

Mobile learning and university teaching

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Abstract: Using portable computing devices (such as laptops, tablet PCs, PDAs, and smart phones) with wireless networks enables mobility and mobile learning, allowing college teaching and learning to extend to spaces beyond the traditional classroom. Within the classroom, mobile learning gives university instructors and learners increased flexibility and new opportunities for interaction. Mobile technologies can support learning experiences at the university level that are collaborative, accessible, and integrated with the world beyond the classroom educative learning initiative (Educate Learning Initiative). This paper tries to discuss the following issues: - What is the concept of mobile learning? - How does mobile learning work? - What are some practices for using mobile learning at the university level? - How can mobile learning affect university teachers and university students?

Key words: Mobile; Learning; Teaching

1. Introduction

Over the past ten years mobile learning has grown from a minor research interest to a set of significant projects in schools, workplaces, museums, cities and rural areas around the world. The m-learning community is still fragmented, with different national perspectives, differences between academia and industry, and between the school, higher education and lifelong learning sectors.

Current areas of growth include:

- Testing, surveys, job aids and just in time learning
- Location-based and contextual learning
- Social-networked mobile learning
- Mobile educational gaming
- "Lowest common denominator" m-learning to cellular phones using two way SMS messaging and voice-based CellCasting, podcasting to phones with interactive assessments, (Wikipedia)

2. The concept of mobile learning

The term mobile learning (m-learning) refers to the use of mobile and handheld IT devices, such as Personal Digital Assistants (PDAs), mobile telephones, laptops and tablet PC technologies, in teaching and learning.

As computers and the internet become essential educational tools, the technologies become more portable, affordable, effective and easy to use. This provides many opportunities for widening participation and access to ICT, and in particular the internet. Mobile devices such as phones and PDAs are much more reasonably priced than desktop computers, and therefore represent a less expensive method of accessing the internet (though the cost of

connection can be higher). The introduction of tablet PCs now allows mobile internet access with equal, if not more, functionality than desktop computers (Excellence Gateway).

M-Learning, or "mobile learning", has different meanings for different communities. Although related to e-learning and distance education, it is distinct in its focus on learning across contexts and learning with mobile devices. One definition of mobile learning is: *Learning that happens across locations, or that takes advantage of learning opportunities offered by portable technologies*. In other words, mobile learning decreases limitation of learning location with the mobility of general portable devices.

The term covers: learning with portable technologies, where the focus is on the technology (which could be in a fixed location, such as a classroom); learning across contexts, where the focus is on the mobility of the learner, interacting with portable or fixed technology; and learning in a mobile society, with a focus on how society and its institutions can accommodate and support the learning of an increasingly mobile population that is not satisfied with existing learning methodologies.

M-learning is convenient, in the sense that it is accessible virtually from anywhere (class, taxi, laundry room, bathroom ...) which provides access to all the different learning materials available. Moreover, it is collaborative; that is sharing is almost instantly among everyone using the same content, which will in turn also lead to receiving instant feedback and tips. M-Learning also brings strong portability by replacing books and notes with small RAMs, filled with tailored learning contents. In addition, this kind of learning is engaging and fun.

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With this kind of learning, it is much easier to combine gaming and learning for a more effective and entertaining experience.

3. Mobile learning usability

Kukulka-Hulme (2007) said to understand current uses of wireless and mobile technologies; we have to begin by asking what motivates teachers, learners and organizations to make use of these new technologies. The reasons are somewhat related to the choice of actual devices, as 'wireless and mobile' covers a very wide range of possibilities.

In their report on the use of 'palmtop computers' for learning, Savill-Smith and Kent (2003) identified five main reasons for their uptake: the devices are relatively inexpensive, they offer the possibility of ubiquitous (anywhere, anytime) computing, they promote information literacy, help with collaborative learning, and they also support independent learning. Additional reasons include: assisting with students' motivation, helping organizational skills, encouraging a sense of responsibility, acting as reference tools, tracking students' progress, and for assessment.

He continued that a range of environmental factors and trends also comes into play. Anderson and Blackwood (2004), who reviewed the use of both mobile phone and PDA (personal digital assistant) technologies in education, identified key factors in the uptake of these technologies as being: (a) the widespread adoption of mobile devices, (b) the changing strategic demands of the educational environment - an increasing emphasis on lifelong learning and widening participation, and (c) developments in pedagogy which have moved towards active learning using constructivist models that emphasize learner autonomy. Specific initiatives can be seen in the context of these trends. For example, in the UK-wide Wireless Outreach Network Initiative 2002-4 (Essom, 2004), the main motivation for using wireless laptops was to widen participation by increasing access to learning for socially and economically disadvantaged adults.

