



iPadagogy: Appropriating the iPad within Pedagogical Contexts

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ABSTRACT

In this paper we compare and critique four mlearning projects using iPads in 2010. Using an action research methodology the authors explored the impact of the integration of the mlearning projects on the pedagogical approaches of these four courses. The four iPad projects present four different approaches to the integration of the iPad within a variety of educational contexts. The four projects were informed by six critical success factors identified from thirty mlearning projects between 2006 and 2010, and the resulting plans for 2011 are introduced.

Author Keywords

iPad, Pedagogy, mlearning

INTRODUCTION

The iPad has ignited interest from educators who see the potential of the iPad's affordances over laptops or smartphones. Is this just another case of the latest tool fever or as Brown-Martin (2010) describes an actual "game changer" for education? This paper explores the potential impact of the iPad upon tertiary education by comparing and critiquing four 2010 iPad project case studies. The common foundational pedagogy guiding the design of each of these projects was social constructivism, focusing upon student-generated content and student-generated contexts. The iPad was used as a "game-changer" by enabling teacher-centric learning environments to be disrupted by empowering students with devices that are portable, wirelessly connected, feature long battery life, and integrated with web 2.0 services for student-generated content, collaboration and sharing. Thus to varying degrees the four iPad projects used the iPad as a catalyst for pedagogical change, illustrating how mlearning can be used to help bridge the Pedagogy-Andragogy-Heutagogy continuum (Ecclesfield & Garnett, 2010; Garnett, 2010; Luckin, et al., 2010).

The Emergent iOS Economy

Apple has progressively developed an entire 'ecosystem' supporting its foray into the mobile market since the introduction of the first iPod in 2001. Ten years on this ecosystem now encompasses not only portable digital media players and the iTunes music store, but now includes the largest mobile application, music, and video revenue. The 2011 iOS economy encompasses a range of mobile devices including the iPod, the iPod Touch, the iPad, and the iPhone. Apple has built up a significant lead over competing mobile ecosystems (Android, Blackberry, Symbian, Windows Phone7, WebOS) in developing a mature mobile ecosystem. Whitney (2011) quotes Jack Kent, an IHS mobile media analyst, "Apple, in contrast, has been able to maintain advantage by leveraging its tightly controlled ecosystem--combining compelling hardware and content with the capability to offer consumers a trusted, integrated, and simple billing service via iTunes" (Whitney, 2011, p. 1). While Apple is often decried for making this iOS ecosystem tightly controlled and closed, the more "open" Google-owned Android mobile ecosystem has been playing catch-up and recently suffered a spate of malware attacks within the Android Market (Kirk, 2011). The Android Market, the equivalent of the iTunes App Store, is reportedly vulnerable to over seventy types of malware (Browning, 2011). Getting the best out of the Android ecosystem currently remains the domain of power users capable of tweaking and updating the OS to get the best out of it. In contrast, Nokia's Symbian ecosystem was recently described by its CEO as a "burning oil platform" (Ricknas, 2011), resulting in a partnership with Microsoft's Windows Phone 7 OS that has yet to attract significant market share. In comparison, the iOS ecosystem presents a maturing, safe and user-friendly environment supported by over 75000 apps, making it the popular mobile platform choice in education. However, the iOS economy is not without its foibles, chief among these is the restrictive file structure imposed upon iOS apps that requires application developers and users to develop creative ways of sharing content and data between applications, often

relying upon cloud-based services. Thus the iPad projects presented several limitations and challenges for the researchers' to mitigate.

