



## Twitter tales: Facilitating international collaboration with mobile web 2.0

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Web 2.0 tools provide a wide variety of collaboration and communication tools that can be appropriated within education to facilitate student-generated learning contexts and sharing student-generated content as key elements of social constructivist learning environments. This paper illustrates this by describing and evaluating an international design collaboration project between two courses on either side of the world. A key communication tool used by the project participants included Twitter. The paper reflects upon the impact of one of the student participant's (LisaTickledPink) serendipitous rise to Internet fame as a result of using Twitter for the project and gaining over 30000 followers within a month. The project is evaluated within a framework of longitudinal research investigating the impact of mobile web 2.0 on higher education.

Keywords: mlearning, mobile web 2.0, twitter, collaboration.

### Introduction

#### Web 2.0 tools for collaboration

"Social software allows students to participate in distributed research communities that extend spatially beyond their classroom and school, temporally beyond a particular class session or term, and technologically beyond the tools and resources that the school makes available to the students." (Mejias, 2006, p. 1). The context of this project was an international collaboration between Product Design students in Ireland and New Zealand. Core web 2.0 (social software) tools used in this collaborative project included: Twitter, Ning, Vox, and YouTube.

#### *Twitter – the king of microblogging.*

Microblogging (Educause Learning Initiative, 2009) is a cross between sms texting, blogging, and instant messaging. Microblogging is an asynchronous, collaborative communication technology, suited to use on mobile devices. The most popular microblogging service at the time of writing is currently Twitter. Twitter usage experienced exponential growth during 2008 to 2009, with an increase of 752 percent to over three million users worldwide in 2008, followed by a 1382 percent increase in 2009 (McGiboney, 2009). New Zealand is one of nine countries (including Ireland) that have a dedicated short SMS service for Twitter usage on cellphones. Therefore students could send and receive Twitter messages (tweets) from any cellphone in both Ireland and New Zealand. One of the key benefits of Twitter is that it can be used on a wide range of Internet connected devices, giving the project participants a variety of access options. There were several reasons for choosing Twitter for the project, briefly outlined here. Twitter is an asynchronous communication tool facilitating bridging of time zones including the thirteen hour time difference between Ireland and New Zealand. All tweets are recorded facilitating collation and analysis and monitoring of behaviour. Tweets can be enhanced with a range of functionality including: hashtags (user-defined searchable tags), geotagging (attaching GPS

data, longitude and latitude, to media), and media uploads (images or video).

#### *Ning – the social network sell-out.*

Social networks (Boyd & Ellison, 2007; Educause Connect, 2008; McLoughlin & Burgess, 2009) such as Ning (<http://www.ning.com>) facilitate group communication and collaboration. Ning has become very popular for hosting educational social networks. Ning social networks are managed by the creator of the network, and thus allow lecturers to create a moderated collaborative web 2.0 space. The volatile nature of the web 2.0 world is illustrated by the lack of longevity of many free hosted services such as Ning. Ning switched from a free service to a paid only service mid 2010 (20<sup>th</sup> July), ostracizing much of its educational fan-base. Alternatives to Ning include ELGG (<http://www.elgg.org>), and BuddyPress (<http://www.buddypress.org>).

#### *YouTube – the new visual Google search.*

YouTube (<http://www.youtube.com>) has become one of the most popular video sharing sites. The mobile version (<http://m.youtube.com>) supports viewing of videos online in the mobile web browser, or via a downloadable Java client for specific phones. Uploading mobile videos to YouTube is achieved via email attachments or using third-party media forwarding applications and services (for example, <http://www.pixelpipe.com>). YouTube currently (mid 2010) services two billion views per day, with twenty-four hours of video uploaded to YouTube every minute (Metekohy, 2010). There is so much content on YouTube now that students regularly search YouTube for information rather than performing Google searches, as a visual tutorial presented on YouTube is often more engaging than reading an online text-based reference. The original ten-minute time limit imposed on YouTube videos ensured that they were succinct, and fall within the limits of most students' attention spans. Within a social constructivist framework, YouTube provides a tool for students to create, host, share, and critique VODcasts, interviews and a range of student-generated videos.

