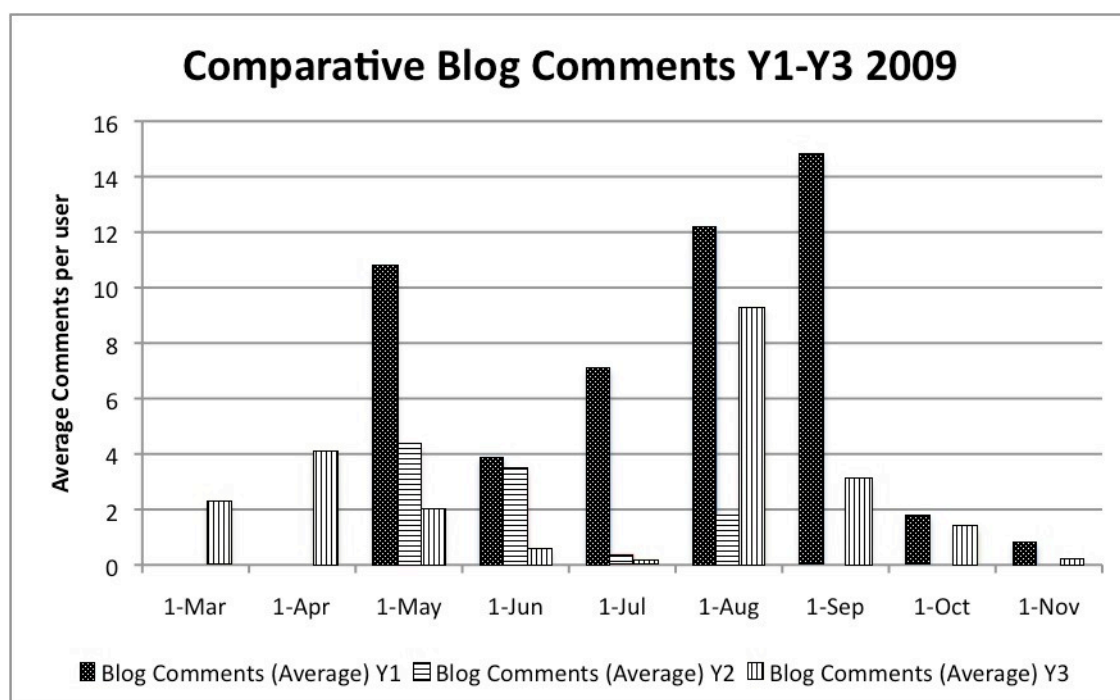

Figure 7: Comparative average blog comments per Product Design student group 2009.

The number and regularity of comments on the students' blogs (Figure 7 above) indicates how much of an interactive and collaborative learning community was established. First year students and their lecturers were highly active in commenting on each other's blog posts. The Second year course was notable in the lack of formative feedback given to students as comments from lecturers on their blog posts. This lack of engagement by the second year lecturers with the student blogs reflected in the students' perceptions on the lack of course integration and importance of their blogs, resulting in a quick drop-off in engagement in the second semester, which in the researcher's view was a wasted opportunity on the part of the lecturer.

