Preface

COMPENDIA, DISRUPTION AND TERMLESSNESS: DESIGN RESEARCH IN MOBILE AND BLENDED LEARNING

Out in the woods or in the city, it's all the same to me...the world's my home when I'm mobile
Going Mobile – The Who

This volume draws together all the articles published by the International Journal of Mobile and Blended Learning in its first year of publication (2009). Reflecting back on this body of work, it seems to provide a landmark moment in the evolution of mobile learning research. The author list reads like a Who's Who of many of the leading researchers in the field, and several of the papers included in this volume are revised and extended versions of the best work from the major international mobile learning conference series, mLearn and IADIS Mobile Learning. In addition, the invited papers that come from the inaugural issue, and the conference keynotes, which tend to take a broader and more discursive view than regular research papers, provide us with some seminal resources for working within our field. Given this pedigree, I very much welcome the opportunity to bring these articles to the attention of a wider audience than those who currently subscribe to the journal. Being able to bring them together into a single volume also gives me an opportunity, in this chapter, to reflect on broader themes than those covered in the editorials of the individual issues, and to explore the role of the journal from a longer term perspective. With this in mind, I begin with something of a historical retrospective on mobile learning research, including the role of disruption and the themes of termlessness, before exploring some issues around design research as a methodological frame for mobile and blended learning, in an attempt to contextualise what follows in the sections that deal more directly with the articles collected together in this book.

The Mobile Compendium

Mobile learning as a research discipline is rooted in technology, and artefacts that we either create or use for learning purposes. Regardless of the specific definitions that people choose to take as their starting point, it is generally agreed that mobile learning does not just mean learning while mobile, but also implicitly involves interacting with some kind of mobile device and/or infrastructure. This is an important facet of our work, because in any practical intervention we have to be able to demonstrate not just that we can deliver learning with mobile technology, but also that we could not have been equally, if not more, successful using (cheaper) alternatives such as books, maps, notepads etc. This brings to the fore the concept of affordance (Sellen & Harper, 2002), whereby we judge not only the affordances

that our device can provide but also the alterative affordances that other approaches might have given us. Moreover, we must also have some kind of criteria for what constitutes a mobile learning device, since other forms of technology might be brought to bear in a learning scenario that includes personal mobility, but yet does not fit into our normal assumptions about what constitutes mobile learning. For example, is a learning intervention in which learners use cameras or video recorders one that we could classify as 'mobile learning'? How do we categorise learning systems that use calculators in a mobile context? Is perhaps digital communication the defining feature of mobile learning? If so, where does that leave some systems described in the literature as mobile learning, based on mobile devices that did not have any communication channels? If all this seems like an unnecessary digression, let me get to the point. Perhaps the most useful way forward in reflecting on this blurred boundary between what may, or may not, be mobile learning, is to consider how the contemporary mobile device has become a compendium, an *embodiment in miniature* (Oxford English Dictionary), of complementary functionality, in the words of Diana Laurillard, 'Perhaps it is this powerful combination that triggers the opportunity to reflect on the implications for how we learn' (Laurillard, in Vavoula et al., 2009). Thus, regardless of past definitions, for future mobile learning research we are likely to concern ourselves not with a single affordance, but a range of synergistic tools that together can generate new and innovative learning experiences. Perhaps we should also remind ourselves at this point just how recent these mobile learning compendia are. The mobile phone has been around for at least a generation (the pioneering Motorola DynaTAC dates from 1985) but the multiplicity of affordances is a more recent phenomenon. Camera phones and mobile Internet browsers didn't appear until around the turn of the millennium, and other smart phone characteristics (media players, WiFi, video etc.) are only now percolating down from the high end device market into common usage. Until recently the perceived advantages of using a mobile device for learning; access anytime and anywhere, widespread ownership, always on, socially discreet and not needing mains electricity, were equally true of the books, maps and notepads mentioned earlier. It is more recent features like rich media, high-speed data and GPS that give mobile devices major advantages over traditional learning tools in the mobile context. As Traxler pointed out, we had to wait some time for the multi faceted device to evolve as an integrated unit; unlike with other technologies we have had limited opportunities to extend their functionality on an ad hoc basis (Traxler, 2007). Only now are we seeing Alan Kay's vision of the personal computer fully realised;

Superior to books and printing in at least some ways without being markedly inferior in others…owned by its user… and portable (which means to me that the user can easily carry the device and other things at the same time.) Need we add that it be useable in the woods? (Kay, 1972).

