

CONNECTING THE THEORY AND PRACTICE OF MOBILE LEARNING: A FRAMEWORK FOR CREATIVE PEDAGOGIES USING MOBILE SOCIAL MEDIA

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Abstract

Designing creative learning environments supported by new technologies involves the development of new literacies for both teachers and learners. One way to do this is to frame teaching and learning around building authentic learning communities. The role of the teacher then becomes creating ecologies where communities can interact, and seeding this interaction via triggering events, while the role of the learner becomes that of content creator and active participant. In this paper we propose and illustrate a framework that links the use of the Substitution-Augmentation-Modification-Redefinition framework (SAMR) framework and the conception of three levels of creativity to trigger transformative curriculum design using mobile social media as a catalyst. A case study provides a practical example of using our mobile social media framework to explore transformative curriculum design both from the perspective of teacher and learner.

Keywords

Substitution-Augmentation-Modification-Redefinition framework (SAMR), educational technology adoption, m-learning, heutagogy, creativity, Scholarship Of Technology Enhanced Learning (SOTL)

1. Introduction

In this paper we reflect upon the development and application of a framework for designing creative learning environments enabled by mobile social media. The framework attempts to provide a practical link between educational theory and practice, providing guidelines for curriculum design that is concerned with supporting creative pedagogies. In this paper we explore the relevance of the concepts of building learning communities, self-determined learning, triggering events, and the role of technology in redesigning learning environments for creativity. Laurillard (2012) describes teaching as a design science and argues that this should involve collaborative curriculum design enabled by digital technologies. Within our framework we embed an explicit focus upon the Scholarship Of Teaching and Learning (SOTL) to inform a deeper level of collaborative curriculum design (Weaver, Robbie, Kokonis and Miceli, 2012). Originally conceptualized by Boyer as a way to validate reflective practice as a viable and valued research focus, a range of researchers have made a case for updating SOTL for the social media environment of twenty first century education (Garnett and Ecclesfield, 2011; Greenhow and Gleason, 2014; Haigh, 2010). Education is often seen as a transformative experience for learners, however the role of technology in mediating transformation in education has been hotly debated (JISC, 2011; Keane and Blicbau, 2012; Puentedura, 2006; Reeves, 2005). The application of SOTL to technology enhanced learning is one way to critically evaluate the broader impact of technology in education, and has led to the emerging development of the Scholarship Of Technology Enhanced Learning (SOTEL) (Wickens, 2006). SOTEL links the scholarship of teaching and learning with the growing body of literature surrounding the exploration and impact of technology enhanced learning.

With the increasing ubiquity of mobile devices and access to social media much of the focus of current educational technology debate is upon the potential of mobile learning to transform education (Laurence Johnson, Adams Becker, Cummins and Estrada, 2014; Johnson, Becker, Estrada and Freeman, 2014; Traxler, 2010). Rather than substituting existing curriculum activities and assessment strategies using mobile social media our framework attempts to modify and redefine the nature of activities and assessments that can be enabled by mobile social media within a specific educational context. The design framework focuses upon drawing students into active participation within a global learning community that will hopefully become a model for participation in life-long professional communities after graduation. By nurturing a culture that celebrates and supports creativity within learning communities we hope to develop creative teachers and creative graduates.

To support creative learning environments the framework refocuses

the teacher's role to establish an ecology of resources (EOR) that trigger critical and creative thinking (Cormier, 2008), and model professional participation within global communities. The framework leverages the concept of creating an EOR to support creative learning communities, involving active participation brokered by expert lecturers, mediated by mobile social media as the ubiquitous technology owned by our students (International Telecommunication Union, 2014). SOTEL is embedded within this framework as an integral part of lecturers' critical reflection upon the process of collaborative curriculum redesign informed by new pedagogies enabled by new technologies.

We illustrate the use of our framework with a case study illustrating the development of new literacies for both teachers and learners, that models collaborative curriculum redesign in practice (Cochrane and Antonczak, 2015).