Research Context

The researcher has managed and implemented almost thirty mlearning projects between 2006 and 2010. The focus of these mlearning projects has been on exploring the potential of mlearning as a catalyst for transforming pedagogy from instructivist lecturer-directed pedagogy to social constructivist pedagogy enabling student-generated content and student-generated contexts (heutagogy). The mlearning projects encompassed nine different tertiary courses, forming nine case studies spanning from one to four years of implementation and refinement, utilizing a range of wireless mobile devices (WMDs), and involved a total of 690 participants. The learning contexts included:

- Bachelor of Product Design (2006 using Palm Lifiedrive, 2008 using Nokia N80, N95, and Apple iPhone 3G, 2009 using Nokia XM5800, N95, N97, 2010 using student-owned laptops and cameraphones, and Nokia N97)
- Diploma of Landscape Design (2006 Using Palm TX, 2007 using Nokia N80, 2008 using Sonyericsson P1i, 2009 using Dell mini9 netbook, 2010 using Nokia XM5800)
- Diploma of Contemporary Music (2008, 2009 using iPod Touch, iPhone 3G, 2010 using Apple iPad)
- Bachelor of Architecture (2009, using Nokia XM5800 and Dell Mini9 netbook, 2010 using Android HTC Desire smartphones and Apple iPads)
- Bachelor of Performing and Screen Arts (2009 using Dell Mini9 netbook and Nokia XM5800, 2010 using Dell Mini9 netbook, Nokia XM5800, and Nokia N97)
- Bachelor of Business (2010 using Apple iPad)
- Bachelor of Computing (2010 using Apple iPhone)
- Bachelor of Graphic Design (2010 using Nokia XM5800 smartphone)
- Bachelor of Civil Engineering (2010 using Apple iPad)

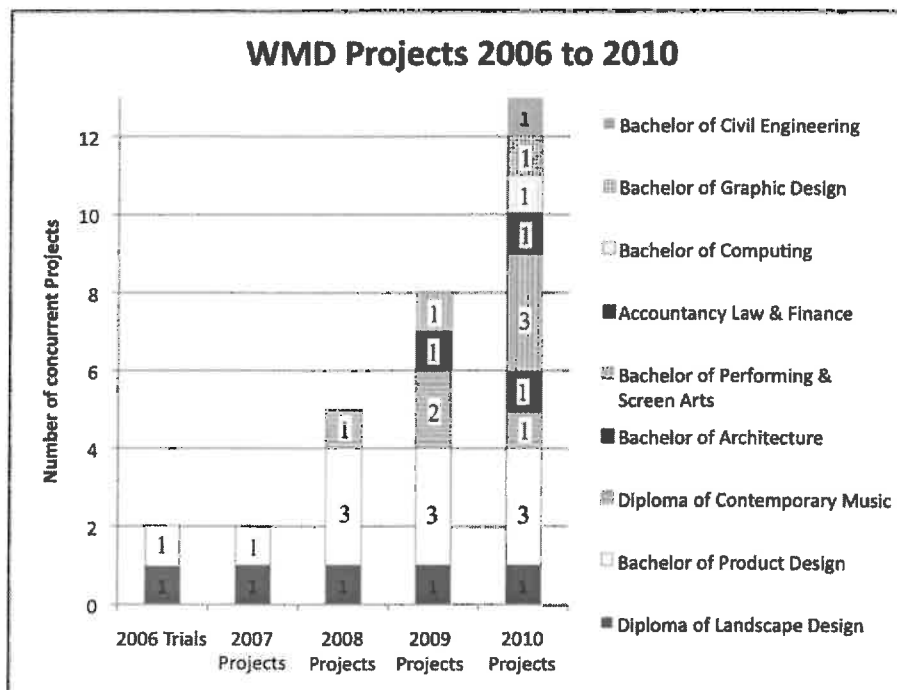


Figure 1: Mlearning Projects 2006 to 2010

Research Methodology

The research involved a partnership between the researcher, the course lecturers, and the students involved in each successive mlearning project. The researcher's role was that of the primary collector of data, and the technology steward (Wenger, White, & Smith, 2009; Wenger, White, Smith, & Rowe, 2005) within the communities of

practice developed to support each project. The research approach was thus participatory action research (Wadsworth, 1998).

Data Collection

The core data gathering tools used in this research consisted of:

1. Pre-project surveys of lecturers and students, to establish current practice, expertise and experience.
2. Post-project surveys and focus groups, to measure the impact of the wireless mobile computing environment, and identify emergent themes.