#### *Vox – a personal journal (Blog) with social collaboration tools.*

Vox (<http://www.vox.com>) combines a personal blog, eportfolio, and group space. Vox includes support for mobile blogging and media uploads and is integrated into the Nokia cellphone Shareonline client. Combined with social networking tools built-in, Vox became the mobile personal eportfolio of choice for the mlearning projects, with a focus on participants inviting their peers and lecturers into their own reflective space. Vox includes media sharing (video, audio, documents, images, links) and linking (YouTube, Flickr) as well as social networking. Vox's Neighbourhood feature allows Vox users to define a group and give various levels of secure access to content. A weekly neighbourhood email update facilitates a community environment.

## **Background**

### **The research base**

#### *Bachelor of Product Design Year 2 2008 – Virtual Cultural Exchange Project*

The project has its roots in an international lecturer exchange programme in 2008. A VOX neighbourhood was used for the exchange of ideas, opinions and observations on the Cultural Leanings project between the second year Product Design students at The University of Limerick and Unitec New Zealand. The project involved an Irish Product Design lecturer at Unitec, and a New Zealand Product Design lecturer at Limerick University facilitating each group of students' learning about the culture of each country, creating a virtual cultural exchange experience for the students. The project brief was set around the identification of a cultural icon or object specific to New Zealand or Ireland. The students researched this item in teams of two or three, and then designed a contemporary twenty-first century response. Their work and final models were posted on team blogs using Vox and included drawing, and sketch models development. The project began and concluded with a live group video conference between the two groups.

#### *Bachelor of Product Design Year 1 2009 – Exploring Mobile Web 2.0*

In response to the enthusiastic feedback on the 2008 projects, a plan was developed to scaffold and stage the integration of mobile and web 2.0 technologies across all three years of the Bachelor of Product Design programme. The 2009 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), while the second year projects move towards andragogy (adult learning or student-centred), and the third year projects facilitate a move towards heutagogy

(self-directed learning), creating a pedagogy to heutagogy (PAH) continuum (Luckin, et al., 2008). 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 and eportfolio documenting and showcasing student's 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) [http://docs.google.com/View?id=dchr4rgg\\_55r5gntvf7](http://docs.google.com/View?id=dchr4rgg_55r5gntvf7)
- [PIC2 Project2](http://docs.google.com/View?id=dchr4rgg_57c3xj5qg7) [http://docs.google.com/View?id=dchr4rgg\\_57c3xj5qg7](http://docs.google.com/View?id=dchr4rgg_57c3xj5qg7)

## Mobile Web 2.0

This project is part of four years of action research mlearning (mobile learning) projects encompassing five different courses, forming five case studies spanning from one to three years of implementation and refinement, and involved thirteen mlearning projects undertaken between 2007 and 2009 with a total of 280 participants, and a subsequent twelve mlearning projects in 2010. The aim of the research was to investigate the potential of mobile web 2.0 tools (with a focus upon smartphones coupled with mobile formatted web 2.0 social software) to facilitate social constructivist learning environments across multiple learning contexts (both formal and informal). The research used a participatory action research methodology, and based its pedagogical decisions upon the foundation of social constructivist learning theories. The research captures the learning journeys of the researcher and participants as they moved from initial skepticism to personal appropriation of the new technologies, to the ontological shifts required for integrating the unique affordances of these mobile web 2.0 technologies into their pedagogical practice and courses, enabling collaborative learning environments that bridge multiple contexts. The research led to the development of an intentional community of practice (COP) model for lecturer professional development and scaffolding student learning, established a pedagogical design framework, identified critical success factors, and developed an implementation strategy for the integration of mlearning within tertiary education, of which this project forms part. An online presentation summarising the research can be found at <http://prezi.com/kr94rajmVk9u/>. The research adds the insights of a longitudinal study to the relatively new body of knowledge around mlearning.