So, the technology is finally here, but what is its role and wider impact for learning? In the next section I consider this technology from two perspectives; its disruptive nature and its possible contribution to termless learning.

Disruption: Making Sense of Change

'Disruption is rooted in life itself. Life's essence lies in accidents and interruptions, in conflicts and tensions, rather than in a form of linear or static continuity' (Dru, 2002 p.287)

For those of us working in educational technology, disruption is one of the few constants. It is sobering to reflect, at the end of the first decade of the 21st century, how much mobile learning has changed over those few years. 'In 2001...few people knew about the concept of mobile learning or, indeed, could envisage the potential of mobile devices for learning' (Gamble, in Attewell, 2005.) Looking back on published research over the last 10 years or so, authors reiterate many themes related to technology and affordance, the cost of devices and connectivity, the features of these devices, the relative numbers of mobile devices compared to desktop PCs, the relative number of mobile as opposed to fixed phone connections, and the difficulties of using small screens (particularly in outdoor lighting conditions) and limited keyboards. The quoted facts and figures change all the time, but the message has consistently been that, despite current limitations, we are always on the threshold of further change. However we may have reached the point where the 'current limitations' issue has almost faded from view. As technology and infrastructure has quickly developed across the world, mobile device utility has increased out of all proportion while connection costs, particularly for data, have fallen. The perceived limitations of mobile devices are increasingly made irrelevant by custom and practice. As Funk points out in 'Mobile Disruption', innovative technologies don't have to be good at everything, but they have key innovative features that attract users even if other factors are limited. As technologies with the disruptive feature of *portability* have developed we have been able to see a paradigm shift in perceptions of mobile learning from something with a minor educational role, providing courseware with limited application and learner interaction, to something with rich content, with wide potential and reach that has a valid place in enhancing and enriching learning experience and performance (Valentine, 2004). Of course the technology alone is not the key driver for change; 'There is no such thing as disruptive technology, only disruptive ways of using it' (Gower et al, 2001 p.52). Thus user–centred disruptive design should be at the heart of the work we do with educational technologies.

Disruption as Distraction

Funk's use of the term 'disruptive' is, of course, focused on the positive. The same term equally has negative connotations. As Sharples pointed out, mobile phones can be disruptive devices in the classroom if their role has not been successfully negotiated; 'A mobile learning device may become a zone of conflict between teachers and learners' (Sharples, 2002, p.518.) This is an ongoing issue that still causes much debate. Even where we have successfully negotiated the context of use for mobile devices, issues of disruption still occur, since the distraction of interacting with a device can detract from sensemaking activities (Rogers et al., 2010.) As we explore evolving opportunities in blended environments of mobile, ubiquitous, augmented and pervasive learning, the task of 'Maintaining a balance between the physical and the digital' (Rogers et al., 2005) will always be a key challenge. As technology becomes ever more pervasive, the possibility for disruption, is all its meanings, will increase. We have to be prepared to address this disruption and adapt to its impact on learning technologies.

Termless Learning

Perhaps the most radical aspect of disruption is that it can fundamentally alter our whole approach to learning. The breaking of boundaries between the classroom and the world, between the formal and the informal, and between the participants in learning that mobility enables is a true paradigm shift in that it can potentially enable *termlessness*; 'Applied to education, termlessness signifies an attitude toward

learning and knowing that regards knowledge, not as something that is acquired, but rather as a perpetual work-in-progress' (Koschmann, 1998.) Underlying the concept of termlessness are six objectives for instruction;

1. To teach generative skills of learning and inquiry rather than a basic inventory of facts
2. To empower learners to determine both the scope and depth of their learning.
3. To ensure that all learning is motivated by a legitimate need to know
4. To expose learners to multiple views and representations of an issue and encourage them to apply multiple strategies in approaching problems
5. To encourage reflection on the credibility and authority of all sources of knowledge
6. To instil the recognition that the understanding of complex material is never completed

In reflecting on how to build *tools for termlessness*, Koschmann did not specifically consider mobility, however three major themes that he discusses, *activeness*, *collegiality*, and *authenticity*, (to paraphrase; active, collaborative and contextual learning) are all well supported by mobile learning, and I shall return to these themes later when discussing the articles in this book.

