



Open Research Online

The Open University's repository of research publications
and other research outputs

Designed and user-generated activity in the mobile age

Journal Article

How to cite:

Kukulska-Hulme, Agnes; Traxler, John and Pettit, John (2007). Designed and user-generated activity in the mobile age. *Journal of Learning Design*, 2(1) pp. 52–65.

For guidance on citations see [FAQs](#).

© [not recorded]

Version: [not recorded]

Link(s) to article on publisher's website:

<http://www.jld.qut.edu.au/>

Copyright and Moral Rights for the articles on this site are retained by the individual authors and/or other copyright owners. For more information on Open Research Online's data [policy](#) on reuse of materials please consult the policies page.

oro.open.ac.uk

Designed and user-generated activity in the mobile age

Dr Agnes Kukulska-Hulme

Institute of Educational Technology
The Open University, UK
A.M.Kukulsak-Hulme@open.ac.uk

John Traxler

University of Wolverhampton, UK
John.Traxler@wlv.ac.uk

John Pettit

Institute of Educational Technology
The Open University, UK
j.g.pettit@open.ac.uk

Abstract

The paper addresses the question of how to design for learning taking place on mobile and wireless devices. The authors argue that learning activity designers need to consider the characteristics of mobile learning; at the same time, it is vital to realise that learners are already creating mobile learning experiences for themselves. Profound changes in computer usage brought about by social networking and user-generated content are challenging the idea that educators are in charge of designing learning. The authors make a distinction between designed activity, carefully crafted in advance, and user-generated activity arising from learners' own spontaneous requirements. The paper illustrates what each approach has to offer and it draws out what they have in common, the opportunities and constraints they represent. The paper concludes that user-generated mobile activity will not replace designed activity but it will influence the ways in which designed activity develops.

Keywords

mobile learning, learning design, user-generated content, citizen journalism, situated learning, contextual learning

Introduction

The field of mobile learning — defined at a simple level as learning with portable devices such as mobile phones, PDAs, ultra-mobile PCs and personal media players — has matured to the extent that researchers and practitioners are able to take stock of what has been achieved and to consider directions for future developments. In 2004–2006, several publications reviewed the mobile learning literature and offered case studies that newcomers could use to orientate themselves in the field and think about its implications (Naismith, Lonsdale, Vavoula, & Sharples, 2004; Kukulska-Hulme & Traxler, 2005; Kukulska-Hulme, Evans, & Traxler, 2005; Cobcroft, 2006). Overviews were also published, some with recommendations and guidance based on experience of what had worked and what hadn't (JISC, 2005; Kukulska-Hulme, Evans, & Traxler, 2005; Wagner, 2005; Faux, McFarlane, Roche, & Facer, 2006).

These publications give some general pointers as to how best to design learning so that it takes advantage of what the technologies, and the circumstances in which they may be used, have to offer. However, recent research on learning design (Conole & Fill, 2005; Sims, 2006; Beetham & Sharpe, 2007) has given a renewed impetus and a sharper focus to the question of how one should design for mobile and wireless learning. At the same time, the profound changes in everyday computer usage brought about by social networking software and user-generated content have called into question the very idea that it is up to educators to be in charge of designing learning: learners themselves may sometimes be better equipped to take the lead.

Within this shifting landscape, researchers agree about something quite fundamental, namely that mobile learning is different from other kinds of technology-supported learning. Given the breadth of the field and its diversity, not all can agree on what are the most important differences. For example, some emphasise the ways in which mobile learning enhances collaboration in the classroom (Cortez et al., 2004), some point out its capacity to provide a bridge across contexts (Vavoula, Sharples, Rudman, Lonsdale, & Meek, 2007; Mulholland, Collins, & Zdrahal, 2005), others focus on its ability to support an individual learner at available times during travel, in waiting rooms or while commuting (Yau & Joy, 2006; Pettit & Kukulska-Hulme, 2007).

In all cases, learning on the move, or in environments where learners are not confined to sitting in front of a fixed computer, means that the nature of what is learnt, and how it is learnt, is liable to change. In this paper, we argue that to make desirable changes happen, activities need to be designed with the particular characteristics of mobile learning in mind; in parallel, we argue that learners themselves are taking matters into their own hands, and are already creating mobile learning experiences for themselves. There is much to be learnt from both approaches, which share common issues yet offer different opportunities and constraints.

According to one group of experts in the UK, key characteristics of mobile learning are that it enables learners to build knowledge and construct understandings in different contexts; it also 'often changes the pattern of learning/work activity' (Winters, 2006, p. 8). Extrapolating from this, if context of use is not taken into account in the design of mobile learning, and, to take it even further, if what the context has to offer is not part of the activity itself, then unique opportunities may be overlooked and the mobile learning activity is unlikely to make sense to the learner. To educators with little experience of mobile learning it can feel more manageable to take existing teaching and learning materials and attempt to 'deliver' them to a much smaller device. Many learners will be grateful that materials have been made available that way, and will welcome familiar types of communication and interaction that can be replicated on a handheld device. This is only one strand of mobile learning, however.