## The 2010 research project

An International collaborative project was established between Ireland, New Zealand and Chile Product Design courses for semester1 2010. Discussions between the lecturers and the researcher led to choosing several web 2.0 (mobile-friendly) tools to facilitate communication and collaboration on the project across the barriers of distance and time-zones. One of these tools was [Twitter](#), which participants could choose to use on almost any Internet capable device. The International collaborative project focused upon student teams in each country designing artefacts for sustainable food production, which became extremely relevant to the project participants after the massive earthquake in Chile during the very beginning of the project. The student teams alternated between the roles of 'client' and 'designer', modelling a real-world design project experience. The student teams were assigned one of the following topics: Domestic Food Cultivation, Community Food Production, Food preparation in the home, Purchasing food, Packaging and Transport, Food on the go, and Shared Dining. The project began with a synchronous Skype video conference introducing the international student teams to each other. The student teams then collaborated on their project designs using their Vox blogs, journaling the design process, background research, and project decisions. Teams then posted project summaries to the project Ning site for sharing and critiquing by their paired international team. Continuous feedback was provided between the international teams via following each other's Twitter posts and Ning forum comments. Skype sessions at the mid-point and end of the project facilitated key reflection and feedback events. Students summarised and presented their project designs using embedded Picasaweb slideshows and YouTube videos on Ning.

The focus of this second year project was on a move from pedagogy to andragogy, building on the students' first year mobile web 2.0 experience, integrating moblogging, social networking, and student-generated content into the course, facilitating more in-depth collaboration and peer critique. The majority of these students' had established an online eportfolio in the previous 2009 mlearning

projects. The 2010 New Zealand-based project participants were supplied with Nokia N97 smartphones (two students opted to use their own iPhones instead) to facilitate an assessed online Blog/eportfolio documenting and showcasing student's design processes, forming the basis of collaborative critique and sharing with worldwide peers and potential employers or clients. Ning was used as a lecturer-facilitated collaborative hub for all the teams involved in the project. The researcher took on the role of a 'technology steward' within the community of practice formed (Wenger, White, & Smith, 2009; Wenger, White, Smith, & Rowe, 2005). This involved advising and supporting the lecturers and students on the pedagogical use of various web 2.0 technologies. A wiki page was created by the researcher for the project, providing a tutorial space scaffolding the technical setup details required.

## **Methodology**

### **Participatory action research**

The core research methodology chosen for the research is action research. Action research is a qualitative methodology, and involves cycles of implementation and reflection, with the research questions often evolving over time. "Qualitative research is a situated activity that locates the observer in the world" (Denzin & Lincoln, 2005, p. 3). According to Denzin and Lincoln (2005), the qualitative researcher uses 'bricolage' creating a 'montage' of tools and techniques. Action research, as a qualitative research methodology, is inherently multi-method in focus, and often uses triangulation of multiple data gathering techniques to validate the results and interpretations given to the results. Action research "deals with real-life problems in context... It creates mutual learning opportunities for researchers and participants, it produces tangible results" (Greenwood & Levin, 2005, p. 60). Action research is "directed towards greater understanding and improvement of practice over a period of time" (Bell, 1999, p. 10).

The research involved a partnership between the researcher, the course lecturers, and the students involved in each successive trial. The researcher's role was that of the primary collector of data, and the technology steward (Wenger, et al., 2005) within the communities of practice (COP) developed for each project. The research approach was thus participatory action research (Wadsworth, 1998). 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 and stakeholders. This allows for the continual development and improvement of the projects based on the feedback from participants at regular points in the projects. These reflective points were focused around the semester breaks, before which participant feedback was gathered via surveys and focus group discussions. Following this the researcher and the course lecturers spent significant time together critiquing the project implementation and modifying it for the following semester period. Each action research cycle involved a series of research cycles that occurred throughout the project providing continuous feedback, reflection and modification of the research approach. The in-project feedback was facilitated by the following:

- Weekly face-to-face technology support sessions (community of practice), facilitated by the researcher.
- Instant Messaging for communication between the students and lecturers, students and the technology steward/researcher, and lecturers and the technology steward/researcher.
- RSS feeds from forums set up on the learning management system (Moodle and Blackboard).
- RSS feeds from student Blogs and online media hosting services.