Eye to the Telescope: Looking Back (and Forward) in Mobile Learning Research

Of course, even as we struggle to keep abreast of technological innovation, it would be wrong to characterize our legacy of research as being preoccupied with the fleeting technical issues of the moment. Whilst we have always had to reflect on the immediate context of our work and the constraints that such issues bring to bear on our practical initiatives, the underlying theme of our work is ultimately pedagogy/andragogy of one type or another. Looking back on some memorable papers of the past, we can see that, regardless of technological limitations, mobile learning research is all about leveraging the value of mobility, of learning in the here and now wherever that may be. Back in 1991, the Wireless Coyote project, using bulky equipment cobbled together with duct tape and velcro, provided us with one of the first insightful mobile learning experiences. Despite the technical limitations, 'students focused on higher-level learning tasks such as problem finding, data sharing, and problem solving' (Grant, 1993.) Other pioneering work showed us that mobile and blended learning could be supported by all kinds of devices that could be integrated into exploratory environments, for example *thinking tags* (Colella, 2000) and *embedded phenomena* (Moher, 2006.) Despite these forward thinking initiatives, we often find ourselves following technology trends rather than driving them, since more powerful economic forces tend be ahead of education in terms of technology innovation. It is no coincidence that significant early work was done in professional mobile learning by technology companies who had the resources and infrastructure to embark on such projects. An early study into the efficacy of mobile learning using mobile phones was carried out by Ericsson (2002), and IBM embarked on a mobile learning initiative involving web based lectures in the same year (Koschembar, 2005). It is unlikely that many educational institutions would have been willing or able to make the significant investment in commercial (as opposed to experimental) devices and data connections that were required at that time to undertake this kind of work. Thus sometimes our role as innovators is one of looking for the right ways to leverage existing technologies, and to make the most of opportunities. As Mitch Davis noted at Stanford University Law School in 1998 "Here we are in the middle of Silicon Valley, and we're using chalk on blackboards in

our classrooms", and seized the opportunity to introduce first wireless learning and then mobile learning, in partnership with Cisco, Nokia, Airwave and Palm (quoted in Currin, 2001.)

Design Science and the Methodology of Construction

Due to the nature of our research, which encompasses both technology and pedagogy, we often find ourselves stretched across both the behavioural and design science domains. Many of the articles in this volume relate to the creation (or assembly) of software artefacts as part of a mobile learning initiative. One aspect of research that seems to be a constant source of debate is how the construction and/or utilization of software artefacts relates to research methodology. Building a software artefact as part of a research exercise has much in common with routine design of software artefacts, but there is an important distinction in our intent;

'design-science research addresses important unsolved problems in unique or innovative ways or solved problems in more effective or efficient ways. The key differentiator between routine design and design research is the clear identification of a contribution to the archival knowledge base of foundations and methodologies' (Hevner et al., 2004 p.81).

Further, design research alone does not dictate a standard set of methods for evaluation. Whilst on the surface an iterative development cycle is measured against its functional objectives, evaluation is more than the simple testing of hypotheses. Rather, 'the evaluation phase exposes an epistemic fluidity that is in stark contrast to a strict interpretation of the positivist stance.' (Vaishnavi, 2005). Hevner et al. (2004) outline this fluidity in their summary of possible design evaluation methods, which encompasses a range of possible techniques, both quantitative and qualitative, and this list is not exhaustive:

- **Observational:** Case Study, Field Study
- **Analytical:** Static Analysis, Architecture Analysis, Optimization, Dynamic Analysis
- **Experimental:** Controlled Experiment, Simulation
- **Testing:** Functional (Black Box), Structural (White Box)
- **Descriptive:** Informed Argument, Scenarios