Lecturers and students recorded their reflections via their own blogs and eportfolios during the project, which were collated by the researcher via RSS feeds. The research used the technologies that were an integral part of the projects, such as participant blog posts, peer blog comments, and VODCast reflections to capture data on the progression and impact of mobile web 2.0 on the participants' learning experiences.

OVERVIEW OF THE IPAD PROJECTS

The four 2010 iPad mobile learning projects formed action research cycles within the longitudinal study into mobile learning at Unitec, utilising the mlearning pedagogical design and support framework developed throughout the earlier projects (Cochrane, 2010a, 2010b). The WMD projects (2006 to 2009) identified six Critical Success Factors for the implementation of mobile web 2.0 (Cochrane, 2010b, 2010c). The six critical success factors include:

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, bridging the pedagogy-andragogy-heutagogy continuum (Garnett, 2010; Luckin, et al., 2010) from lecturer-directed pedagogy to student-directed heutagogy.

These were used to inform the development of the 2010 iPad projects with a focus upon the pedagogical integration of mobile web 2.0 within the courses and the establishment of supporting communities of practice that met regularly throughout the length of a semester.

First Year Bachelor of Business

In semester 2 of 2010 the first iteration of the Bachelor of Business project took place. The project took place in a first year Information Systems course spread across two streams of approximately 30 people each. Students of the day stream were given iPads to work with over the duration of the course and students of the night stream were given netbooks. The mobile devices were integrated into all class sessions and their use outside of class was strongly encouraged. The classical lecture was replaced with class sessions that involved a variety of activities, all of which were integrated with the mobile devices. A typical session involved brief presentations from the lecturer, involving class interaction through the use of polls. These presentations were mixed in with a series of activities where the students were at the centre of the learning, dealing with real world problems and creating their own solutions and content.

Students were encouraged to use the mobile devices to access and store a range of class materials including PDF handouts and eBooks with embedded audio and video. Students were given access to the course text book in eBook format as the main reference for the course. While both the iPad and the netbook were capable of storing and displaying the book, the iPad proved to be easiest to read, navigate and annotate. The course also involved a large number of handouts and exercises that traditionally were either printed or PDF based combined with videos. These were converted into iBook compatible eBooks with embedded video files making it very easy for the day class students to view the material wherever they wanted it.

The Mindmeister collaborative mindmapping online service was used regularly throughout the semester. It worked well with both the iPads and the netbooks allowing the students to work together on problems both during the class time and outside of class. Students engaged well with this and in many cases spent much more time on the activities outside of the class than they otherwise would. Blogging was also used throughout the course. Students initially used the Vox platform and then moved their blogs to the Wordpress platform after Vox shut down. The blogs were based around five assessed blog posts relating to the mobile devices and various aspects of the course. Students were also encouraged to blog between these summative posts and a number chose to do so.

Over the semester students were supported via a Moodle course designed with materials and activities encouraging interaction. Students made use of forums and glossaries to support each other and to gain support from their lecturer. In addition to this virtual layer of support a weekly face to face meeting was available for students to interact with their community specifically about using their mobile device for learning.

Business Education Affordances of the iPad

Example affordances of the iPad utilized in the Bachelor of Business mlearning project are outlined in Table 1.

iPad Capability	Supporting Social Constructivist Pedagogy	Example Application of Affordances
eBooks	Background reading that formed the basis of class discussions	Individual access to material enabling students to be informed in their interaction with each other.
Polling	A springboard for generating class conversations	Gathering and sharing of student thoughts, questions and answers. www.polleverywhere.com .
Blogging	Peer critique and collaboration via commenting	Student ePortfolio creation. www.wordpress.com
Mind Mapping	Concept linking and sharing of learner-generated content (Bruns, 2008).	Student idea creation and sharing.