1.1 Three Stages of Mobile Learning

The history of mobile learning research has been broadly characterized by three stages, identified by Cook (2009) and Sharples (2009) as:

1. a focus upon mobile devices;
2. a focus upon learning outside the classroom;
3. a focus upon the mobility of the learner.

Pachler, Bachmair and Cook (2010) argue that transformative impact of mobile learning is encapsulated in the socio-cultural impact of mobile devices within the everyday lives of learners (stage 3) rather than a stage 1 focus upon technology per se. However any reading of the mobile learning research literature reveals a continued emphasis upon case studies that compare the efficacy of traditional forms of content delivery to those mediated by mobile devices (Rushby, 2012). Laurillard (2007) argues for the critical role of lecturers in designing mobile learning experiences, and we argue that the inability of lecturers to reconceptualise the potential of mobile learning to enable new learning experiences is due, to a large extent, to a reliance upon traditional pedagogical strategies (Cochrane, 2013). New wine requires new wine skins, and to realize the potential of mobile learning to transform teaching and learning requires engagement with new pedagogies, else we find ourselves within an endless cycle of stage 1 case studies.

1.2 New Pedagogies

The choice of pedagogical strategies within a teaching and learning environment is driven by the graduate outcomes or type of qualities that we want our graduates to be able to achieve. This is informed by foundational learning theories chosen to guide the design and implementation of learning environments and experiences. Increasingly a high value is placed upon the ability of graduates to be creative team members within a variety of global professional communities (Hager and Holland, 2006; Litchfield, Nettleton and Taylor, 2008). In this context we argue social learning theories provide an appropriate foundation to guide learning design and also align with the collaborative and contextual affordances of mobile devices. Social learning theories include social constructivism (Vygotsky, 1978), and communities of practice (COP) (Wenger, 1998). Social learning theories provide the foundation for a wide range of social learning frameworks such as: the conversational framework (Laurillard, 2001), learner-generated contexts (Luckin et al., 2010), and pedagogy 2.0 (McLoughlin and Lee, 2010). These new pedagogies focus more upon what the student does within the learning process rather than teacher-delivered content, redefining both the role of the student and the teacher.

1.2.1 Creativity

Creativity is one of the key attributes that we want to develop in our students. Sternberg, Kaufman and Pretz (2002) argue that there are three basic levels of creativity that anyone can learn, including: reproduction, incrementation, and reinitiation. Creative pedagogies focus upon nurturing exploration and flexible learning environments that are often 'messy' and unpredictable, but lead to serendipitous experiences and discoveries (Buchem, 2011; Jameson, Ferrell, Kelly, Walker and Ryan, 2006). Danvers (2003) argues that designing transformative learning environments involves cultivating, supporting, and encouraging student creativity. Developing a creative learning culture can be achieved by using an ecological approach to curriculum design that identifies the key components required to support the graduate outcomes of a course. An example of an ecological model of education is Cormier's (2008) rhizomatic learning for enabling self-determined learning communities (cMOOCs) based upon the analogy of the decentralized root structure of rhizomes.

1.2.2 Rhizomatic learning

Closely related to connectivism (Siemens, 2004), rhizomatic learning has become one of the foundational theories behind the development of cMOOCs (connectivist massive open online courses). While it is debated