We contend that mobile learning should aim to innovate and to discover what is gained through having portable tools that support observations, interactions, conversations and reflections, within and across various contexts of use. Early generations of mobile learning projects tended to propose highly 'designed' activities (that is, carefully crafted in advance by educators and technologists), although there has also been some scope for learners to deviate from, or build on, what they were expected to do. With widespread ownership of mobile and wireless devices, learners are increasingly in a position to take the lead and engage in activities that are motivated by their personal needs and circumstances of use. What, if anything, do these two approaches have in common?

The paper describes progress in both categories, and then draws together what might be the key opportunities and constraints that will impact on the future of mobile learning design.

Designed activity

It has been established that mobile learning has considerable attractions in terms of delivering learning in ways that will increase inclusion, widen participation and improve efficiency, flexibility and access. In the developed world, these attractions derive from the near universal ownership, usage and acceptance of some devices (mobile phones and increasingly, personal media players), along with increasing network coverage and connectivity especially in urban areas and many educational buildings. Diverse and robust business models support these trends. These are some key external factors in the design of learning that exploits mobile devices but they are also factors that play out very differently across social, economic and ethnic groups, across different ages, regions and areas, and this must have implications for the design of learning.

Mobile learning also has considerable — in some cases unique — intrinsic attractions in terms of the wealth and variety of designs of learning that it facilitates. Mobile and wireless technologies support learning designs that are personalised, situated and authentic. Mobile and wireless technologies can also support learning designs that are opportunistic, informal and spontaneous: but these are clearly more problematic, in attempting to reconcile ideas of intention and design with ideas of informality, opportunism and spontaneity. Informal and pastoral learner support may be regarded as sitting on the boundary between design and spontaneity.

Mobile and wireless devices are usually by their nature private and personal (and often have zero latency), and so can also support designs for learning that are based on spontaneous reflection and self-evaluation; e-portfolio technologies (see for example, www.pebblepad.co.uk), the current technologies for this kind of learning, are migrating to mobile devices but this way of building portfolios is still in its infancy. In this section, we show how mobile and wireless technologies are meshing with types of learning that take advantage of their special attributes.

Personalised and context-aware

By personalised learning, we mean learning that recognises diversity, difference and individuality in the ways that learning is developed, delivered and supported. Personalised learning defined in this way includes learning that also recognises different learning styles and approaches (though perhaps this should not be related too literally to the established literature of 'learning styles', see Coffield, Moseley, Hall, & Ecclestone, 2004), and recognises social, cognitive and physical difference and diversity.

An example of personalised learning is the Bletchley Park project in the UK (Mulholland et al., 2005) where researchers decided to use mobile technology to encourage follow-up activities among recent visitors to the Bletchley Park museum. As they wander around the museum, visitors can express their interests in particular exhibits by sending text messages containing suggested keywords, using their mobile phone. This information is subsequently used to create a personalised web site for each visitor to use when they get home, so that they can explore information about their chosen exhibits as well as semantic connections between them.

This example also shows the increasing possibility of using mobile and wireless technologies to support learning designed for the convergence of personalised learning with context-aware learning. This combination differs dramatically from personalised e-learning currently designed for desktop computers. Mobile technologies can support learning designed to recognise the context and history of each individual learner (and perhaps their relationships to other learners) and can deliver learning to each learner when and where they want it.

Prototypes exist for learning designed on the basis of knowing:

- where the learner is (and perhaps where the learner *should* be!)
- how long they have been there
- where they were before
- who else was learning nearby or learning at the same time
- their progress and preferences as learners, and other preferences.

There are also adaptive prototypes and designs for learning that evolve with the learner and their learning (Goh, Kinshuk, & Lin, 2003).

Situated and authentic

By situated learning, we mean learning that takes place in the course of activity, in appropriate and meaningful contexts (Lave & Wenger, 1991). The idea grew up by looking at people learning in communities as apprentices by a process of increased participation. It can however be extended to learning in the field (in the case of botany students for example), in the hospital ward (in the case of trainee nurses), in the classroom (in the case of trainee teachers) and in the workshop (in the case of engineering students). Mobile learning can be designed to support this context-specific and immediate 'situated' learning (for example, Kneebone & Brenton, 2005; Wishart, McFarlane, & Ramsden, 2005).

What is more, we argue that mobile learning with its capacity to facilitate and empower situated learning can challenge one of the underlying mechanisms of many educational systems. This is the mechanism that delivers abstractions, simplifications and representations of 'the outside world' to learners within educational institutions using lectures, text-books, simulations and 'tethered' e-learning. Mobile and wireless technologies have the capacity to take learners and learning back into 'the outside world'. They can structure and scaffold learners' engagement with this world rather than mediate and constrain it.

By authentic learning, we mean learning that involves 'real-world' problems and projects that are relevant and interesting to the learner. It means that learning is best based around authentic tasks, that students should be engaged in exploration and inquiry, that they should have opportunities for social discourse, and that ample resources should be available to them as they pursue meaningful problems. Mobile learning enables the conditions for authentic learning to be met, allowing learning tasks designed around content creation, data capture, location-awareness and collaborative working in real-world settings (Chen, 2003; also Hine, Rentoul, & Specht, 2003, describe this approach in natural history).