### **The research questions**

The research investigated the pedagogical issues of utilizing mobile wireless devices in tertiary education. The aim was to transform pedagogy and positively enhance students' learning. The study situated itself firmly in the discursive and student-centred pedagogies rather than didactic and teacher-centred pedagogies. The emphasis was upon 'what the student does' – getting the students involved in the discovery of learning, rather than being merely receptors for course content. Communication is a key in this, as defined in the chosen underpinning pedagogical paradigms, for example: Laurillard's 'conversational model' of learning (Laurillard, 2001; Sharples, 2005). Another key issue in successful tertiary education is the alignment of teaching and learning activities with the course assessment and

outcomes. Biggs has coined this ‘constructive alignment’ (Biggs, 2003). This concept helped guide the development of appropriate assessment strategies for each project. The theories of constructivism, social constructivism, communities of practice, and the conversational model, were drawn upon to guide the research project.

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?

### Project planning and design framework

The design framework for each of the projects is shown in Table 1. This framework was developed iteratively over the life of the research, which began in 2006 with two test projects that informed the practical implementation of the subsequent projects in 2007 to 2009. The framework table format is based loosely on that suggested by Sharples et al (2009), emphasizing that the starting point of the design process is the learning practice and chosen pedagogical framework, which then informs the appropriate choice of mediating technologies.

**Table 1: MLearning project design framework**

<b>Learning Practice</b>	<b>Mediating Circumstances</b>		
<b>Social Constructivism</b>	<b>Context</b>	<b>Technology</b>	<b>Agent</b>
Lecturer Community of Practice	Lecturer professional development, pedagogical brainstorming	Face to face Scaffolded using LMS Smartphone Web 2.0 services	Lecturers as peers, with researcher as technology steward
Student and lecturer Community of Practice	Pedagogical integration and technical support	Face to face Scaffolded using LMS Smartphone Web 2.0 services	Students’ as peers, Lecturer as guide and pedagogical modeler, with the researcher as technology steward
Collaboration	Group projects	Social networking, Collaborative documents	Google Docs, student peers
Sharing	Peer commenting and critique	Web 2.0 media sites, eportfolio creation	RSS, student peers, lecturer
Student content creation	Student individual and group projects	Smartphone with camera and microphone, content uploaded to web 2.0 sites	Student and peers
Reflective	Journal of learning and processes, recording critical incidents	Web 2.0 hosted Blog	Personal appropriation, formative feedback from lecturer
Learning Context Bridging	Linking formal and informal learning	Smartphone used as communications tool and content capturing	Student interacting with context, peers, and lecturers

Missing from Sharples et al (2009) design framework are the critical elements of assessment, and pedagogical and technological support structures (Laurillard, 2007). Within the researcher’s framework presented above, the elements of assessment, and pedagogical and technological support are explicitly dealt with within the lecturer pre-project COP and in the implementation stage of the project within the student and lecturer collaborative COP.

The use of web 2.0 tools was modelled by the lecturers and the technology steward by using these tools to facilitate the planning of the project.

This collaborative project planning involved the creation of the following Google Docs:

- Project Brief [http://docs.google.com/fileview?id=0B9kx7n-UKqvBMmM4MDIwMmMtZjZmZi00Y2VmLThlMjAtZDZiNjBkMmIwZmIw&hl=en\\_GB](http://docs.google.com/fileview?id=0B9kx7n-UKqvBMmM4MDIwMmMtZjZmZi00Y2VmLThlMjAtZDZiNjBkMmIwZmIw&hl=en_GB)
- Collaboration Map [http://docs.google.com/fileview?id=0B9kx7n-UKqvBMDM2N2RkYzUtYmU0MC00NjM3LWFhNDAZmIwODMxNTk1ZmVi&hl=en\\_GB](http://docs.google.com/fileview?id=0B9kx7n-UKqvBMDM2N2RkYzUtYmU0MC00NjM3LWFhNDAZmIwODMxNTk1ZmVi&hl=en_GB)
- Project Steps [http://docs.google.com/fileview?id=0B9kx7n-UKqvBMTdmNTNkZjktMTJlYy00MjliLWE3YmYtMjI4OTI1N2UxM2Fk&hl=en\\_GB](http://docs.google.com/fileview?id=0B9kx7n-UKqvBMTdmNTNkZjktMTJlYy00MjliLWE3YmYtMjI4OTI1N2UxM2Fk&hl=en_GB)
- Project Outline Development Document [http://docs.google.com/View?id=dv83r4v\\_31cf5fj4gv](http://docs.google.com/View?id=dv83r4v_31cf5fj4gv)