whether connectivism can be strictly described as a learning theory (Bell, 2010; Kop and Hill, 2008), the concept has had significant impact on the development of new pedagogical strategies such as cMOOCs in particular. Cormier's (2008) concept of rhizomatic learning decentralizes the locus of control within educational environments, and refocuses the lecturers role upon facilitating interaction and participation within learning communities by providing an appropriate ecology of resources (EOR), and designing triggering events, rather than focusing upon content delivery. The concept of developing an ecology of resources to support learning has been applied to mobile learning by Pachler, Bachmair, and Cook (2010). The integration of mobile learning and social media provides the potential for a social learning environment that is accessible from anywhere, anytime, and driven by student-generated content and contexts. An EOR based upon mobile social media implies a wide variety of platforms that require curating to form a basis for peer and teacher formative and informative feedback. Within the context of a cMOOC this is even more important where the learners are required to be very self-directed. Recent criticisms of Cormier's application of a rhizomatic approach to learning within cMOOCs (Mackness and Bell, 2015) has highlighted the need for guidance and feedback to be built into the learning environment and to be part of the explicit design of the EOR. This can be achieved within a mobile social media learning environment by defining a hashtag that becomes the curation point of the social media used as part of the learning environments EOR. An example of a hashtag curation tool is TAGSExplorer, developed and shared by Martin Hawksey (2011) for curating and analysing Twitter conversations. Hashtag curation tools search and filter social media content based upon a user-defined keyword with a hash (#) character as a prefix. Our case study provides an example of the design of a mobile social media EOR curated via hashtags.

1.3 Educational Design Research

While there is a wide and growing body of literature exploring mobile learning much of the research has been ad hoc and characterised by case study reports rather than the development of transferable strategies. This is due largely to the 'messy' nature of mobile learning, that can occur anytime and anywhere, and encompasses both formal and informal learning environments. Several mobile learning research literature reviews have highlighted gaps in previous research. For example, Wingkvist and Ericsson (2011) found that the predominant research methodology reported in the literature has been case studies (24%) followed closely by normative (comparative analysis) research (21%). According to Wingkvist and Ericsson (2011), less than 5% of published mobile learning research evidences an action research methodology or

meta analysis. An earlier analysis of 102 mobile learning projects published between 2002 and 2007 revealed that the majority of mobile learning projects published in the literature focused upon supporting novice learners via content delivery to mobile devices, rather than leveraging the unique affordances of mobile devices to support innovative pedagogies. «Despite the fact that mobile phones initially started as a communication device, communication and collaboration play a surprisingly small role in Mobile Learning projects» (Frohberg, Goth and Schwabe, 2009, p. 307). Similarly Rushby (2012) calls for «research findings that offer proof of educational, economic and social outcomes and impacts» (Rushby, 2012, p. 355). Bannan, Cook and Pachler (2015) argue that educational design research provides a research methodology that can effectively guide researchers through the messiness of mobile learning and result in a more systemic and strategic approach. Educational design research (EDR) is also referred to as design-based research (DBR). EDR is concerned with the development of practical principles for curriculum redesign, and stands in contrast to the typical comparative analysis approach of much of the educational technology research literature (McKenney and Reeves, 2012; Reeves, 2005). EDR has similarities to action research that is concerned with transformational change through a series of iterative cycles, but adds the development of transferable design principles as a goal, bringing together research and design (Educause Learning Initiative, 2012; McKenny and Visscher-Voerman, 2013).

1.4 A Mobile Social Media Framework for Creative Pedagogies

A framework provides a pragmatic link between theory and practice, creating a guide for lecturers from a range of discipline contexts to design and implement strategies for creative pedagogies that are informed by appropriate learning theories. Through a series of mobile learning projects spanning 2006 to 2014 we have developed a mobile social media framework for creative pedagogies (Cochrane, 2014; Cochrane, Antonczak, Keegan and Narayan, 2014). The framework maps a three-stage continuum across several key theoretical foundations, providing simple guidelines for each stage. This three-stage representation also aligns with a meta analysis of the growth and maturity of mobile learning through three phases (Cook, 2009; Sharples, 2009):

1. A focus upon mobile devices (pedagogy)
2. A focus upon learning outside the classroom (andragogy)
3. A focus upon the mobility of the learner (heutagogy)