There is a clear overlap between authentic learning and situated learning, and existing examples often combine features of both. In a higher education context in the Netherlands, the Manolo project (2006) has amassed a good deal of experience of authentic and situated learning in mobile fieldwork in subjects like archaeology, biodiversity and vegetation science. Archaeology students have used PDAs with GPS for field surveys. This has allowed them not only to collect field data in electronic form but also to be more involved in processing and interpreting the data than was previously possible. The PDA's mobile phone function has been used by these students to communicate with their group leader in the field, with the texting and email functions used for other types of support.

In a project called *Mudlarking in Deptford*, schoolchildren have used PDAs to take part in (and to co-produce) a guided tour of the riverbed at Deptford Creek. A handheld device with GPS capabilities delivers location-sensitive information when the child walks into node areas indicated on a map. Children are also able to create multimedia content during their tour and alert other users to that content. The project aims to engage young learners in responding creatively to an environment that blends physical experiences with the history of the area (Sutch, 2005). In the *Savannah* project (Facer, Stanton, Joiner, Reid, Hull, & Kirk, 2005) a mobile game was designed for use by groups of children moving around in the school playing field, aimed at encouraging the development of children's conceptual understanding of animal behaviour in the wild. This 'learning experience' involves the use of global positioning systems linked to PDAs through which the children 'see', 'hear' and 'smell' the world of the Savannah as they move around various zones in the playing field, acting like a pride of lions. There is also a special designated indoors area where they can reflect on how well they have succeeded in the game, develop their strategies and access resources to support their understanding.

Informal and pastoral

Informal learning can be defined as occurring spontaneously and independently of formal education, but in mobile learning the term is frequently used to describe forms of learning where the technology supports a specific activity that has been designed in advance with a particular user group in mind. For example, Fallahkhair, Pemberton and Griffiths (2005) have developed a system to support informal mobile language learning; Corlett and Sharples (2004) describe the use of Tablet PCs with software designed to support informal collaboration among engineering students; while Bradley, Haynes and Boyle (2005) report on the development of materials for a mobile local history tour. Various informal, contextual or location-based learning experiences are being trialled in art galleries and museums.

These are often experimental projects that are imaginative in terms of their epistemological and pedagogical approaches as much as in the technology that is used; typically they explore the territory where informal learning can be enhanced. In Birmingham's Botanic Garden (Naismith, Sharples, & Ting, 2005) a system has been developed to support visitors with location-based information that reflects their interests and needs. Content and activities are presented to them through PDAs with GPS capability, which they borrow for the duration of their visit. Visitors are presented automatically with audio content upon entering different parts of the garden; they can then view additional multimedia content for that particular location, or capture their own observations if they wish to do so. Using the PDAs has been found to increase participants' engagement with their physical surroundings. This example, and other similar examples, illustrates some of the tensions between designs for learning that is informal *and* context-aware *and* personalised — until educators develop systems that exploit the mobile and wireless devices actually owned and carried by learners, there will always be a pay-off.

Mobile and wireless technologies can also deliver learning specifically designed for learners' wider social and economic contexts. In particular, the widespread acceptance and ownership of sophisticated mobile phones allows educators to design learning that encourages participation in e-learning amongst groups often under-represented in formal learning (for example, Attewell & Savill-Smith, 2003). Increasingly in the UK, students in formal learning are under a range of growing pressures, most obviously those of time, money, resources and conflicting/competing roles. Learning designed around mobile and wireless technologies can allow these students to exploit small amounts of time and space for learning, to work with other students on projects and discussions and to maximise contact and support from tutors (Sharples, Corlett, Bull, Chan, & Rudman, 2005; Traxler & Riordan, 2004).

It has also been shown that mobile and wireless technologies allow unique opportunities to design learning for students who might have difficulty fulfilling their potential with other e-learning technologies. One example is students with dyslexia since mobile devices can support time management (Rainger, 2005). These remarks take us back to our earlier remarks about the intrinsic and external factors involved in designing for learning and shows how intimately connected they actually are.

Mobile learning is a far more seamless and integral part of learners' lives than classroom or institutional learning and it uses technologies and devices that are far more part of their lives. This, however, challenges the design of learning delivered by mobile and wireless devices to compete with all the other events, pressures, stimuli and challenges of learners' lives. It also raises the issue of mobile technologies and mobile learning as 'disruptive' (Sharples, 2002), meaning that there is a risk of disruption of institutional learning and that mobile learning, designed or not, can be at odds with institutional learning. The next section sets out how learners are creating mobile learning experiences according to their needs and sharing them with others.

User-generated activity

Nearly half the world

The business intelligence provider, Informa, predicts that three billion people — almost half the world's population — will have a mobile phone subscription by some point in 2007 (reported in Fildes, 2006). Many of these people live in countries such as China and India, where handsets are often relatively simple. In the developed world, in contrast, 'mobile phone' has long ceased to capture the range of functions converging within one device. For reasons including small screen and high cost, however, many users have been reluctant to exploit functions such as video and tv or internet access.