The focus on design research here is not intended to suggest that all mobile learning research is (or should be) about the creation of testable system instantiations. Given the behavioural aspects of our field that would not be appropriate. However a design research framework also embraces theories and models as well as multiple types of artefact. There is also much debate about the very nature of design research itself. Perhaps it is worth noting Carlsson's (2005) critique which promotes the role of critical realism, and reflects the complexity and difficulty of empirical research that relates to learning; 'The real world consists of a plurality of structures and generative mechanisms that generate the events that occur and do not occur. From an epistemological stance, concerning the nature of knowledge claim, the realist approach is non-positivistic which means that values and facts are intertwined and hard to disentangle.' (Carlsson, 2005 p.97). Without wishing to enter further into that debate, I have taken Hevner et al.'s (2004) depiction of the information systems research framework as a starting point for a (simplified) view of how design research can help to contextualise different aspects of mobile learning research (Figure 1). Whilst many technology enhanced learning projects will encompass most, if not all, of the aspects

Figure 1. Mobile learning research within a design research frame (adapted from Hevner et al., 2004)
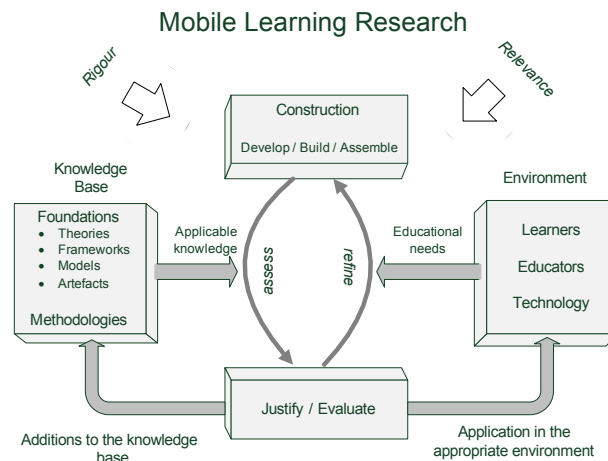
of this framework, it also provides a useful way of categorising the key contributions of certain research articles, and therefore may help us to juxtapose different pieces of work and begin to understand how their main contributions may illuminate certain parts of the framework in a complementary manner.

Foundations of the Knowledge Base

Having spent some time reflecting on the journey that we have taken to get to this point in the story of mobile learning, and considered some possible approaches to analysis, I will now turn my attention to the articles in this volume, and their contributions to the research field of mobile and blended learning. Taking the foundations of the knowledge base from Figure 1 as my starting point, I will begin by introducing those articles that primarily address issues of theory.

Foundations: Theory

Perhaps one of the most important theoretical articles in this volume is the contribution from Yrjö Engeström, based on his keynote address at the mLearn 2008 conference. Previously his work on activity theory has informed and perhaps inspired much of the theorising that has underpinned mobile learning (see for example, Sharples et al, 2007; Wali et al, 2008). This new contribution, however, looks at "Wildfire activities: new patterns of mobility and learning". It places mobility and learning together in an historical context before abstracting and analysing a mode of informal mobile learning that transcends the current incarnation of mobile learning based around technology. Engeström's article contributes to a greater understanding of the wider context of learning with mobility, and will catalyse new perspectives and theorising within the mobile learning research community.

John Traxler's "Learning in a Mobile Age" addresses the definition and evolution of mobile learning in the dynamic context of socio-technical developments. Traxler addresses the key issues of research and development that now face our discipline. Having come through the pioneering phase of learning how to build and apply mobile learning tools: the mobile learning community is now faced with broader challenges of scale, durability, equity, embedding and blending. Traxler concludes by asserting that we

must now focus not just on the inward looking development of what we build, but on the outward looking awareness of the context and importance of mobile and blended learning within the environments in which it is being used.