Table 6: iPad business pedagogical affordances.

eCV Third Year Bachelor of Architecture Elective

The 2010 Architecture project was preceded by a larger but less successful mlearning project in 2009 using netbooks and Nokia Xpressmusic 5800 smartphones with second year Architecture students. The 2009 Architecture mlearning project illustrated the importance of leveraging the unique affordances of WMDs and of their use within collaborative learning environments (Cochrane & Rhodes, 2011). Consequently a different approach was taken in 2010 to establishing an Architecture mlearning project. The third year elective course was previously a lecturer taught course on how to create an electronic CV (curriculum vitae) using Flash and HTML. This elective course was rewritten as a collaborative project between the researcher, the course lecturers, and the course students. The 2010 eCV mlearning project involved the use of HTC Desire Android smartphones for student-generated content and student-generated contexts, and the iPad for editing and sharing this content, within the context of a third year Bachelor of Architecture elective course. The course was modeled on an intentional community of practice (COP) (Langelier, 2005), with the participants consisting of the researcher as the technology steward (Wenger, et al., 2009), the course lecturers, and the course students. The goal of the course was twofold: 1. To stimulate student-negotiated group projects involving student-generated content and student-generated contexts resulting in a foundational web 2.0 eportfolio that the students could then continue to build upon throughout the rest of their course, and 2. To create a group of students and lecturers within the Architecture Department that would then become educational technology evangelists, drawing in the rest of the Architecture lecturers and students from the periphery of the community of practice, thus using the integration of mobile web 2.0 technologies as a catalyst to transform the embedded pedagogy of the Architecture Department. Architecture education is traditionally modeled upon an Atelier studio-based approach where students work in physical group spaces, guided by an expert lecturer, and culminating in face-to-face presentations of their designs critiqued by their lecturers. The goal of the eCV course was to facilitate a move to a heutagogical learning environment, that is: student-directed, 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.

The eCV elective course consisted of weekly COP meetings where the participants investigated the unique affordances of the smartphones and iPads. Following this the COP met for a week-long intensive planning session during the semester break to formulate the student project plans. Students established four teams and brainstormed project concepts using a Twitter hashtag collated and presented live to the whole group using Twitterfall stimulating further discussion and ideas. The student groups then spent two days dispersed throughout Auckland City establishing their projects. They used the smartphones to capture geotagged photos and videos, and digitally augment the real world with augmented reality applications such as: creating points of interest for augmented reality browsers Wikitude and Junaio, QR Codes, and Google Maps. Media captured via the smartphones was then collated and edited using the iPads while on location, previewed using mobile laser pico projectors, and uploaded to their eportfolios from the point of capture using 3G connectivity enabled by mobile broadband hotspots allowing the students to connect in small teams of up to five members, sharing resources and connectivity. Students were required to regularly tweet their progress throughout these two days, allowing their lecturers to

provide formative feedback and guidance on their progress and ideas. The eCV COP then continued weekly throughout the rest of the semester, supporting the development of the student projects, and culminating in the student teams presenting their projects at the end of year Grad Show.

Architectural Education Affordances of the iPad

The unique affordances of the iPad utilized within the Architecture student eCV projects are summarized in Table 2.

iPad Capability	Supporting Social Constructivist Pedagogy	Example Application of Affordances
Image Editing and sharing	Student content generation and sharing situated learning contexts (Bruns, 2008; Stead & Colley, 2008).	Situated learner-generated content, including: geotagging of photos on smartphones, and direct upload to Web 2.0 sites for sharing. For example: Photoshop Express App
Video Editing and sharing	Learner-generated content and sharing of situated learning contexts (Bruns, 2008; Stead & Colley, 2008).	Situated user-generated content such as VODcasts, interviews, real-time streaming or asynchronous upload to Web 2.0 sites and Skype video calls. Capturing critical incidents in students' learning journeys. For example: http://www.youtube.com and Reeldirector App
Geolocation	Facilitating situated learning or authentic learning (Herrington & Herrington, 2007).	Group activities involving: Mapping, Geocaching, and Navigation. For example: http://maps.google.com
Augmented Reality (3G model)	Bridging learning contexts by supporting learner-generated contexts (Cook, 2010; Luckin, et al., 2010).	Using the built-in camera, GPS and compass to overlay the physical environment with student created POIs (points of interest) and location-based data. For example: http://www.layar.com and http://www.wikitude.com
Microblogging	Collaborative publishing and communication across contexts (Luckin, et al., 2010), such as geographic and time-zone barriers.	Asynchronous communication, collaboration & media sharing beyond the classroom. For example: Twitter http://www.twitter.com
Sketch Pad	Concept linking and sharing of learner-generated content (Bruns, 2008).	Student idea creation and sharing.