Media Elements in Posts

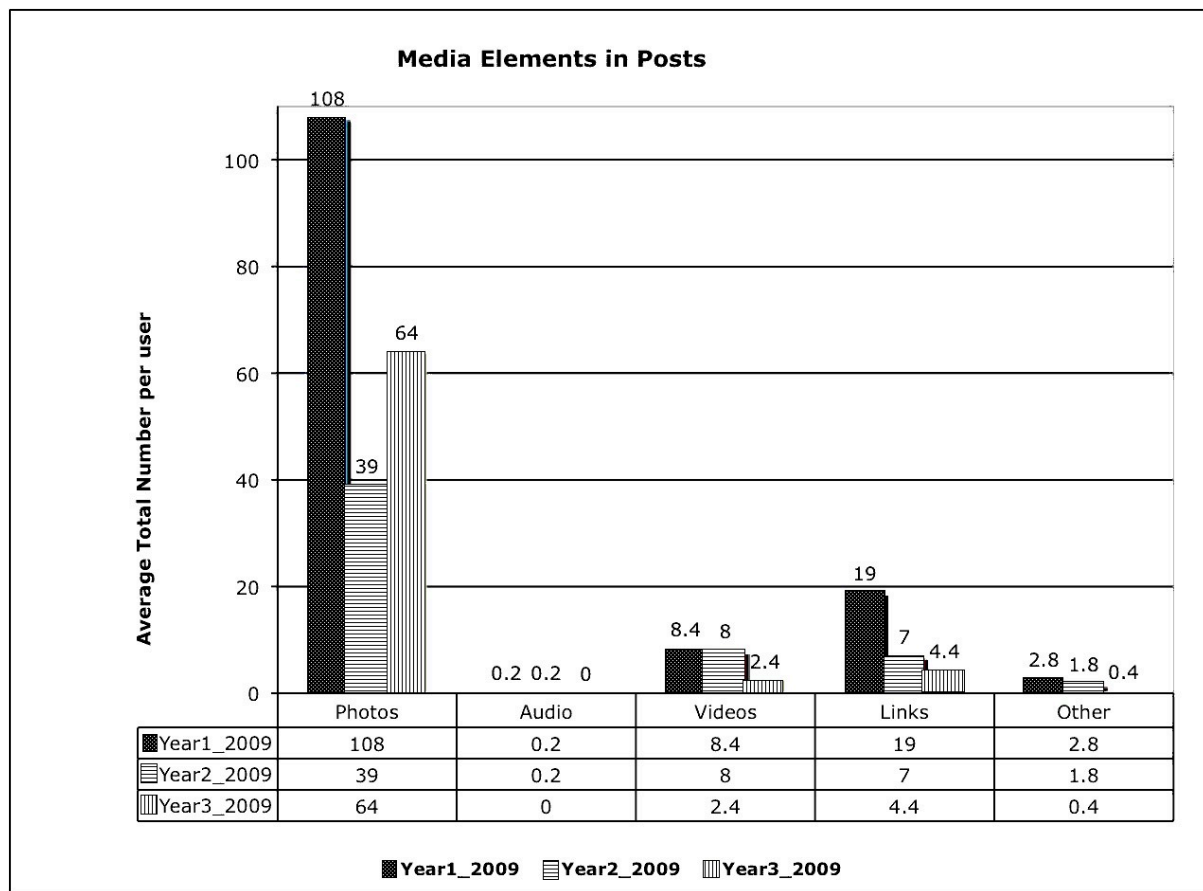|	Photos	Audio	Videos	Links	Other
Year1_2009	108	0.2	8.4	19	2.8
Year2_2009	39	0.2	8	7	1.8
Year3_2009	64	0	2.4	4.4	0.4

Figure 8: Comparative blog media elements per Product Design student group 2009.

The majority of media uploaded to student blogs was captured via the smartphones. As Figure 8 above indicates, the bulk of this media was in the form of still images, followed by web links to resources and closely followed by videos – either original recorded videos from their smartphones or embedded YouTube videos. Links to Google Docs and Picasa Slideshows (collections of images formatted as interactive online albums) were also popular. First year students uploaded a surprising number of images to their blogs. The student-content creation focus of the first year project generated a lot of engagement from the students.

4.   Case Study Analysis

This section brings out some of the key themes highlighted by the mlearning integration into the Bachelor of Product Design programme in 2009.

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

4.1   Implications for the Research Questions

In general the integration of mobile web 2.0 technologies into the Bachelor of Product Design has been very successful. As the case studies show the student and lecturer experience within the programme have been enhanced through the facilitation of a social constructivist environment that bridges multiple contexts. Over the last three years significant changes in pedagogical approach and levels of student engagement have been realised. The future aim is to continue to build upon the insights gained focusing upon the PAH alignment of the unique affordances of mobile web 2.0 (Table 1) using a staged and scaffolded model (Table 3) to fully embed mobile web 2.0 tools into the entire Bachelor of Product Design curriculum. Additionally, the importance of both technical and pedagogical scaffolding for both the lecturers and students via a community of practice model has been found to be critical.

While the research has sought to produce transferable principles and strategies to enhance tertiary education using mobile web 2.0, it is ultimately bound by the limits of the contexts of the learning communities that it is embedded in, and the current affordances of the available mobile web 2.0 technologies. To create a sustainable approach, the goal going forward is to move to a student-owned model, where students purchase their own smartphone. It is yet to be seen whether there can be transferability of the research outcomes based upon an institution supplied or specified WMD and mlearning projects based upon student chosen and owned WMDs (Traxler, 2010).

4.1.1 What are the key factors in integrating Wireless Mobile Devices (WMDs) within tertiary education courses?

While every implementation of mlearning and each learning context will be unique, several key factors have been identified by the research that have proven to be important across multiple mlearning implementations and contexts (Cochrane, 2010). The pedagogical integration of the technology into the course criteria and assessment is critical. Lecturer engagement and modeling of the pedagogical use of the WMDs is essential. These changes in curriculum design and practice (and student acceptance) take time (Chi & Hausmann, 2003), in the example case study given this time frame has spanned several years. Innovative practice must take a scaffolded and staged approach to implementation, and lecturers (and students) require significant pedagogical and technical support during this time.