Foundations: Frameworks

Moving on from theory to other foundational constructs, the next article addresses describes a framework. "m-learning generations and interview study results of A Mobile context-AWARE learning schedule FRAMEWORK," by Jane Yin-Kim Yau and Mike Joy, describes the design of a theoretical framework to support learning in different locations and with different time availability. In their analysis of related work, the authors claim that built-in software in mobile devices is not designed to support learning since 'audience' activities such as reading course content and attending lectures (presumably implying listening to the lecturer) are not supported by them. Interestingly, the paper argues implicit learning is denoted by people who behave as if they have learnt something but have difficulty reporting what they have learnt. Following from this, it may be suggested that 'creator' activities may provide learners with the means to articulate what they have learnt. The analysis of empirical data from an interview study which explores the relevance of five learning contexts for a personalised mobile learning application, leads the authors to conclude that individual m-learning and learning environment preferences should form the basis for suggesting appropriate materials for each learner.

Foundations: Models

Models, a further construct from the foundations of the knowledge base, are explored in "A Model of Collaborative Learning Scripts Instantiated with Mobile Technologies" by Pierre Dillenbourg and Zeno Crivelli. In this article the authors acknowledge that learning scripts themselves are not necessarily computer mediated, and are simply a pedagogical method. However the relevance of mobile technologies is to enable the execution of a computational workflow across heterogeneous spaces. Thus we see how mobile technologies can give added value to a pedagogical model using a blended approach. Once again the authors highlight the challenge of successfully integrating mobile technologies into blended learning environments. As the authors state, 'We do not claim that mobile learning is an easy way to enhance collaborative learning...However this should not prevent researchers from continuing to explore the richness of the convergence of social and physical interactions.'

Another article that focuses strongly on the concept of models is "Adaptive and activity-oriented pervasive learning systems at Workplace based on Service Oriented Architecture" by Cuong Pham- Nguyen, Serge Garlatti, B.-Y.-Simon Lau, Benjamin Barbry and Thomas Vantroys. Here, the authors address issues of context in pervasive learning. They begin their article by asserting that 'Pervasive learning is becoming a new wave in technology-enhanced learning', and go on explore how the development of such systems might be supported in terms of the complex interactions that take place between the learner and their dynamic learning environment. Specifically, they describe the use of context modelling scenarios to support the development of a pervasive learning system that aims to integrate context-aware corporate learning and working activities within an e-retail framework. The article describes a hierarchical task model having the task/method paradigm, with methods defining how to achieve a task. The system described is based on a service oriented architecture that enables the delivery of these methods to be adaptive, based on classification and filtering of content and adaptive navigation. Having outlined the key

architectural elements in their system, the authors conclude that 'A service oriented architecture approach is suitable for pervasive learning systems to deal with…dynamic learning content and environments.'

"Designing Participant-Generated Context into Guided Tours" by Juliet Sprake of Goldsmiths, University of London addresses design models for context-aware informal mobile learning. This article brings together a number of diverse conceptual perspectives and metaphors to help us theorise and enrich context, space and place and their relationship to learning and empowerment. In particular she introduces the concepts of 'seeding' fragments of content and 'threading' them together. 'Both concepts work on the central notion that the tour is produced through participation'. She also addresses the issue of distraction, noting that in mobile learning the dynamic relationship between participants, artefacts and the environment are not distractions but rather key attributes of the mobilised learner. We might reflect here that the guided tour scenarios outlined by Sprake encompass all three of Koschmann's (1998) termless learning themes of *activeness*, *collegiality*, and *authenticity*.

Construction and the Iterative Cycle

The central part of the framework covers the construction and evaluation of mobile learning systems. Under 'construction' we might also include the concept of assembly, whereby existing technologies are utilised within the context of a particular research design. Of course there is no point to construction without evaluation, and no evaluation without some artefacts to evaluate, and these are both integral parts of the 'assess and refine' iterative cycle of design research. However some articles stress the construction aspects, whereas others focus more on the mechanisms of evaluation. Therefore In this section I begin by discussing those articles that focus on the construction of new mobile learning systems, and in the following section focus on those that concern themselves primarily with evaluation.