Meanwhile one of the simplest usages, text messaging, continues to expand rapidly, with a 38% increase in December 2006 in the UK, for example, compared with December 2005 (MDA, 2007). This brought the number of UK person-to-person text messages on GSM to more than 4 billion in December 2006, compared — in that same month — with only about 16 million unique sessions where a mobile device was used to access the internet (MDA, reported in BBC, 2007a).

Though their pattern will change over time, such differences in usage are an important feature of the environment in which practitioners may need to design mobile learning. Our approach in this section of the paper is to consider a number of mobile-related activities where users themselves take a lead in creating material: broadly, activities characterised as 'Web 2.0'. The section explores how far these examples constitute 'learning', and considers whether practitioners can gain something from them in terms of seeing how to provide structure and support.

The power is shifting

Keeping up with this fast-developing area is not easy: new devices and services are being brought to market, for example 3G phones that support video downloads, bidding on eBay, and accessing music and images from a home PC (Weber, 2007). Even where users acquire such a device, however, it is still not clear how much professionally generated content they will access, and how far — in contrast — they will wish to generate and share content in what Shirky (2002) called 'mass amateurization'. In a 2005 survey of alumni from an ICT-oriented Masters program, Pettit and Kukulska-Hulme (2007) found that about one in four respondents used mobile devices to access websites at least once per week. Not surprisingly, and in line with the figures quoted above, sending text messages predominated in terms of 'content creation'.

Table 1 gives more data about the activities of the respondents, most of whom were aged 35–54 and lived in the UK and continental Western Europe.

Table 1: Respondents' frequency of participation in various activities with mobile devices

	No response	Never	<1 per month	1 per month	1 per week	A few days per week	At least once per day
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Browsing mobile (WAP) websites	–	56	18	2	11	11	4
Browsing 'ordinary' websites	2	56	14	5	2	5	16
Reading e-news	–	51	14	7	5	14	9
Listening to an audio file	2	44	18	11	4	11	12
Sending text messages (excluding Bluetooth use)	2	16	5	5	16	19	37
Reading an e-book	2	65	16	5	7	2	4
Recording own voice	4	58	23	9	5	2	–

n = 57. Because of rounding up, some totals exceed 100%.

Of the two strands, content creation and content consumption, is one likely to predominate? Wilson (2006, p. 238) argues that some 3G providers are still thinking in terms of 'the ring-fenced, essentially receptive model of content delivery', whereas he believes they should be looking to make mobile telephony an 'architecture of participation'. That point seems to be accepted in at least some parts of the business community: Informa Telecoms and Media (2006, p. 2) argues that user-generated content offers particular opportunities for mobile operators, and stresses that 'personal relationships and emotional ties' will encourage users to stay in mobile communities (and generate revenue for the mobile operators).

The significance for education of this type of activity has been widely discussed for some time. Downes (2006), for example, argues that the phenomenal growth of social networking sites such as MySpace and YouTube has profound implications for educational institutions. As students increasingly find their own learning content and even create it, institutions lose some control over the processes of learning and teaching, and even the curriculum. This seems to be at least partly borne out by Conole, de Laat, Dillon and Darby (2006, p. 4), who, in relation to higher education, report that '[a]cross all subjects the students made extensive use of personally owned technologies including mobile phones, laptop computers, personal digital assistants and USB memory sticks'. As students use such devices and access learning from a variety of sources to create personal learning environments, some of the levers of formal education appear to be slipping from the grasp of educators.

Outside the boundaries of formal education, there are a number of user-generated activities where mobile devices seem particularly well suited, and where users pull many of the levers themselves; for example, digital storytelling, citizen journalism, blogging, photosharing and cultural citizenship.

Cultural citizenship and other activities

Writing of projects in Australia, Burgess, Foth and Klæbe (2006, p. 1) construe 'citizenship' as including 'everyday life, leisure, critical consumption and popular entertainment', and not just the more obvious civic and political activities. They see the social networking site Flickr as having a role in this, for example in the sharing of images by the 'Brisbanites' (a group who use photographs to explore ways in which that city has changed, and who do this online and offline).

Though they are not relating it specifically to cameraphones, the authors describe Flickr as ‘an emergent and collaborative three-way articulation of social networking with individual creativity and communities of practice’ (p. 7).

The study reported by Pettit and Kukulska-Hulme (2007) gives an insight into how that articulation may take place. One of their interviewees (from a group of Masters alumni) would upload images to an online photoblog to keep family and friends up to date when the interviewee was travelling. As the bloggers commented on each other’s photos, the interviewee came to concentrate on ‘what pushes people’s buttons’ in terms of the type of images they liked. And photoblogs of this kind may have encouraged the evolution of a mobile aesthetic, suggests Repo (2005), who writes of the evolution of the ‘notion of picture-worthy’.

The practice on the photoblog, in the study by Pettit and Kukulska-Hulme, further evolved into citizen journalism, with the bloggers posting mobile photographs of the London bombings of July 2005. It is widely argued (Owen, 2005, for example) that images from such ‘amateurs’ — to link back to Shirky’s phrase — played a major role in the news coverage of this event. A hybrid is also emerging where professional news organisations incorporate citizen journalism: ‘News can happen anywhere at any time and we want you to be our eyes’, invites the BBC (2007b).