4.1.2 What challenges/advantages to established pedagogies do these disruptive technologies present?

Mobile web 2.0 tools are 'disruptive' technologies (Sharples, 2001) that democratize the learning environment, empowering students, and providing opportunities for social constructivist pedagogies. The ubiquitous connectivity of WMDs combined with the student content creation and sharing capabilities of web 2.0 shift the learning focus from teacher-directed to student-centred learning (Bruns, 2007; Cochrane, Bateman, & Flitta, 2009; Laurillard, 2007). This learning can then occur across almost any context, bridged by the

ability of the WMDs to augment, capture, share and communicate learning experiences (Cochrane, 2009; Vavoula, 2007). This changes the role of the educator and the nature of learning for the students. For many lecturers integrating a social constructivist learning environment will mean redesigning assessments and developing a new pedagogical 'toolkit'. This takes time and commitment. Technological and pedagogical support for these paradigm shifts is critical. These disruptions facilitate appropriate shifts along the pedagogy to heutagogy continuum (Cochrane, Flitta, & Bateman, 2009; Luckin, et al., 2008; C McLoughlin & Mark Lee, 2008)

4.1.3 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?

Mobile web 2.0 can be used to facilitate collaborative, authentic learning within authentic contexts (A. Herrington & Herrington, 2007; A. Herrington, Herrington, & Mantei, 2009). The aggregation of a variety of mobile web 2.0 tools facilitates metacognition and reflection. Students demonstrate increased motivation and engagement when using personal devices and personalized media-rich learning spaces (JISC, 2009a, 2009b). Students initially engaged by the use of personal and innovative technologies can appropriate the pedagogical use of these tools when scaffolded and supported by learning communities guided by an appropriate technology steward (Cochrane, 2007; Wenger, et al., 2009; Wenger, et al., 2005).

4.1.4 To what extent can WMDs be used to harness the potential of current and emerging social constructivist e-learning tools?

Since the researcher's first attempts at marrying the affordances of web 2.0 and mobile technologies in 2006, mobile web 2.0 has developed into a range of viable, user-friendly, rich-media, flexible and context independent tools (Cook, et al., 2007) that can be used to bridge both the formal and informal learning environments (Vavoula, 2007), spanning both distance and time. As these tools develop further, so will their educational potential and richness.

5.   Conclusions

The Product Design mlearning projects achieved significant 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. The case study illustrated the potential to stage and scaffold mlearning integration across all three years of a Bachelor level course, starting with establishing a learning community culture involving both the students and the lecturers and facilitation of a progression of teaching paradigms from pedagogy to heutagogy (PAH) (Luckin, et al., 2008) following the first year to third year of the course. The PAH continuum maps well with the progression of mobile web 2.0 course integration from web 2.0 appropriation (JISC, 2007, 2009a) in first year to student mobile facilitated content creation (Bruns, 2007; JISC, 2009b) in second year, and finally the context independence and bridging affordances of mlearning (Luckin, et al., 2008; Vavoula, 2007) leveraged in the third year 'nomadic studio'. Both positive and negative influences on the integration of mlearning within the course were also identified and discussed.

6.   References

Bijker, W. (1995). *Of bicycles, bakelites, and bulbs. Toward a theory of sociotechnical change*. Cambridge: MIT Press.

Bruns, A. (2007, March 21-23). *Beyond difference: reconfiguring education for the user-led age.* Paper presented at the ICE3: Ideas in cyberspace education: digital difference, Ross Priory, Loch Lomond.

Chi, M., & Hausmann, R. (2003). Do Radical Discoveries Require Ontological Shifts? In L. Shavinina & R. Sternberg (Eds.), *The International Handbook on Innovation* (Vol. 3, pp. 429 - 442). New York: Elsevier Science.

Cochrane, T. (2007, 16-19 October). *Moving Mobile Mainstream: Using Communities of Practice to Develop Educational Technology Literacy in Tertiary Academics.* Paper presented at the MLearn 2007 - Making the Connections 6th International Conference on Mobile Learning, Melbourne Exhibition Centre, Melbourne.

Cochrane, T. (2009). Mobile Web2.0: Bridging Learning Contexts. In S. Caballe, F. Xhafa, T. Daradoumis & A. A. Juan (Eds.), *Architectures for Distributed and Complex M-Learning Systems: Applying Intelligent Technologies* (pp. 123 - 151). Hershey, PA 17033, USA: IGI Global.