Kukulka-Hulme also suggested that information about reasons for using wireless and mobile devices is also found in individual published trials and case studies. In the JISC Case Studies in Wireless and Mobile Learning in the post-16 sector (2005), which included the use of various devices as well as some specially designed or adapted 'learning spaces', a number of different challenges were identified, e.g.

Access:

- To enable nurses to work in geographically dispersed nursing placements and home environments as well as at university
- To take ICT classes to adults who find it hard to attend classes on campus, and to traditionally 'hard to reach' or disadvantaged groups

Changes in teaching and learning:

- To enable students to communicate and share ideas effectively, especially in small group collaboration

- To support differentiation of student learning needs and personalised learning
- To further the use of ICT within the curriculum by direct involvement of students in the data collection process as part of learning 'in the field'
- To enable new developments in formative and summative assessment
- To increase motivation and address low interaction levels in large classes

Alignment with institutional or business aims:

- To respond to rising student demand for access to ICT facilities
- To improve retention and achievement, by improved monitoring of student attendance and by giving immediate and regular feedback to students regarding attendance and progress – teachers were able to do this by having ready access to information on their mobile devices.

Kukulka-Hulme indicated that similar concerns, and some additional ones, emerge from an analysis of 12 international case studies in the book on mobile learning by Kukulka-Hulme & Traxler (2005). This shows that reasons for using mobile technologies in teaching and learning again relate principally to improving access, exploring changes in teaching and learning, and alignment with institutional or business aims. Typical reasons include:

Access:

- Improving access to assessment, learning materials and learning resources
- Increasing flexibility of learning for students
- Compliance with special educational needs and disability legislation

Changes in teaching and learning:

- Exploring the potential for collaborative learning, for increasing students' appreciation of their own learning process, and for consolidation of learning
- Guiding students to see a subject differently than they would have done without the use of mobile devices
- Identifying learners' needs for just-in-time knowledge
- Exploring whether the time and task management facilities of mobile devices can help students to manage their studies
- Reducing cultural and communication barriers between staff and students by using channels that students like
- Wanting to know how wireless/mobile technology alters attitudes, patterns of study, and communication activity among students

Alignment with institutional or business aims:

- Making wireless, mobile, interactive learning available to all students without incurring the expense of costly hardware
- Delivering communications, information and training to large numbers of people regardless of their location
- Blending mobile technologies into e-learning infrastructures to improve interactivity and connectivity for the learner

- Harnessing the existing proliferation of mobile phone services and their many users (Agnes Kukulska and Hulme, 2007).

4. Some practices for using mobile learning at the university level

M-Learning creates learning opportunities that are significantly different to those provided by e-learning (at a desktop) or paper-based distance learning. Chen and colleagues (as cited in Bridgland & Blanchard, 2005) describe the principal considerations to be taken into account when designing m-learning delivery:

- The urgency of the learning need
- The need for knowledge acquisition
- The mobility of the learning setting
- The interactivity of the learning process
- The situatedness of the instructional activities
- The integration of instructional content (Peters 2007).

Most mobile devices are useful in education as administration, organization and teaching aids for practitioners, and also as learning support tools for learners. Here are some of the main benefits:

- Learners can interact with each other and with the practitioner instead of hiding behind large monitors.
- It's much easier to accommodate several mobile devices in a classroom than several desktop computers.
- PDAs or tablets holding notes and e-books are lighter and less bulky than bags full of files, paper and textbooks, or even laptops.
- Handwriting with the stylus pen is more intuitive than using keyboard and mouse.
- It's possible to share assignments and work collaboratively; learners and practitioners can e-mail, cut, copy and paste text, pass the device around a group, or 'beam'? The work to each other using the infrared function of a PDA or a wireless network such as Bluetooth.
- Mobile devices can be used anywhere, anytime, including at home, on the train, in hotels - this is invaluable for work-based training.
- These devices engage learners - young people who may have lost interest in education - like mobile phones, gadgets and games devices such as Nintendo DS or PlayStation Portable.
- This technology may contribute to combating the digital divide, as this equipment (for example PDAs) is generally cheaper than desktop computers (Excellence Gateway).

Traxler noted that mobile education, however innovative, technically feasible, and pedagogically sound, may have no chance of sustained, wide-scale institutional deployment in higher education in the foreseeable future, at a distance or on site. This is because of the strategic factors at work within educational institutions and providers. These strategic factors are different from those of technology and pedagogy. They are the context and

the environment for the technical and the pedagogic aspects. They include resources (that is, finance and money but also human resources, physical estates, institutional reputation, intellectual property, and expertise) and culture (that is, institutions as social organizations, their practices, values and procedures, but also the expectations and standards of their staff, students and their wider communities, including employers and professional bodies).