Our framework links new pedagogies that focus upon developing student creativity (Sternberg, et al., 2002) with the unique affordances of mobile learning, and the potential for designing transformational educational experiences. The framework is effectively a mashup of new

pedagogical frameworks that scaffold a transformational continuum from teacher-directed pedagogy to student-determined heutagogy (Luckin, et al., 2010). These frameworks can be aligned with a refocus on technology from a substitute for current practice towards the catalyst for redefining teaching and learning (Puentedura, 2006) as authentic experiences of active participation (Danvers, 2003) within global communities or communities of practice (COP). These pedagogical frameworks resonate with Sternberg, Kaufman and Pretz (2002) view of creativity involving the three stages of reproduction, incrementation (or modification of a current idea), and reinitiation (or redefinition). The overall framework is outlined in table 1, outlining the relationship between theory and practice.

TABLE 1
A mobile social media framework for creative pedagogies (modified from Luckin et al., 2010)

	Pedagogy (P)	Andragogy (A)	Heutagogy (H)
Locus of Control	Teacher	Learner	Learner
Course timeframe and goal	Initial establishment of the course and induction into the wider learning community	Early to mid-course: Student appropriation of mobile social media and initial active participation	Mid to end of course: Students actively participate within an authentic community of practice
Cognition Level (Danvers, 2003)	Cognitive	Meta-cognitive	Epistemic
Knowledge production context	Subject understanding: lecturers introduce and model the use of a range of mobile social media tools appropriate to the learning context	Process negotiation: students negotiate a choice of mobile social media tools to establish an ePortfolio based upon user-generated content	Context shaping: students create project teams that investigate and critique user-generated content. These are then shared, curated, and peer-reviewed in an authentic COP
SAMR (Puentedura, 2006)	Substitution & Augmentation: Portfolio to ePortfolio Focus on productivity Mobile device as personal digital assistant and consumption tool	Modification: New forms of collaboration Mobile device as content creation and curation tool	Redefinition: Authentic Community building Mobile device as collaborative tool
Supporting mobile social media affordances	Enabling induction into a supportive learning community	Enabling user-generated content and active participation within an authentic design COP	Enabling collaboration across user-generated contexts, and active participation within a global COP

Creativity (Sternberg, et al., 2002)	Reproduction	Incrementation	Reinitiation
Ontological shift	Reconceptualising mobile social media: from a social to an educational domain	Reconceptualising the role of the teacher	Reconceptualising the role of the learner

The framework provides a simple guide for identifying the appropriate design of mobile learning environments according to a pedagogical goal within the pedagogy-andragogy-heutagogy (PAH) continuum (Luckin, et al., 2010). For example – a focus upon the redevelopment of course materials or content as ebooks or ibooks aligns with a teacher-directed pedagogy and a focus upon devices as a substitute for traditional content delivery platforms. A focus upon the use of interactive content or an institutionally hosted eportfolio to enhance a pre-defined learning experience such as a fieldtrip or museum visit aligns with a student-centred andragogy. In comparison, a focus upon students using mobile devices to capture and share a negotiated learning experience and critical reflections on these experiences by the development and publication using a publication format or eportfolio of their own choice aligns with a phase three student-directed heutagogy.

1.5 The Intersection of EDR and Mobile Learning

In this section we explore the interrelation between mobile learning, rhizomatic learning, and SOTEL, all embedded within an educational design research methodology. The outcome of EDR is usually the production and sharing of transferable design principles. Within our model we embed the use of SOTEL as a framework for sharing peer reviewed reflective practice to critically evaluate the broader impact of our educational design research process, and reify this practice in the development of transferable principles. The curriculum design process is informed by our mobile social media framework that also links the design process to learning theories that focus upon creativity and student-generated content and contexts. Bannan, Cook and Pachler (2015) explore the intersection between mobile learning and EDR, and propose a four stage integrated design research process for mobile learning design research: informed exploration, enactment, evaluation of local impact, evaluation of broader impact. Bannan, Cook and Pachler (2015) argue that the purpose of exploring the intersection between these theories and processes «is to bring the creative (e.g. the design-seeking activity of the research team) and analytic together in a systematic but flexible manner» (Bannan et al., 2015, p. 4). Taking this cue from Bannan et al. (2015) we explore the intersection of mobile learning with EDR by embedding our mobile social media framework, rhizomatic learning, and the scholarship

of technology enhanced learning (SOTEL) within an overarching EDR methodology, thereby connecting theory, practice, and critical reflection (Table 2).