Table 7: iPad architecture pedagogical affordances.

Contemporary Music Diploma

The 2010 iPad mlearning project was the third iteration of mlearning within the Diploma of Contemporary Music course. The 2010 iPad project was preceded by a 2008 iPod Touch project and a 2009 iPhone 3G project. These preceding projects established the importance of the integration of the mlearning projects into the course assessment and delivery, and the establishment of a supporting community of practice (Cochrane, 2009; Cochrane, et al., 2009). In 2010, the use of the iPad was integrated into the second year music technology paper. The project was scaffolded by the formation of a weekly community of practice involving the researcher as the technology steward, the course lecturer, and the course students. The COP investigated the application of the iPad to the course and its music creation and sharing capabilities. Within the course the iPad was used by students to complete three assignments: an online eportfolio project consisting of at least five blog postings outlining the progress on their work throughout the course containing and promoting student-generated content including audio (30%), an internet search assignment (20%), and three digital audio tasks using the iPad to record environmental sounds which were then mixed into coherent music tracks using Logic and ProTools (15%, 20% and 15%).

Students experimented with a wide range of affordances of the iPad throughout the project, including both productivity applications such as notes, email and blogging, and a variety of music playing, theory, composition and recording applications. The Music students were particularly engaged by the touch interface of the iPad which appealed to their kinesthetic nature as musicians. This is illustrated in a transcription of a student VODCast reflecting upon their experience.

I used it [the iPad] for my digital audio recording assignment and some compositions. Of course I also played games on the iPad! I used the application Audionote for the recording task, and Sonatanote and Virtuoso for compositions. I think it is a very handy tool for my tasks – it is portable, and easy to use because it has a touch pad. Through this course I have come to know digital technology better than before. Before this course I could only compress CDs into mp3 or ogg files, but now I can make my own digital music pieces... I think this course was very helpful for my music career. (Diploma of Contemporary Music Student, 2010)

Music Education Affordances of the iPad

Example affordances of the iPad utilized in the Contemporary Music Diploma mlearning project are outlined in Table 3.

iPad Capability	Supporting Social Constructivist Pedagogy	Example Application of Affordances
Music Creation and Performance	Student content generation and sharing within situated learning contexts (Bruns, 2008; Stead & Colley, 2008).	A wide range of music creation applications including: drum machines, DJ apps, virtual synthesis, virtual keyboards, sample editing, full music production: For example via Garageband for iPad
Musical Notation Reader	Collaborative performance	Following score sheets from the iPads during band practices and performances
Blogging	Critical reflection and peer commenting	Collaborative student ePortfolio creation
Video editing and sharing	Learner-generated content and sharing of situated learning contexts (Bruns, 2008; Stead & Colley, 2008).	Student VODCast editing (video recording will be a feature of the iPad2). For example ReelDirector and iMovie
Audio Recording and editing	Sharing of student-generated content in a variety of contexts	Recording and sharing of environmental sounds and student performances: For example Audioboo and Soundcloud
Web Connectivity	Collaborative communication and research	Student team-based research, online community building, eportfolio generation

Table 8: iPad music pedagogical affordances.