Blurring boundaries

The interviewee also reported that the ensuing political discussion became so engaged that ‘the server overloaded and went down that evening, and I actually learnt quite a bit...’. This rich example illustrates an evolution of practice, and also the way in which types of activity — photosharing, citizen journalism, discussion and learning — may coexist and blur, with the users themselves moving the focus from one activity to another.

Pettit and Kukulska-Hulme’s example of the photoblog also illustrates the relationship between real-world events and online discussion, which is consistent with Burgess et al.’s report (2006) that the Brisbanites met both online and face to face. Another interviewee from Pettit and Kukulska-Hulme (2007) illustrated the meshing of real-world and online interests, and specifically the link to citizenship: this interviewee indicated that members of the residents’ association used mobile devices to keep in contact, and there was a suggestion that a cameraphone image of rubbish in the area had been sent to the chair of the association.

The importance of ownership

Prensky (2005) has argued that the near-ubiquity of the mobile phone in the developed world makes it an ideal learning tool, particularly among young people. Lee (2006), however, reporting on the groundwork for a project to enable 14–16-year-olds to ‘reclaim their cities’ (p. 6), found that not all of them owned a phone, and that — in line with the points made earlier — functionality tended to be limited. SMS was therefore selected as the mode of communication, but Lee found that potential participants (most of whom had pay-as-you-go contracts) were unwilling to spend relatively small additional amounts on sending a few text messages ‘to make visible their opinions about the place in which they spend most weekdays’ (p. 12). She also concluded that the time needed to ‘ensure emotional attachment and ownership’ (p. 18) was too demanding within the project’s constraints.

In seeking to develop a theory of mobile learning, Sharples, Taylor and Vavoula (2005) argue that there is a ‘continual co-evolution of technology and human communication’, and they acknowledge the role here of telecommunications companies. Lee (2006) reminds us that many people live — and perhaps learn — some way behind this evolutionary frontline, in an area where the cost of a few SMS messages can be a serious constraint.

She also emphasises the importance, for the 14–16-year-olds she was studying, of engaging them in a sense of ownership. Not surprisingly, that sense is also important in the context of formal learning: Conole et al. (2006) found that students' sense of ownership and control of learning technologies, including mobile devices, was an important motivator (p. 91).

Turning to Web 2.0, the studies explored above suggest the importance of links between users' real-world experiences and their online interactions. Burgess et al. (2006), for example, report the connections between the fabric of Brisbane and the city's photobloggers, arguing that the online and offline interactions were mutually supportive. Lee (2006), in contrast, writing of a project with young people in the UK, suggests that ease of face-to-face communication may work against the success of online interaction. Further work would be useful to explore the effect on mobile-enabled social networking of pre-existing real-world communities.

Common issues, opportunities and constraints

What do these two approaches — designed and user-generated — have in common? First, they both rely on the proliferation of mobile devices in society. Most institutions cannot afford to roll out mobile learning on any significant scale without having recourse to the devices that learners already have in their pockets. Equally, user-generated activity is more difficult to imagine if learners have to borrow equipment that will not be theirs for long. It is recognised that ownership is an important aspect of appropriation, although we have not been able to find any studies making a direct comparison between learning on personally owned devices and borrowed ones. Furthermore, due to the role of well documented affective or motivational factors in learning, there may be more nuanced distinctions to be made between:

- a device one has chosen and purchased oneself
- a device that was a surprise personal gift, for example, from a family member
- a device that has been borrowed for a limited period from the institution
- a device that is supplied as part of a course of study, and doesn't have to be returned
- a device that is a surprise gift from the institution, for example, it was introduced as part of a research project and it doesn't have to be returned.

Second, the issue of whether institutions are ceding some of their control is also at the heart of both approaches. In a designed activity, mobile learners often find themselves beyond the physical boundaries of an institution, and even within classrooms, their activity can be hard to monitor; consequently, they may have more scope to deviate from their original task. A user-generated activity is by definition not controlled by an institution. In both cases, the ways in which learners exercise their control may or may not be creative and beneficial, and it seems likely that they will need some guidance and awareness-raising in order to gain most benefit from their mobile learning experiences.

Third, just as 'real world experiences' are an important motivator for the design of some of the most successful mobile learning activities, they are also the reason why many learners choose to pick up their mobile device, capture what is happening around them and connect it with their learning. At this stage in the development of mobile learning, the distinction between information or media sharing, and real mobile community, is insufficiently explored.

Based on our review of the two approaches to mobile learning activity, what opportunities and constraints can be identified and how will they impact on the future of mobile learning design?

A key opportunity is supporting learners when they negotiate blurred boundaries between formal and informal learning, between asset sharing and learning community building, between popular journalism and academic discourse. The challenge here is for educators to understand the issues well enough to be able to design engaging bridging activities and steer learners deftly in the right direction. Hardware and software designers also have to acquire a better understanding of what it means for learners to maintain continuity across learning activities and contexts.