TABLE 2
The intersection between mobile learning and educational design research.

Methodology	Educational Design Research			
4 stages	Informed Exploration	Enactment	Evaluation: Local Impact	Evaluation: Broader Impact
Intersection with mobile learning	Mobile social media framework informing curriculum redesign	Rhizomatic Learning: Developing an Ecology of Resources	Designing Triggering Events	Participant Feedback
Connecting theory and practice	Theory	Practice		Critical Reflection

We have implemented our mobile social media framework for creative pedagogies via collaborative curriculum redesign, supported by the partnership of educational researchers and discipline lecturers, forming communities of practice to explore the application of this framework to their own contexts. In the following section we explore an example of implementing this framework within university teaching and learning.

2. Case studies

In this section we explore an example of the application of our mobile social media framework for designing creative learning environments within an elective course.

2.1 Designing an Elective Course

In 2013 the authors developed a new elective minor course as part of a three-year undergraduate bachelors degree in design. The elective minor consisted of four papers across the three years of the degree, one paper in first year, two papers in the second year, and a final paper in the third year of the degree. In 2014 an opportunity arose to test the design of the elective minor within a shorter six week elective project. The elective

project was a six week long option for students to choose a short specialty project within the second year of their bachelors degree. Students could choose from a selection of six different six week projects related to specialties based within Graphic Design. The project options included: Paper-engineering for pop-up books, Photography in context, Calligraphy, A journey into the web, and Designing with your smartphone. Each elective project was run twice, allowing students to chose two elective projects from the 2014 options. The Designing with your smartphone elective project provided the opportunity to apply our mobile social media framework for designing a creative learning environment and evaluate it over two iterations in 2014.

2.1.1 Curriculum design

The Designing with your smartphone elective project was scheduled as six three-hour sessions, one per week for six weeks. The goal of the elective was to develop students' digital literacies by focusing upon the students building a professional mobile social media portfolio. The elective was therefore not defined by a preset curriculum of content to be delivered by the course lecturers. The participants were second year Bachelor of Design students, predominantly from the field of graphic design. The elective was scheduled to run twice throughout the second semester of the 2014 academic year. An initial survey of the participating students established that they all owned a smartphone and also a laptop computer or an iPad. The survey also indicated that although students were aware of a range of social media platforms they were only active participants on a small number of these platforms, with Facebook dominating their experience.

2.1.2 Developing an ecology of resources

The ecology of resources supporting the Designing with your smartphone elective project was based around Google Plus (G+), Twitter, Wordpress, and Behance. We defined the #autmsm2014 hashtag as a central point to curate the range of mobile social media explored throughout the elective. For example, students included the #autmsm2014 hashtag in the title of their Vine Vimeo and YouTube videos, as well as within any Twitter, Google Plus and Wordpress posts that were relevant to the course. This allowed us to analyze student participation through the use of hashtag analysis tools such as TAGSExplorer and TAGBoard, from which we could identify the emergence of specific students as key nodes of collaboration and also those students who were lone rangers. This also allowed us to provide encouragement, feedback and guidance in a timely manner throughout the course. Google Plus provided a community hub for the course members (Students and lecturers), while Behance provided an online platform for student eportfolios with a specific focus on