Civil Engineering

The second semester students from the Civil Engineering certificate course in 2010 participated in this project. The students enrolling in this course were required to buy a scientific calculator worth around \$400NZ. This scientific calculator had a very limited use in class, mainly for calculations and programming use only. The course has a mix of theory and practical sessions including four field experiments. Students meet once in a week for a four-hour lecture that is followed by a three hour practical session, learning to use the surveying equipment to read data that is subsequently used in calculations. The student's recorded the field experiment data on a sheet of paper and this was later (when the students return to the classroom) checked by the lecturer. The limitations of this approach meant that the data couldn't be verified by the lecturer during the field experiments because the students worked in groups and would be located hundreds of meters away from the lecturer. This created a few problems for the students and the lecturer. The lecturer couldn't provide feedback nor verify the data collected by the students. This could only be done when the students were back in the classroom. Because the data was collected on paper it limited the calculations that could be performed by the students in the field. A survey of the students revealed that they found the four-hour lecture 'overwhelming' and 'boring'. The lecturers teaching the course reflecting on the four-hour sessions stated that standing in front of the class talking and going through PowerPoint presentations and pdf's was the norm for delivering the course content to the students. Learners in the class played a passive role in this learning process. The 'learning' and 'assessment' in the course were seen as two distinctively separate processes. Learning involved lecturer-mediated content. Assessment involved student knowledge recall.

The use of the iPad together with some free Apps available from the App store became a catalyst for a transformational shift in the classroom from a lecturer-centred pedagogy to student-centred social constructivism. Students downloaded the m48 scientific calculator for the iPad for free. Documents 2, another free App available on the iTunes Appstore, allowed the students to edit, create, download and synchronize documents from Google docs. Google Buzz was used for collaborative micro-blogging, while the use of Theodolite and mobile blogging addressed the issues of access to data beyond the classroom. Although the

project was initially promoted as a way to replace the course-required calculator, the affordances of the iPad created opportunities to engage the learners in the learning process, moving the embedded course pedagogy along the PAH continuum to Andragogy. Students' used the iPad to blog and Buzz to seek feedback from their peers, the lecturer, to share ideas and communicate. The field experiment data collected by the students were able to be verified by the teacher in context via Google docs providing the students with an opportunity to correct the mistakes by taking another reading.

Engineering Education Affordances of the iPad

Example affordances of the iPad utilized in the Certificate of Engineering mlearning project are outlined in Table 4.

iPad Capability	Supporting Social Constructivist Pedagogy	Example Application of Affordances
Scientific Calculator	Enabling sharing of data and calculations in context via wireless connectivity	Virtual emulation of the required scientific calculator
GPS for Geolocation (3G model)	Facilitating situated learning or authentic learning (Herrington & Herrington, 2007).	Group activities involving: Mapping, Geocaching, and Levelling. For example: http://maps.google.com , Theodolite.
Google Docs	Collaborative publishing and communication across contexts (Luckin, et al., 2010), such as geographic and time-zone barriers..	Situated user-generated content such as field data, reflections, sharing of useful resources and collaborative learning through enhanced communication and connectedness across learner generated contexts (formal and informal).
Microblogging	Bridging learning contexts by supporting learner-generated contexts and collaboration (Cook, 2010; Luckin, et al., 2010)	Asynchronous communication, collaboration & media sharing beyond the classroom. For example: http://www.twitter.com
Blogging	Learner-generated content and sharing of situated learning contexts (Bruns, 2008; Stead & Colley, 2008).	Student idea creation and sharing.

Table 9: iPad engineering pedagogical affordances.

DISCUSSION

The Bachelor of Business iPad project enabled a high level of student interaction and engagement within classes, allowing the course lecturer to move away from a lecture-based approach to a collaborative workshop approach to the classes. Students were also enabled with flexible access to course materials and communication tools beyond the classroom.

After an initial collaborative investigation of the affordances of smartphones and the iPads, the eCV Architecture mlearning student projects were brainstormed and negotiated by the students with the course lecturers. This approach represented a paradigm shift from pedagogy (teacher-directed) towards heutagogy within the course. The eCV mlearning project also enabled student-generated content and student-generated contexts beyond the face-to-face classroom with students geotagging images and video of Architecture throughout the city.