The project Ning social network was also used to brainstorm the project details between the New Zealand and Irish lecturers with the input of the reseracher. Skype and Google Talk were used for real-time communication among the project participants.

### Scaffolding the Project

A range of mobile friendly web 2.0 tools were used to support the project, including:

- Individual Blogs using Vox.
- A supporting Wiki <http://ctliwiki.unitec.ac.nz/index.php/InternationalDesign>.
- A collaborative Ning social network <http://intdesigncollaboration.ning.com/>.
- Twitter for asynchronous communication, with project tweets collated using the hashtag #f4t10.
- YouTube for student-generated video summaries.
- Google Talk and Skype for synchronous communication.
- RSS aggregation of the various web 2.0 tools was achieved via Google Reader (<http://reader.google.com>).

Table 2 outlines the social constructivist pedagogical affordances of the chosen web 2.0 tools:

**Table 2: ePortfolio pedagogical framework**

Web 2.0 Tool	Social Constructivist Pedagogy	Context	Examples and supporting references
Blogs	Collaborative Community (Farmer, 2004) Multimedia content generation Context bridging	Shared rich-media learning journal (Bain, Ballantyne, Packer, & Mills, 1999) Peer and expert reflection, critique, feedback and evaluation via commenting (Panday, 2007) Collation of user-generated content	(Educause, 2005a; Educause Learning Initiative, 2005; Farmer & Bartlett-Bragg, 2005; Luca & McLoughlin, 2005; Trafford, 2005) <a href="#">Vox</a>
Wikis	Project scaffolding	Technology implementation assistance	(Educause, 2005b; Litchfield & Nettleton, 2008) <a href="#">Wikispaces</a> <a href="#">Mediawiki</a>
Social Networks	Community Of Practice formation and nurturing Context independent learning conversations Collaboration, peer support and critique	Interaction with Peers and Lecturers Community of interest formation	(Educause Connect, 2008) <a href="#">Ning</a> <a href="#">Vox</a>
Microblogs	Asynchronous	Community formation	<a href="#">Twitter</a>

	communication and collaboration	and nurturing Information sharing	(Educause Learning Initiative, 2009)
Online Video	Student content generation and sharing Event capturing, notification and sharing Communication	Situated user-generated content – VODcasts, interviews, real-time streaming or asynchronous upload to Web 2 sites Geotagging videos Skype video calls	<a href="#">Qik</a> <a href="#">Ustream</a> <a href="#">Bambuser</a> <a href="#">Flixwagon</a> YouTube Google Talk (Educause, 2005a; Educause Connect, 2007; Educause Learning Initiative, 2008)
RSS	Content aggregation Context bridging	Collation of COP content and information Shared resources and artifacts	<a href="#">Google Reader</a> (Kaplan-Leiserson, 2004; Wenger, et al., 2005)

## Results

### Student engagement

A high level of interaction and community building was evidenced throughout the project using the various web 2.0 tools chosen. The project focused upon student-generated content and research, rather than lecturer presentations or lecturer-created content. Lecturers therefore used the web 2.0 tools to give student's formative feedback and guidance on their project progress and alignment with the project brief.

During the six-week project, the student interaction via Ning generated 36 forum posts, 32 Blog posts, 524 uploaded photos, and 63 videos, from 42 members. Ning formed the communication and collaboration hub between the Irish and New Zealand student teams.

Vox Blogs formed the basis of the New Zealand students' design process journals and interaction within the New Zealand student project teams.