We noted the role of text messaging in user-generated activity and it is also being talked about in relation to how mobile devices can best be used within the growing repertoire of means of communication between institutions, teachers and learners. The costs of messaging and web access on the go are currently a significant barrier to the uptake and integration of mobile learning and are often reported in UK-based projects and studies. Issues of usability also continue to stand in the way of progress with the devices (Kukulska-Hulme, 2006).

All learning contains some elements that cannot be predicted, but mobile learning highlights this aspect for designers. Gilbert et al. (2005) have written about the period after initial use of a mobile service, 'during which the scope of use expands to fulfil emergent needs' (p. 207); similarly, Keinonen (2003) has observed that you cannot always predict what users will choose to do: 'new solutions are utilized in ways that never even occurred to their designers' (p. 2).

Conclusions

Much of the potential of mobile learning is only now becoming apparent as technological and pedagogical expertise builds up. Case studies in the book by Kukulska-Hulme and Traxler (2005) and elsewhere in the literature make it clear that progress in designing for learning with mobile and wireless technologies is hampered by the current state of the technologies but also by the diversity of educational objectives. It is also hampered by the ongoing problems of conceptualising, characterising and defining mobile learning (Sharples, Taylor, & Vavoula, 2005; Traxler 2007) and the recurrent but related problems of knowing how to evaluate its pilots and monitor its implementations (Traxler & Kukulska-Hulme, 2005).

It seems to us that user-generated mobile activity will not replace designed activity, but it will influence the ways in which designed activity develops. 'Content consumption' will always be attractive for many reasons. However, those who design the content will be more aware of how learners might wish to interact with it in various circumstances of use, and how they might go about enriching the content with their own input. It is very likely that the use of mobile and wireless technologies will accelerate the rate at which user-generated activity and the new ways of sharing user-created content become an integral part of learning.

Note: Some of the data reported here were first published in Pettit, J., & Kukulska-Hulme. A. (2007, forthcoming). Going with the grain: Mobile devices in practice. *Australasian Journal of Educational Technology*, 23(1).

References

- Attewell, J., & Savill-Smith, C. (2003). Mobile learning and social inclusion: Focusing on learners and learning. In *Mlearn 2003: 2nd world conference on mLearning*: London: Learning and Skills Development Agency.
- BBC (2007a). *Mobile internet use 'increasing'* [Online]. Retrieved February 15, 2007, from <http://news.bbc.co.uk/1/hi/technology/6309593.stm>.
- BBC (2007b). *Your news, your pictures* [Online]. Retrieved February 15, 2007, from http://news.bbc.co.uk/1/hi/talking_point/2780295.stm.
- Beetham, H., & Sharpe, R. (Eds.). (2007, forthcoming). *Rethinking pedagogy for a digital age: Designing and delivering e-learning*. London: Routledge.

- Bradley, C., Haynes, R., & Boyle, T. (2005). *Adult multimedia learning with pdas — the user experience*. Mlearn 2005, Cape Town, October 25–28.
- Burgess, J., Foth, M., & Klaebe, H. (2006). Everyday creativity as civic engagement: A cultural citizenship view of new media. *Proceedings of the Communications Policy & Research Forum* [Online]. Retrieved February 14, 2007, from <http://eprints.qut.edu.au/archive/00005056/01/5056.pdf>.
- Chen, Y. S., Kao, T.C., & Sheu, J.P. (2003). A mobile learning system for scaffolding bird watching learning. *Journal of Computer Assisted Learning*, 19(3), 347–359.
- Cobcroft, R. S. (2006). *Literature review into mobile learning in the university context*. Queensland University of Technology e-prints. [Online]. Retrieved February 20, 2007, from <http://eprints.qut.edu.au/archive/00004805/>.
- Coffield, F., Moseley, D., Hall, E., & Ecclestone, K. (2004). *Should we be using learning styles? What research has to say to practice*. London: Learning and Skills Research Centre.
- Conole, G., & Fill, K. (2005). A learning design toolkit to create pedagogically effective learning activities. *Journal of Interactive Media in Education* (Portable Learning. [Special Issue]).
- Conole, G., de Laat, M., Dillon, T., & Darby, J. (2006). *Student experiences of technologies. JISC LXP Final Report* [Online]. Retrieved February 20, 2007, from http://www.jisc.ac.uk/media/documents/programmes/elearning_pedagogy/lxp%20project%20final%20report%20dec%2006.pdf.
- Corlett, D., & Sharples, M. (2004). *Tablet technology for informal collaboration in higher education*. Third annual Mlearn international conference, 2004. [Online]. Retrieved February 20, 2007, from http://www.mobilearn.org/download/events/mlearn_2004/presentations/Sharples.pdf.
- Cortez, C., Nussbaum, M., Santelices, R., Rodriguez, P., Zurita, G., Correa, C., & Cautivo, R. (2004). Teaching science with mobile computer supported collaborative learning. *2nd IEEE International Workshop on Wireless and Mobile Technologies in Education* (p. 67).
- Downes, S. (2006, June 5). *The students own education*. Presentation to the Knowledge Media Institute, The Open University, Milton Keynes, United Kingdom. [Online]. Retrieved February 20, 2007, from <http://stadium.open.ac.uk/stadia/preview.php?s=29&whichevent=798>.
- Facer, K., Stanton, D., Joiner, R., Reid, J., Hull, R., & Kirk, D. (2005). Savannah: Mobile gaming and learning? *Journal of Computer Assisted Learning*, 20, 399–409.
- Fallahkhair, S., Pemberton, L., & Griffiths, R. (2005). *Dual device user interface design for ubiquitous language learning: Mobile phone and interactive television (iTV)*. IEEE International Conference on Wireless and Mobile Technology for Education (WMTE), Tokushima, Japan.
- Faux, F., McFarlane, A., Roche, N., & Facer, K. (2006). *Handhelds: Learning with handheld technologies*. Handbook for Futurelab. [Online]. Retrieved February 20, 2007, from http://www.futurelab.org.uk/research/handbooks/05_01.htm.
- Fildes, J. (2006). *Mobiles still ringing in New Year* [Online]. Retrieved January 25, 2007, from <http://news.bbc.co.uk/1/hi/technology/6199293.stm>.
- Gilbert, A. L., Sangwan, S., & Mei Ian, H. (2005). Beyond usability: The OoBE dynamics of mobile data services markets. *Personal and Ubiquitous Computing*, 9(4), 198–208.
- Goh T. T., Kinshuk, & Lin T. (2003). Developing an adaptive mobile learning system. In K. T. Lee & K. Mitchell (Eds.), *Proceedings of the international conference on Computers in Education 2003* (pp. 1062–1065.) Norfolk, VA: AACE.
- Hine, N., Rentoul, R., & Specht, M. (2003). *Collaboration and roles in remote field trips*. Mlearn 2003 conference. London: Learning Skills Development Agency.