The Contemporary Music iPad project integrated the use of the iPad as an illustration of how music production and delivery is influenced and changed by the introduction of new technologies. The iPad project also allowed students to experience a more flexible learning environment than the courses dedicated music lab, and enabled the course lecturer to integrate student-generated content and authentic learning contexts into the course. The Contemporary Music iPad project thus enabled a pedagogical shift from the more lecturer-directed approach of the rest of the course to student-centred andragogy within the mlearning project.

The Civil Engineering iPad project enabled bridging of class field trips and the classroom-based lectures, creating an authentic bridge between the theory and practice of the course. However, the physical size and perceived fragility of the iPad were viewed as negatives for using the iPad during field-trips by the participating students. As a direct replacement for the course required scientific calculator within a smaller form-factor than the iPad the iPod Touch may well be a better choice for this context in the future.

Implications for 2011

The 2010 iPad projects generated huge interest from lecturers on the periphery of the communities of practice surrounding each project, providing the potential to drive pedagogical change throughout each of the departments. To achieve this communities of practice of lecturers in each department have been established investigating the potential of the integration of the iPad and mlearning within their own courses. Three of the departments have purchased iPads for lecturers to trial as members of these communities of practice. The Architecture eCV elective course has been refocused directly on creating mobile web 2.0 evangelists within the department in 2011 and the surrounding COP broadened to include international collaboration between students and lecturers in courses in the UK and Spain. Within the context of contemporary music course the iPad has developed from a mobile productivity tool and grown into a powerful music platform with over 2640 apps in the iTunes Store music category, most costing a fraction of their laptop or desktop computing versions. This presents a range of course integration opportunities for 2011. The Bachelor of Business programme is now investigating all first year students purchasing their own iPads for the second semester of 2011, and the Civil Engineering course requirement has changed from a dedicated calculator to include the option of an iPod Touch instead.

CONCLUSIONS

While initially designed and presented as a web enabled content delivery device the iPad iOS ecosystem has developed into a powerful collaboration and content generation platform. Leveraging the optimal pedagogical impact from these devices requires innovative pedagogical design and support. The four iPad mlearning projects outlined in this paper provide examples of the pedagogical integration of the iPad within social constructivist learning environments, supported by the reimagining of courses around communities of practice.

REFERENCES

- Brown-Martin, G. (2010, 8 March). iPad - a game changer for learning? Blog posted to <http://www.learningwithoutfrontiers.com/blog/2010/11/23/ipad-a-game-changer-for-learning.html>
- Browning, J. (2011). Google's Android phones face more attacks via apps. SFGate.com. Retrieved from <http://sfgate.com/cgi-bin/article.cgi?f=/c/a/2011/04/22/BUL51J5G3C.DTL>
- Bruns, A. (2008). *Blogs, Wikipedia, Second Life, and Beyond: From Production to Produsage*. New York: Peter Lang Publishing.
- Cochrane, T. (2009). Contemporary Music Students and Mobile technology. In J. Odonoghue (Ed.), *Technology Supported Environment for Personalised Learning: Methods and Case Studies* (pp. 429 - 454). Hershey, PA 17033, USA: IGI Global.
- Cochrane, T. (2010a). Beyond the Yellow Brick Road: Mobile web 2.0 informing a new institutional elearning strategy. Special Issue 'The Transformational Impact of Learning technology' of ALT-J, *Research in Learning Technology*, 18(3), 221–231.
- Cochrane, T. (2010b). Exploring Mobile Learning success factors. ALT-J, *Research in Learning Technology*, 18(2), 133-148.
- Cochrane, T. (2010c, 26-30 October). An mlearning Journey: Mobile Web 2.0 Critical Success Factors. Paper presented at the MLearn 2010: The 9th International Conference on Mobile Learning, Valletta, Malta.
- Cochrane, T., Bateman, R., Cliffin, P., Gardner, J., Henderson, I., & Holloway, S. (2009, 6th to 8th July). Mobilizing Learning: Mobile Web 2.0 Scenarios in Tertiary Education. Paper presented at the EDULEARN09 the International Conference on Education and New Learning Technologies, Barcelona, Spain.
- Cochrane, T., & Rhodes, D. (2011). iArchi[tech]ture: Heutagogical Approaches to Education Facilitated by Mlearning Integration. Paper presented at the International Conference on Information and Communication Technologies in Education ICICTE 2011. Retrieved from <http://www.icicte.org/index.htm>
- Cook, J. (2010). Mobile Phones as Mediating Tools Within Augmented Contexts for Development. Paper presented at the Education in the Wild, Alpine Rendez-Vous, within the framework of the STELLAR Network of Excellence. Retrieved from <http://www.slideshare.net/johnmiguelcook/cook-mobile-phones-as-mediating-tools-within-augmented-contexts-for-development>
- Ecclesfield, N., & Garnett, F. (2010). The Open Context Model of Learning and the craft of teaching. Paper presented at the iPED 2010, 5th International Inquiring Pedagogies Conference, "Contextualising Impact: Exploring the effectiveness of practice through pedagogic research". Retrieved from <http://www.slideshare.net/fredgarnett/nefg-opencontextmodelcraftteachingoutlinev4>
- Garnett, F. (2010, 18th November). Heutagogy and The Craft of Teaching. The Heutagogy Archives Retrieved 19th November, 2010, from <http://heutagogyarchive.wordpress.com/2010/11/18/heutagogy-the-craft-of-teaching/#more-340>