Building Systems

At the forefront of mobile learning research is the desire to explore the technologies and applications that go beyond current practice. Hiroaki Ogata's article, "Supporting Awareness in Ubiquitous Learning" based on his keynote at the IADIS Mobile Learning 2009 conference, looks at a number of ambitious projects undertaken at the University of Tokushima. It presents a technological perspective of ubiquitous learning requirements and focuses on the concept of awareness. It discusses five types of awareness: social, task, concept, workspace and knowledge, which may initiate learning in ubiquitous learning contexts. Ogata's paper also presents four applications: TANGO, LOCH, PERKAM and LORAMS. In these applications we can see various approaches to skills based learning, supported by innovative and integrated technologies, and it is interesting to observe the various balances of activeness, collegiality, and authenticity in the nature of the applications described. This kind of research underlies the concept of the compendia of technologies being brought to bear in authentic learning contexts.

Einstein, a keen chess player, apparently once said (though the quote may be apocryphal) that "Games are most elevated form of investigation." "Premierløytnant BIELKE: a Mobile Game for Teaching and Learning History" by Jo Dugstad Wake and Rune Baggetun, presents the design and pilot evaluation of a mobile location-based game for history learning. The game utilises the surroundings and milieu of a town to support the players' creation of meaning in relation to a historical period and its events. Through its missions, the game provides a context for 'audience' activities such as reading and watching (maps and instructions), and searching. Unlike in more traditional searching activities, the searching

supported by Premierløytnant BIELKE is location based and has players roaming a town. Perhaps the most interesting aspect of this game is that it strongly exemplifies all three themes of activeness, collegiality and authenticity.

Describing their "Affective Tutoring System for Better Learning", Abdolhossein Sarrafzadeh, Samuel Alexander and Jamshid Shanbehzadeh introduce the research behind a lifelike animated agent called Eve, who is able to detect student emotion through facial expression analysis, and can display emotion herself. Whilst the current implementation is tied to a desk top environment, the authors suggest that the ever increasing power of mobile devices, integrated with personal and wide area networks, may bring affective tutoring to the mobile learner, blending the personal mobile device with the personal attention of an affective tutor. We might reflect that this type of system is one way of supporting a kind of virtual collegiality, even in the absence of a real world interaction.

Assess and Refine

"The Genesis and Development of Mobile Learning in Europe" by Agnes Kukulska-Hulme, Mike Sharples, Marcelo Milrad, Inmaculada Arnedillo-Sánchez and Giasemi Vavoula, discusses not one mobile learning implementation but several. The authors trace major European projects such as MOBILearn and M-Learning, before turning their attention to the development of more recent projects. They demonstrate that our concerns have now begun to address mobile learning from a more blended perspective, typically embracing multiple technology platforms and ensuring the support of teacher education and indeed educational policy making. The authors conclude that the research challenge ahead will require a combination of technical, pedagogical and sociological expertise to be able to make sense of, and give some direction to, emerging forms of mobile and blended learning. The broad sweep of this article takes us beyond construction into the realms of evaluation, which we will address in the following section. It also gives us a strategic view of the 'assess and refine' cycle of design research, which can be applied not only within an individual project but across multiple projects.

Evaluation and Ethics

"Meeting the Challenges in Evaluating Mobile Learning: A 3-level Evaluation Framework" by Giasemi Vavoula and Mike Sharples puts evaluation on a systematic and comprehensive footing and sets the standard for subsequent improvements across the community. The proposed framework, reaching from innovation through to deployment, should contribute to the kinds of credible and authoritative evaluations that will unlock increased public finance for mobile learning in schools, colleges and universities. The 3-level framework integrates well with the iterative, reflective structures of design research.

Evaluation needs measures of some kind. Sometimes these are readily identifiable metrics, such as usability metrics (a number of these have been published by the ISO, for example). It has become something of a mantra in publications related to mobile learning on small devices to highlight usability issues with small screens and keyboards. However few researchers have attempted to evaluate how human-computer interaction design principles developed in other contexts might apply to mobile learning when integrated into the systems development process. Nevertheless this is just the question addressed in "A Design of Collaborative Learning System Based on PDA for Improving Performance of Real-Time Learning", by Kuo-Wei Su, Cheng-Li Liu and Meng-Fang Kuo. As the authors assert, 'Mobile services will not be successful if we do not understand and design for the needs of the end-users, which

are very different from those traditionally studied in HCI research.' Perhaps one of the most pertinent findings from this article, which provides extensive analysis of data gathered from users of a prototype system, relates to the use of landscape mode for presentation, since an increasing number of devices are now able to support this mode of content delivery. Su, Liu and Kuo suggest that a preference for either portrait or landscape mode is dependent on the type of content, and go on to provide some examples of which content seems to work better in landscape or portrait modes.