Twitter formed the basis for announcing media uploads to Ning and YouTube, and lecturer notices relevant to the project. Several student teams also utilised Twitter to communicate across the time-zones, and Twitter facilitated the technology steward, based in New Zealand, to also support the Irish student teams, answering queries even while attending a conference in Porto Portugal during the project. The device agnosticism of Twitter meant that students could choose what device they posted and read tweets on. The project generated dozens of tweets using the hashtag #f4t10, and these were collated during the COP sessions via TwitterFall (<http://www.twitterfall.com>) as a visual summary of the project communication and progress, supplementing the face-to-face engagement of the participants.

The two student groups created real-time face-to-face presentations using Skype and Google Talk, and shared virtual presentations using Ning and YouTube video summaries.

Example project outputs included:

- An Irish student design team designed and prototyped a backpack to replace disposable shopping bags and shopping trolleys.
- A New Zealand student design team designed and prototyped a reusable indoor compost bin for recycling food waste.

### LisaTickledPink

A serendipitous tale of how using Twitter as part of her 2010 Product Design course brought Internet fame to one of the New Zealand Product Design students'. Students were introduced to Twitter by their lecturers (supported by the technology steward) at the start of the project as a tool for facilitating communication between the students and lecturers in Ireland. One of the New Zealand students, Lisa,

being initially somewhat unsure of using Twitter, posted her first Twitter tweet as "I hate technology!" Coincidentally a popular Podcast show (TwitTV) decided to make a random Twitter user famous by recommending their subscribers follow their choice with one random follower winning an iPad. Lisa's tweet caught their attention and within minutes several thousand people from around the world began following her on Twitter. This quickly grew to 30000 in less than a month. As her Internet fame unfolded (view the media links that follow), it provided a motivational boost for the engagement of all of the students involved in the project. Lisa's technology appropriation journey is captured in rich media, and provides a snapshot into the viral and powerful nature of web 2.0 for creating global communities (See the links for the following summary of events at <http://ctliwiki.unitec.ac.nz/index.php/TwitterTales>).

- Lisa's initial Twitter post was found by Leo Laporte on the TwitTV PODCast show and the co-hosts chose to make Lisa famous: <http://twit.tv/238>
  - To view the sections on Lisa's story watch the TwitTV show episode on "I Hate Technology" from 24 minutes to 30 minutes, and 1 hour 26 minutes.
- Within a couple of hours Lisa was making Internet headlines
- A local radio station (KiwifM) interviewed Lisa on her Twitter fame.
- Some of the backstory to "Lisa hates technology" circulated on popular blog sites such as geeknewscentral.
- Lisa reflected on her course blog about the surprise Internet fame as part of the student International collaborative project using Ning and Twitter.
- BlogtalkRadio featured Lisa taking part in the show after she was talked about by Kevin Rose, founder of Digg.com, in competition to Conan O'Brien, and how she went from 2 followers to over 23,000 in a few days.
- STuff Magazine wrote an article on Lisa's Internet fame.
- Lisa appeared on a public Television interview 24th March 2010.
- A Spanish PODCast show, [Tecnocasters](#) interviewed Lisa, giving her further international fame.
- Lisa received one of the first iPads in New Zealand from Leo Laporte.

Lisa now has a virtual support community of 21455 follows, and regular slots on several PODCast shows, including a weekly tip on tecnocasters, a Spanish blog and podcast site.

## Discussion

### Web 2.0 pedagogical affordances

Although the utopian views of web 2.0, social constructivism, and communities of practice have been critiqued for creating a 'cult of the amateur' (Keen, 2007; Kirschner, Sweller, & Clark, 2006; Osborne, 1996; Storberg-Walker, 2008), these arguments are based upon radical constructivism (von Glasersfeld, 1995) scenarios where the guiding role of an experienced expert or lecturer is removed. As presented in the example of the project reported herein, the researcher sees web 2.0 tools as a way of facilitating the critical input and guidance of an expert lecturer across the barriers of time and distance, and in a similar way providing students with access to a world-wide network of peers and experts to interact with. Laurillard (2007) emphasizes the teacher's input in mobile environments through good pedagogic design that facilitates continuity between the face to face and remote peer learning contexts. Her definition of mobile learning incorporates the critical pedagogical design input of the teacher: "M-learning, being the digital support of adaptive, investigative, communicative, collaborative, and productive learning activities in remote locations, proposes a wide variety of environments in which the teacher can operate" (Laurillard, 2007, p. 172). Thus the integration of mobile web 2.0 was scaffolded by the integration of a physical (local) and virtual (International) intentional community of practice (Langelier, 2005) within the course.