- Herrington, A., & Herrington, J. (2007). Authentic mobile learning in higher education. Paper presented at the AARE 2007 International Educational Research Conference, Fremantle, Australia.
- Kirk, J. (2011). After attacks, Google vows to fortify Android Market. iOS Central 8 March. Retrieved 8 March, 2011, from http://www.macworld.com/article/158389/2011/03/android_security.html#src.rss_weblogs_ioscentral
- Langelier, L. (2005). Working, Learning and Collaborating in a Network: Guide to the implementation and leadership of intentional communities of practice. Quebec City: CEFIRO (Recherche et Études de cas collection).
- Luckin, R., Clark, W., Garnett, F., Whitworth, A., Akass, J., Cook, J., et al. (2010). Learner-Generated Contexts: A Framework to Support the Effective Use of Technology for Learning. In M. Lee & C. McLoughlin (Eds.), *Web 2.0-Based E-Learning: Applying Social Informatics for Tertiary Teaching* (pp. 70-84). Hershey, PA: IGI Global.
- Ricknas, M. (2011). 'Burning' Memo From Nokia's Elop Sets Stage for OS Shake-up. PCWorld, (10 February). Retrieved from http://www.pcworld.com/article/219107/burning_memo_from_nokias_elop_sets_stage_for_os_shakeup.html
- Stead, G., & Colley, J. (2008, 7th to 10th October). The Power of Me: Learning By Making Your Own Rich Media Mobile Resources. Paper presented at the MLearn08: the bridge from text to context, Telford, Shropshire, United Kingdom.
- Wadsworth, Y. (1998). What is Participatory Action Research? *Action Research International*, 2002(May 3), Paper 2. Retrieved from <http://www.scu.edu.au/schools/gcm/ar/ari/p-ywadsworth98.html>
- Wenger, E., White, N., & Smith, J. (2009). *Digital Habitats: stewarding technology for communities*. Portland, Oregon: CPsquare.
- Wenger, E., White, N., Smith, J., & Rowe, K. (2005). Technology for Communities. In L. Langelier (Ed.), *Working, Learning and Collaborating in a Network: Guide to the implementation and leadership of intentional communities of practice* (pp. 71-94). Quebec City: CEFIRO.
- Whitney, L. (2011). Report: Apple remains king of app-store market. *cnet News*, 2011(February 15). Retrieved from http://news.cnet.com/8301-13579_3-20032012-37.html#ixzz1EpRMifWJ