Blended Learning Evaluation

So far I have focused almost exclusively on mobile learning, but the journal also encompasses blended learning. In my original expectations of the journal, I saw blended learning as the wider context within which mobile technologies can support learning environments that blend together multiple modalities and learning spaces, as exemplified by work such as (Spikol et al., 2009) and (Verdejo et al., 2009). However this is no reason to preclude high quality submissions that confine themselves to a more traditional view of blended learning, and so two such papers are included in this volume. In both of these papers, activeness and collegiality are key aspects of the participants' experiences.

The first of these is "Exploring the effects of web-enabled self-regulated learning and online class frequency on students' computing skills in blended learning courses" by Pei-Di Shen and Chia-Wen Tsai. In a context in which on-line learning alone is not possible due to local regulations, the authors have evaluated the effects of blended learning in contrast to more traditional approaches in vocational education. Their results clearly show the benefits of blended learning, with the students who studied in a blended learning environment gaining marks 'significantly higher than those who learned through traditional teaching.' The authors go on to say; 'This study highlights the necessity of applying innovative teaching methods and technologies, and appropriate arrangement of Blended Learning courses to help students learn.'

The second blended learning article is Andrew Kitchenham's "Blending Professional Development for Rural Educators: An Exploratory Study", exploring the use of blended learning as a model of e-professional development for teachers in northern Canada. Kitchenham argues that the 'blended learning model is superior to others as it is based on adult-learning principles.' Using an online survey, semistructured interviews, and an emailed survey, the research described in this article progressively gathered data from a range of key stakeholders to identify the value proposition of blended learning in this particular environment. The author concludes that the development of a blended learning solution for teachers in this context means that 'geography, climate, cost, and isolation will no longer be barriers for these professionals.'

Ethics

Evaluation frequently requires us to also address ethical considerations, since we are often working with real world learners whose interests must be protected. Ethics in mobile learning has been largely overlooked and so "Ethical considerations in implementing mobile learning in the workplace" by Jocelyn Wishart is a welcome and necessary addition, especially as it addresses both ethics in mobile learning evaluation and mobile learning deployment. The nuances of ethical issues across sectors and counties continue to surprise researchers and practitioners, and are sometimes poorly understood by ethics review boards and professional bodies' ethical codes. Wishart explicitly addresses workplace mobile learning

but many of her conclusions have a much wider significance and her proposed framework is a concrete contribution to reasoning about ethical issues.

Application in the Environment

The third part of the design research framework outlined in Figure 1 relates to the application of mobile learning designs in the environment. This is where the learners, educators and technologies come together and we are able to see the outcomes of our work. Several of the articles in this book consider applications that relate to various technologies and concepts (such as blogging, podcasts, multi media creation and sharing, and social networking) that are often seen as coming under the umbrella of Web 2.0, so I have taken this as the overarching theme for this part of the chapter.

Web 2.0 Memes and Meanings

O'Reilly's original definitions of what constituted Web 2.0 were broad indeed (O'Reilly, 2005), so it is no surprise that the term has become a catch all expression for almost any kind of web based interaction that goes beyond server-centric content delivery. Many people tend to think of social networking as one of the key aspects of Web 2.0, though the relevant aspect of the original 'Web 2.0 meme map' was the loftier (and more inclusive) 'architecture of participation'. Perhaps the other key features of that map that would relate to our experiences of mobile learning design would be 'software above the level of a single device', and 'emergent: user behaviour not predetermined' and 'harnessing collective intelligence', as we see made manifest in the articles introduced in this section. Again, activeness and collegiality are implicit in these memes.