- Informa Telecoms and Media. (2006). *Mobile communities and user-generated content: White paper* [Online]. Retrieved February 15, 2007, from http://www.m-e-f.org/fileadmin/user/Suhail/Communities/Mobile_Communities_White_Paper_2006.pdf.
- JISC. (2005) *Innovative practice with e-learning* [Online]. Retrieved February 20, 2007, from http://www.jisc.ac.uk/eli_practice.html.
- Jones, A., Kukulska-Hulme, A., & Mwanza, D. (Eds.). (2005). *Portable learning: Experiences with mobile devices* [Online]. Retrieved February 28, 2007, from <http://jime.open.ac.uk/2005/24/>.
- Keinonen, T. (2003). Introduction: Mobile distinctions. In C. Lindholm, T. Keinonen, & H. Kiljander (Eds.), *Mobile usability: How Nokia changed the face of the mobile phone*. New York: McGraw-Hill.
- Kneebone, R., & Brenton, H. (2005). Training perioperative specialist practitioners. In A. Kukulska-Hulme & J. Traxler (Eds.), *Mobile learning: A handbook for educators and trainers*. London: Routledge.
- Kukulska-Hulme, A. (2006). Mobile usability in educational contexts: What have we learnt? Mlearn 2006 Conference, Banff, Canada, October.
- Kukulska-Hulme, A., Evans, D., & Traxler, J. (2005). *Landscape study on the use of mobile and wireless technologies for teaching and learning in the post-16 sector* [Online]. Retrieved February 20, 2007, from http://www.jisc.ac.uk/whatwedo/programmes/elearning_innovation/eli_outcomes.aspx.
- Kukulska-Hulme, A., & Traxler, J. (Eds.). (2005). *Mobile learning: A handbook for educators and trainers*. London: Routledge.
- Kukulska-Hulme, A., Heppell, S., Jelfs, A., & Nicholson, A. (2005). *Case studies of innovative practice: JISC-funded project outcomes*. [Online]. Retrieved February 20, 2007, from http://www.jisc.ac.uk/eli_oucasestudies.html.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.
- Lee, T. (2006). *Pleasurable cities: A discussion paper* [Online]. Retrieved February 15, 2007, from http://www.futurelab.org.uk/download/pdfs/research/project_reports/Pleasurable_Cities_discussion_paper.pdf.
- Manolo. (2006). Project website <http://130.37.78.10/Projecten/Manolo/> [accessed February 15, 2007].
- Mobile Data Association (MDA). (2007). *41.8 billion text messages for 2006* [Online]. Retrieved February 15, 2007, from http://www.themda.org/PressReleases/Page_Press_PressReleases_Stats.asp.
- Mulholland, P., Collins, T., & Zdrahal, Z. (2005). Bletchley Park text: Using mobile and semantic web technologies to support the post-visit use of online museum resources. *Journal of Interactive Media in Education*. [Special Issue].
- Naismith, L., Lonsdale, P., Vavoula, G., & Sharples, M. (2004). *Literature review in mobile technologies and learning*. Report 11 for Futurelab [Online]. Retrieved February 20, 2007, from http://www.nestafuturelab.org/research/lit_reviews.htm#lr11.
- Naismith, L., Sharples, M., & Ting, J. (2005). Evaluation of CAERUS: A Context aware mobile guide. *Mlearn 2005* [Online]. Retrieved February 20, 2007, from <http://www.mlearn.org.za/CD/papers/Naismith.pdf>.
- Owen, J. (2005, July 11). London bombing pictures mark new role for camera phones. *National Geographic News* [Online]. Retrieved February 28, 2007, from http://news.nationalgeographic.com/news/2005/07/0711_050711_londoncell.html.