participation within a wider global visual design community. Twitter was used as a global networking and communications channel. A Google Plus Community was established as a group discussion forum, and allowed students to share ideas, articles, and multimedia. Google Plus Hangouts were used to bring international guests into the classes virtually via synchronous video and audio calls projected onto a large screen during classtime. These Hangouts were also archived on a #autmsm2014 YouTube playlist for anyone who missed the class. Behance has established itself as a social media hub and community for professional visual design portfolios. Behance was acquired by Adobe – the defacto owner of the most widely used professional visual design software such as Photoshop and In Design – and Adobe has subsequently integrated Behance into their software suite and has developed a solid mobile App for sharing visual design portfolios. Twitter has become an asynchronous hub for global collaboration and is integrated into both iOS and Android mobile operating systems. Wordpress was used for students to create their own reflective learning journals (workbooks). These four social media platforms formed the core of our EOR for the elective, with several other mobile social media tools explored throughout the course. Figure 1 outlines the EOR for the elective course.

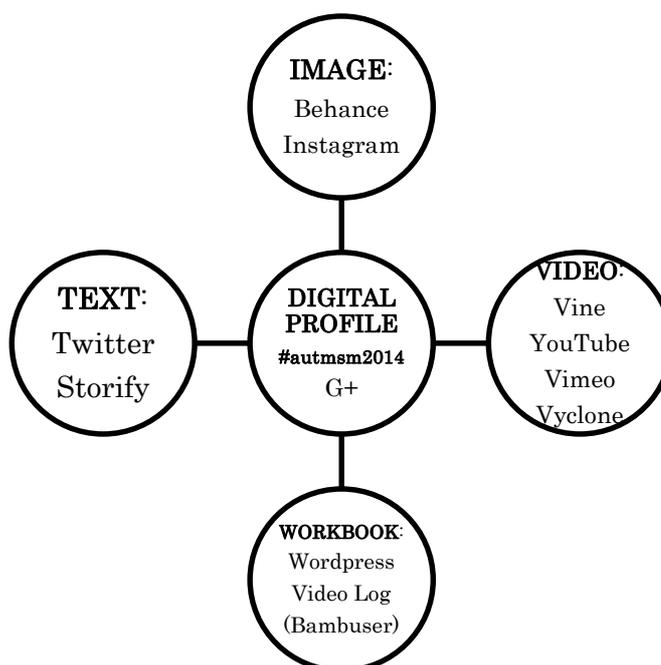


Fig. 1. Ecology of resources for the #autmsm2014 elective

2.1.3 Designing triggering events

Each week of the elective was designed to introduce a topic as a triggering event to initiate creative explorations for students as active participants within a learning community. These triggering events

included a range of guest experts, both local and international (via Google Hangouts), invited by the course lecturers to share their experiences with the class. Each weekly class consisted of a mix of a review of student activity over the prior week, the introduction of a discussion topic via a guest lecturer or practitioner, followed by discussion, and then student exploration of a mobile social media application for user-generated content creation and sharing to be used within their own eportfolio. The focus of the course was therefore not upon the delivery of a prescribed cannon of content, but upon student-generated content as a result of their experiences and explorations of mobile social media throughout the project. The elective project design focuses upon drawing students into active participation within a global learning community that models participation in professional communities. Student participation was assessed by three activities including: the production and sharing of a six-second self-promotional video using Vine, evidence of engagement in the course community via mobile social media (posts on Google Plus community, Twitter, and creation of a video channel on either YouTube or Vimeo), and the collation of students' online profiles and work in progress using Behance as a personal ePortfolio. Table 3 provides an outline of the weekly triggering events for the #autmsm2014 elective.