Perhaps the canonical example of 'software above the level of a single device' is the phenomenon of the iPod (and similar portable media devices), which utilises an integrated platform that spans servers, desktop clients and mobile devices. Leveraging the mobile media player as a learning device is considerably easier than doing the same with the mobile phone, because the platform and its capabilities are more constrained and predictable. Thus there are great opportunities to integrate such devices into blended learning environments. In "iPod Technologies: Advancing Dance and Digital Performance", Dennie Wilson, Ben Andrews and Crispin Dale show how iPods have become a key tool in teaching aspects of dance for video. The iPod screen offers a new platform for dance performance, where perhaps first and foremost, it offers the artist a different perspective from which to consider making Dance for Screen, that of the screen size and image quality, the portable nature of the viewing platform and the location of the viewing experience. By exploiting the mobile tools that students already use on a regular basis, this project vividly demonstrates the potential for using the existing environment as an enabler. Rather than trying to impose new systems to support mobile learning, the authors take advantage of the embedded and scalable infrastructure of the personal media player. Utilising these devices in the creative context of dance also provides an excellent example of the 'emergent: user behaviour not predetermined' aspect of Web 2.0, as well as providing an authentic context for learning.

The role of media players is also important In "M-Learning and Y generation: the reality behind the myth", by Melanie Ciussi, Gill Rosner and Marc Augier, where podcasts are used in an informal learning setting. In this article the authors declare the death of two myths: 1. regardless of commonly adopted discourses, the 'net generation' are not digital natives; 2. despite the availability of ever-connected, portable technologies, students do not want to learn all the time. The article presents data from a project

aiming to support English learning with podcasts. Results from this study indicate that students will not engage with informal learning through podcasts unless the activities are part of a formal curriculum.

Thomas Cochrane and Roger Bateman's "Transforming Pedagogy Using Mobile Web 2.0" reports on the transformation of a product design course from a traditional face-to-face studio approach to a mobile Web 2.0 one. The article describes how mobile devices and social software such as blogs are used to record, upload, collate, comment and reflect upon evidence of the students' design process. Thus, mobile and Web 2.0 technologies seem to support the articulation of implicit learning through the 'bread crumb trail' left by the media created by the participants. The authors report the media creation activities the participants engaged in increased interaction and helped students improve their editing skills, harnessing collective intelligence. By and large, students captured and shared more images than made blog entries which the authors suggest shows a preference of this medium over traditional writing.

"Improving cross-cultural awareness and communication through mobile technologies" by Adele Botha, Madelein van den Berg, Steve Vosloo and John Kuner links the concerns of the mobile learning community, especially informal learning and the web 2.0 agenda, with insights into the cultures evolving around mobile technologies, documented elsewhere by Katz and Aakhus (2002) and by Ling (2004) amongst others. The article describes how mobile technologies were used by groups of young people (aged 12-14) in the United States and South Africa to communicate with one another and share their cultural understandings. We might characterise this work as being primarily collegial, but it might also be seen as being authentic, even though the participants did not physically experience their peer's environments, the virtual sharing of cultural experiences was nevertheless very much rooted in their real lives.

Conclusion

I have attempted to frame the work presented in this volume from a number of perspectives. In particular I have used the concepts of design research to contextualise the range of concerns covered by the various chapters. In addition, Koschmann's (1998) themes of *activeness*, *collegiality*, and *authenticity*, have been identified as key features of the termless nature of mobile and blended learning. I hope that by applying these unifying concepts I have assisted the reader in understanding some of the major relationships that underlie the apparently disparate articles gathered together in this volume.

Much has been claimed for the benefits of mobile learning. Research has suggested that it helps learners to improve their skills and recognise their existing abilities as well as identifying areas where they need assistance and support. It helps to remove some of the formality from the learning experience, can be used to encourage both independent and collaborative learning experiences, engages reluctant learners and helps learners to remain more focused for longer periods. It also helps to combat resistance to the use of ICT, bridge the gap between mobile phone literacy and ICT literacy, and raise self-esteem and self-confidence (Attewell, 2005). It cannot, however, achieve all this without considerable effort from researchers, technology developers and educators. The role of a journal such as the International Journal of Mobile and Blended Learning, and collections such as this book, is to assist this effort by helping to disseminate knowledge and experience among the researcher and practitioner community. The work presented here encapsulates a valuable compendium of mobile and blended learning research that I am sure will serve as a useful resource for many years to come.

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