Cochrane, T. (2010). Exploring Mobile Learning success factors. *ALT-J, Research in Learning Technology, 18*(in press).

Cochrane, T., Bateman, R., & Flitta, I. (2009, 22-24 April). *Integrating Mobile Web 2.0 within Tertiary Education.* Paper presented at the m-ICTE2009, Lisbon, Portugal.

Cochrane, T., Flitta, I., & Bateman, R. (2009). Facilitating Social Constructivist Learning Environments for Product Design Students Using Social Software (Web2) and Wireless Mobile Devices. [Journal]. *DESIGN Principles and Practices: An International Journal, 3*(1), 15pp.

Cook, J., Bradley, C., Lance, J., Smith, C., & Haynes, R. (2007). Generating learner contexts with mobile devices. In N. Pachler (Ed.), *Mobile Learning: towards a research agenda* (Vol. 1, pp. 55-73). London: WLE Centre, Institute of Education.

Cook, J., Pachler, N., & Bradley, C. (2008). Bridging the Gap? Mobile Phones at the Interface Between Informal and Formal Learning. *Journal of the Research Center for Educational Technology (RCET), 4*(1), 3 - 18.

Herrington, A., & Herrington, J. (2007). *Authentic mobile learning in higher education.* Paper presented at the AARE 2007 International Educational Research Conference, Fremantle, Australia.

Herrington, A., Herrington, J., & Mantei, J. (2009). Design Principles for mobile learning. In J. Herrington, A. Herrington, J. Mantei, I. Olney & B. Ferry (Eds.), *New Technologies, new pedagogies: Mobile learning in higher education* (pp. 129-138). Wollongong: Faculty of Education, University of Wollongong.

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.

JISC (2007). *In Their Own Words: Exploring the learner's perspective on e-learning* (Internet). Bristol: Higher Education Funding Council for England.

JISC (2009a). Effective Practice in a Digital Age. In JISC (Eds.) Available from http://www.jisc.ac.uk/publications/documents/effectivepracticedigitalage.aspx

JISC (2009b). *Higher Education in a Web 2.0 World* (http://www.jisc.ac.uk/publications/documents/heweb2.aspx): JISC.

Langelier, L. (2005). *Work, Learning and Networked: Guide to the implementation and leadership of intentional communities of practice*. Quebec City: CEFIRO (Recherche et Études de cas collection).

Laurillard, D. (2007). Pedagogcal forms of mobile learning: framing research questions. In N. Pachler (Ed.), *Mobile Learning: towards a research agenda* (Vol. 1, pp. 33-54). London: WLE Centre, Institute of Education.

Luckin, R., Clark, W., Garnett, F., Whitworth, A., Akass, J., Cook, J., et al. (2008). Learner Generated Contexts: a framework to support the effective use of technology to support learning Retrieved 5 November, 2008, from http://api.ning.com/files/Ij6j7ucsB9vgb11pKPHU6LKMGQQkR-YDVnxruI9tBGf1Q-eSYUDv-Mil6uWqX4F1jYA1PUkZRXvbxhnxuHusyL1lRXVrBKnO/LGCOpenContextModelning.doc

McLoughlin, C., & Lee, M. (2008). Future Learning Landscapes: Transforming Pedagogy through Social Software. *Innovate: Journal of Online Education, 4*(5), 7.

McLoughlin, C., & Lee, M. (2008). *Mapping the digital terrain: New media and social software as catalysts for pedagogical change.* Paper presented at the ASCILITE Melbourne 2008, Deakin University, Melbourne.

Sharples, M. (2001). Disruptive devices: mobile technology for conversational learning. *International Journal of Continuing Education and Lifelong Learning, 12*(5/6), 504-520.

Traxler, J. (2010). Will Student Devices Deliver Innovation, Inclusion, and Transformation? *Journal of the Research Center for Educational Technology (RCET), 6*(1), 3-15.

Vavoula, G. (2007). *Learning Bridges: a role for mobile technologies in education*. Paper presented at the M-Learning Symposium. from http://www.wlecentre.ac.uk/cms/index.php?option=com_content&task=view&id=105&Itemid=39

Wenger, E., White, N., & Smith, J. (2009). *Digital Habitats: stewarding technology for communities*. Portland, Oregon: CPsquare.

Wenger, E., White, N., Smith, J., & Spa, K. R.-. (2005). Technology for communities. *2006*(14 July). Retrieved from http://technologyforcommunities.com/

V1-20091124