TABLE 3
Overview of the communication design mobile social media elective project

Topic	Triggering event	Activity design	Conceptual shift	SAMR	PAH
Week 1: Introduction to mobile social media	International guest (UK) via Hangout: The power of social media and curation	Establish personal digital identity via G+ and Twitter. Introduction to a global network	Teacher modeled educational use of mobile social media and G+ Community participation	Redefinition of course LMS as a collection of student owned mobile social media – building a learning community	Pedagogy
Week 2: Brand yourself	Guest speaker from Journalism Department : The power of an online profile	Creating promotional videos via Vine	Teacher guided exploration of digital identity	Redefinition of social media as an educational platform	Andragogy
Week 3: Contextual affordances of mobile social	International guest (Colombia) via Hangout:	Establishing a shared personal workbook via Wordpress	Teacher guided exploration of contextual affordances	Augmentation of mobile video	Andragogy

media	The power of mobile video		of mobile		
Week 4: Creating an mPortfolio	Guest speaker (NZ): The power of an ePortfolio	Establishing identity within a global professional community (Behance)	Student negotiated	Modification of student portfolios	Andragogy
Week 5: Collaborative video production	International industry guest from Vyclone (USA) via Hangout: The power of collaborative production	Collaborate in a team-based project as content creators using Vyclone	Student negotiated	Modification of collaborative video production	Andragogy
Week 6: Student presentations and reflections	International guest (Ireland) via Hangout: The power of a shared journey	Presentation of ePortfolios and reflection on new digital identity perspectives	Active student participation within a learning community	Augmentation of student reflections	Andragogy to heutagogy

2.1.4 Student Activity

The authors were pleasantly surprised at the level of student engagement and activity evidenced throughout the two iterations of the elective project in 2014. In comparison to the limited mobile social media participation indicated in the initial pre-project student survey, students throughout the elective project evidenced interaction with several new mobile social media content creation and sharing platforms. One student created a workbook that consisted of 45 Wordpress blog pages throughout the 6-week elective. Table 4 provides a summary of mobile social media use associated with the two iterations of the elective.

TABLE 4
Summary of #autmsm2014 mobile social media activity

Mobile social media	Elective1 activity for 15 students	Elective2 activity for 12 students
Map of geotagged #autmsm2014 Tweets http://goo.gl/maps/vvBgm	179 tweets from 20 users	145 tweets from 32 users

Google Plus Community http://is.gd/Vy5NHY	96 posts and 150 comments	68 posts and 68 comments
TAGBoard https://tagboard.com/autmsm2014/182047	320 posts	103 posts
Vine video production http://vinebox.co/tag/autmsm2014	30 Vine videos	52 Vine videos
Example ePortfolio interaction on one Behance profile	187 views 26 appreciation s 7 follows	197 views 48 appreciation s 20 follows
Wordpress workbooks	Average of 12 pages of posts	Average of 12 pages of posts

Interestingly the Twitter hashtag analysis indicated that there was interest in the project beyond the student and lecturer participants, particularly within the global networks associated with the invited international guest lecturers.

2.1.5 Participant Feedback

Students were asked to provide reflective feedback at the end of the elective via either a blog post or embedded video PODCast. The student feedback was very positive as illustrated by some examples transcribed below.

«This class was great, I enjoyed learning about the power of social mobile media and it has opened up so many opportunities to me that I didn't know existed. The importance of a good online profile was something that had not really occurred to me prior however I am now grateful that I have a good basis to share future work.» (Student E1, 2014)

«The class had a positive atmosphere and allowed us to be creative, and not set to a particular trajectory. I liked that we were able to go outside of the classroom to practice our skills, something that we don't see as much in other papers.» (Student E2, 2014)

2.1.6 SOTEL

Critical reflection on the experience of designing and implementing the mobile social media elective have included conference proceedings (Cochrane and Antonczak, 2015; Cochrane, Antonczak and Guinibert, 2014; Cochrane, Antonczak, Guinibert and Mulrennan, 2014), book chapters (in review), and journal papers (Cochrane and Antonczak, 2014). These have helped refine and reshape the elective project design and also

informed the design and development of subsequent courses. These articles also provide the opportunity to conceptualize the design of the course by making a direct link between theory and practice, and also a model for our lecturer colleagues within the department and the wider university to explore.