### Student Web 2.0 appropriation

Carroll et al (Carroll, Howard, Peck, & Murphy, 2002) define technology appropriation as "the way that users evaluate and adopt, adapt and integrate a technology into their everyday practices". In this research project the researcher is primarily interested in facilitating the use of technologies to enhance learning that will engage students and they would be likely to personally own, and thus an informed user-friendly choice of WMD and web 2.0 software is critical. Choosing a participatory action research

methodology for the project allowed student feedback to continually modify the project parameters in response to identified issues. Lisa's story contextually illustrated the power of social networking to create community beyond the barriers of time and distance, and provided a motivating experience for the other students.

The integration of web 2.0 presents the need for paradigm shifts for both the lecturers' and the students', acting as a catalyst for lecturers' to reconceptualise teaching, and students' to reconceptualise learning, creating ontological shifts (Chi & Hausmann, 2003) in the participants' understanding of teaching and learning. Staging and scaffolding the introduction of these disruptive technologies reduces student's cognitive load and maximizes the effectiveness of the zone of proximal development (Attwell, 2006; Vygotsky, 1978). A key strategy to facilitate a move along the Pedagogy-Andragogy-Heutagogy (PAH) continuum (Luckin, et al., 2008) is curriculum integration of mobile web 2.0. Thus beginning the introduction of web 2.0 integration into the first year of a course (in multi-year courses) will prepare students for higher-level context bridging in subsequent years of their course. Hence the foundation laid in these students' first year course allowed the lecturer to introduce an adventurous collaborative project early in their second year course.

## Issues

Ethical issues specific to the use of WMDs were discussed with the participants, including: capturing and uploading images to the Internet, capturing or streaming live video, sharing geolocation data (for example Google Latitude), the appropriate use of communication tools such as Twitter where posts can be taken out of context, limiting personal information on publically accessible mobile web 2.0 sites, and user responsibility for voice, SMS, and excess data charges. All participants signed an acceptable use policy indicating the general type of WMD use behaviour expected during the project. A table of indicative costs associated with typical mlearning activities was created and used to inform participants of the cost implications of using 3G data during the project. The issues of the permanence and cost of web 2.0 use were highlighted during the project with the chosen social network (Ning) announcing the end of free hosting in the middle of the project. The level of interaction design complexity of the project was initially too complex, and required significant negotiation from the researcher as the technology steward to guide the lecturers to make these elements simpler in the project. There were technical issues around real-time video conferencing between Ireland and New Zealand that were frustrating, but not unsurmountable. These issues needed to be anticipated and contingencies planned for. The Irish students were initially slower to appropriate the web 2.0 tools than the New Zealand students, as they did not have the first year web 2.0 experience that the New Zealand students' did. However the New Zealand students encouraged the participation of the Irish students, and after a few initially tentative tweets and posts the international communication flourished. Thus peer mentoring and modelling had significant impact, similar to Lave and Wenger's concept of legitimate peripheral participation (Lave & Wenger, 1991), with the goal of drawing these participants into the core of the learning community.

## Conclusions

The paper has illustrated how based upon a social constructivist design framework, mobile web 2.0 tools can facilitate learning experiences that bridge time and distance, bringing the world into the students' learning community. A participatory action research methodology aligned well with the establishment of an intentional community of practice to support the project participants. Staging and scaffolding the integration of web 2.0 tools across the first and second year of a degree course facilitated the integration and appropriation of these tools into students' and lecturers' educational frameworks.

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