- Pettit, J., & Kukulska-Hulme, A. (2007, forthcoming). Going with the grain: Mobile devices in practice. *Australasian Journal of Educational Technology*, 23(1).
- Prensky, M. (2005). What can you learn from a cell phone? Almost anything! *Innovate*, 1(5). [Online]. Retrieved February 28, 2007, from <http://www.innovateonline.info/index.php?view=article&id=83>.
- Rainger, P. (2005). Accessibility and mobile learning. In A. Kukulska-Hulme & J. Traxler (Eds.), *Mobile learning: A handbook for educators and trainers*. London: Routledge.
- Repo, P. (2005). User applications of mobile multimedia [Online]. *Proceedings of the PICS Workshop at Ubicomp 2005*, Tokyo [Online]. Retrieved February 17, 2007, from <http://www.spasojevic.org/pics/PICS/ubicompprepocamera.doc>.
- Sharples, M. (2002). Disruptive devices: Mobile technology for conversational learning. *International Journal of Continuing Engineering Education and Life Long Learning*, 12(5/6), 504–520.
- Sharples, M., Taylor, J., & Vavoula, G. (2005). Towards a theory of mobile learning. *Proceedings of mLearn 2005 Conference*, Cape Town [Online]. Retrieved February 15, 2007, from <http://www.eee.bham.ac.uk/sharplem/Papers/Towards%20a%20theory%20of%20mobile%20learning.pdf>.
- Sharples, M., Corlett, D., Bull, S., Chan, T., & Rudman, P. (2005). The student learning organiser. In A. Kukulska-Hulme & J. Traxler (Eds.), *Mobile learning: A handbook for educators and trainers*. London: Routledge.
- Sharples, M. (Ed.). (2006). *Big issues in mobile learning*. Report of a workshop by the Kaleidoscope Network of Excellence Mobile Learning Initiative, University of Nottingham, UK.
- Shirky, C. (2002). *Weblogs and the mass amateurization of publishing* [Online]. Retrieved February 17, 2007, from http://shirky.com/writings/weblogs_publishing.html.
- Sims, R. (2006). Beyond instructional design: Making learning design a reality. *Journal of Learning Design*, 1(2), 1–7 [Online]. Retrieved February 20, 2007, from <http://www.jld.qut.edu.au/>.
- Sutch, D. (2005). Bossing adults and finding spotty bras: Learners as producers within mobile learning contexts. *Mlearn 2005: 4th world conference on mLearning*, Cape Town, South Africa, October 25–28 [Online]. Retrieved February 20, 2007, from http://www.mlearn.org.za/CD/BOA_p.63.pdf.
- Traxler, J. (2007). Defining, discussing and evaluating mobile education. *International Review of Research in Open and Distance Learning*.
- Traxler, J., & Riordan, B. (2004). *Using PDAs to support computing students*. Belfast: LTSN.
- Traxler, J., & Kukulska-Hulme, A. (2005). Evaluating mobile learning: Reflections on current practice. *Mlearn 2005: 4th world conference on mLearning*, Cape Town, South Africa, October 25–28 [Online]. Retrieved February 28, 2007, from http://www.mlearn.org.za/CD/BOA_p.65.pdf.
- Vavoula, G., Sharples, M., Rudman, P., Lonsdale, P., & Meek, J. (2007, forthcoming). Learning bridges: A role for mobile technologies in education. *Educational Technology Magazine*.
- Wagner, E. D. (2005, May/June). Enabling mobile learning. *EDUCAUSE Review*, 40(3), 40–53 [Online]. Retrieved February 20, 2007, from <http://www.educause.edu/er/erm05/erm0532.asp>.
- Weber, T. (2007). *Living the converged media life* [Online]. Retrieved February 21, 2007, from <http://news.bbc.co.uk/1/hi/business/6355449.stm>.

- Wilson, J. (2006). 3G to Web 2.0? Can mobile telephony become an architecture of participation? *Convergence: The International Journal of Research into New Media Technologies*, 12(2), 229–242 [Online]. Retrieved February 16, 2007, from <http://con.sagepub.com/cgi/content/abstract/12/2/229>.
- Wishart, J., McFarlane, A., & Ramsden, A. (2005). Using personal digital assistants (pdas) with internet access to support initial teacher training in the UK. *Mlearn 2005: 4th world conference on mLearning*, Cape Town, South Africa, October 25–28 [Online]. Retrieved February 21, 2007, from <http://www.mlearn.org.za/papers-full.html>.
- Yau, J., & Joy, M. (2006). Context-aware and adaptive learning schedule for mobile learning. *Proceedings of the Mobile and Ubiquitous Learning Workshop, as part of the International Conference on Computers in Education*, Beijing, China, 2006.

Copyright © 2007 Kukulska-Hulme, Traxler and Pettit.