3. Discussion

In this section we briefly highlight some of the key themes we have identified within the intersection between mobile learning and educational design research as we have implemented our framework using mobile social media for designing creative pedagogies.

3.1 Designing authentic mobile learning experiences via an appropriate ecology of resources (EOR)

The Internet has created a global network, and mobile connectivity facilitates interaction with this network anytime anywhere, bridging formal and informal learning. Our framework informs the choice of mobile social media platforms that can create an ecology of resources focused upon learner-generated content and learner-generated contexts. An ecology of resources of this type scaffolds a move from substitution of traditional pedagogies via new technologies towards the exploration of experiences and pedagogies that were previously difficult or impossible to achieve. This includes the ability to frame learning experiences around active participation within authentic global communities across a wide range of contexts. Within the context of Graphic Design our elective project provided students with their first experience of participating within the global community connected via Behance – the de facto professional community of visual designers. Linking our face-to-face classes within a global network of educational and multimedia experts via Google Plus and Twitter provided a rich environment beyond the physical confines of their own student peers, and initiated students into participation within a global community. Identifying an appropriate ecology of resources to support any educational context forms an integral initial step in the educational design cycle, and integrates into an educational design research methodology.

3.2 Modeling Creativity via triggering events

Reconceptualizing lecturers as the designers of triggering events for student creativity is a significant pedagogical leap for many lecturers and students. We have attempted to model this change in pedagogical strategies within the design and implementation of an elective project for second year students. In this example our role as lecturers has changed

from being one predominantly focused upon content deliverer to interaction facilitators, with the course content effectively becoming student-generated and shared. We have scaffolded these reconceptions via the design of a weekly series of triggering events, providing a framework of guidance and collaborative support rather than leaving students to sink or swim, which has been the source of criticism leveled against social constructivist learning designs (Kirschner, Sweller and Clark, 2006). We agree with Laurillard (2007) that the role of the lecturer is critical in both designing and modeling new learning environments that bridge both the classroom and informal learning experiences, and does not provide an excuse for minimal guidance. Mobile learning provides a powerful platform for designing authentic and creative learning experiences that are learner-centered and leave room for serendipity. As lecturers learn to relinquish their control over the classroom environment and model the use of mobile social media within their own practice we believe students will be empowered to become creative participants of new learning communities. Danvers (2003) calls this type of approach radical pedagogy.

3.3 The scholarship of technology enhanced learning (SOTEL)

The case study of the collaborative design of an elective project is but one example of implementing our model of collaborative curriculum redesign informed by the scholarship of technology enhanced learning. This model has resulted in a wide body of research within a variety of educational contexts that now encompasses a network of over 37 lecturers as collaborative curriculum designers and reflective practice co-authors, producing over 100 peer reviewed publications. Embedding critical reflection upon the impact and effectiveness of our learning designs by an explicit focus and nurturing of the scholarship of technology enhanced learning enables a deeper reflective process and a wider impact via scholarly peer-reviewed publications. We encourage publication within open access journals, conference proceedings, and establishing research profiles on emerging social media research communities such as Researchgate.net and Academia.edu, but acknowledge that this is still an emergent avenue for academic scholarship. For many of the lecturers that we work in partnership with, SOTEL represents a new field of research that can compliment their discipline-based research activities. Using an EDR methodology that focuses upon SOTEL provides an avenue for dissemination of transferable principles and pedagogical strategies creating the potential for wider impact across a global education network.

4. Conclusions

Mobile learning is inherently 'messy', however we have argued that it is possible to design mobile learning that explicitly connects theory, practice, and critical reflection using an educational design research methodology. This can be achieved by embedding a mobile social media framework, curriculum design based upon rhizomatic learning, and the scholarship of technology enhanced learning (SOTEL) within an overarching educational design research (EDR) methodology. We have illustrated the implementation of this design framework with the design of an elective project, and we argue that this design framework is potentially transferable to wider educational contexts.

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