Implementing wireless and mobile education within higher education must address these social, cultural, and organizational factors. They can be formal and explicit, or informal and tacit, and can vary enormously across and within institutions. Within institutions, different disciplines have their own specific cultures and concerns, often strongly influenced by professional practice in the 'outside world' – especially in the case of part-time provision and distance learning. Because most work in mobile learning is still in the pilot and/ or trial phase, any explorations of wider institutional issues are still tentative (Traxler, 2005; JISC, 2005) but it points to considerable hurdles with infrastructure and support (Traxler, 2007).

However, we may need to consider the following potential disadvantages:

- Small mobile and PDA screens limit the amount and type of information that can be displayed.
- There are limited storage capacities for mobiles and PDAs.
- Batteries have to be charged regularly, and data can be lost if this is not done correctly.
- They can be much less robust than desktops (although tablet PCs are beginning to tackle this problem).
- It's difficult to use moving graphics, especially with mobile phones, although 3G and 4G will eventually allow this.
- It's a fast-moving market, especially for mobile phones, so devices can become out of date very quickly.
- Bandwidth may degrade with a larger number of users when using wireless networks (Excellence Gateway).

Also, technical challenges include:

- Connectivity and battery life
- Screen size and key size
- Ability for authors to visualize mobile phones for delivery
- Multiple standards, multiple screen sizes, multiple operating systems
- Repurposing existing e-Learning materials for mobile platforms

Furthermore, social and educational challenges include:

- Accessibility and cost barriers for end users: Digital divide.
- How to assess learning outside the classroom
- How to support learning across many contexts
- Developing an appropriate theory of learning for the mobile age
- Conceptual differences between e- and m-learning

- Design of technology to support a lifetime of learning
- Tracking of results and proper use of this information
- No restriction on learning timetable
- Personal and private information and content
- No demographic boundary
- Disruption of students' personal and academic lives
- Access to and use of the technology in developing countries (wikipedia).

Traxler, 2007, said mobile learning has growing visibility and significance in higher education. Evidence for this growing visibility and significance is as follows. First, there is the growing size and frequency of dedicated conferences, seminars, and workshops, both in the United Kingdom and internationally. The first of the MLEARN series, MLEARN 2002 in Birmingham, for example, was followed by MLEARN 2003 in London, with more than 200 delegates from 13 countries, by MLEARN 2004 in Rome in July 2004, by MLEARN 2005 in Cape Town in October 2005, and by MLEARN 2006 in Banff, Alberta in November 2006. Another dedicated event, the International Workshop on Mobile and Wireless Technologies in Education (WMTE, 2002), sponsored by IEEE, took place in Sweden in August 2002 (<http://lttf.ieee.org/wmte2002/>). The second WMTE (<http://lttf.ieee.org/wmte2003/>) was held at National Central University in Taiwan in March 2004, in Japan in 2005, and in Athens in 2006. Both these series report buoyant attendance. There are also a growing number of national and international workshops. The June 2002 national workshop in Telford on mobile learning in the computing discipline attracted 60 delegates from UK higher education (<http://www.ics.ltsn.ac.uk/events>). The National Workshop and Tutorial on Handheld Computers in Universities and Colleges at Telford (http://www.einnovationcentre.co.uk/eic_event.htm%20) on June 11, 2004, and subsequent events on January 12, 2005 and November 4, 2005 (<http://www.aidtech.wlv.ac.uk/>) all attracted over 90 delegates. The International Association for Development of the Information Society (IADIS) (<http://www.iadis.org/>) now run a conference series, the first taking place in Malta in 2005, the second in Dublin in 2006, and the third in Lisbon in 2007. Secondly, there have also been a rising number of references to mobile learning at generalist academic conferences, for example the Association for Learning Technology conference (ALT-C) every September in the UK (<http://www.alt.ac.uk/>) (Traxler, 2007).

5. Mobile learning and university teachers and university students

Teaching has a long established culture of individualism and secretiveness and many teachers are very challenged by the need to work collaboratively with technicians, Web developers,

instructional designers and programmers to deliver successful Web-based education (Peters, 2007).

Peters, 2007, expressed that many teachers are interested and able, however, to provide m-Learning content, learning management and support. He gave the following examples to illustrate how m-Learning is being used and supported:

- 'Environmental Detectives' is an example of an increasing suite of games designed for mobile devices. Students played the role of environmental engineers presented with a scenario in which the spread of a toxin was simulated on a location-aware *Pocket PC* equipped with a Global Positioning System (GPS). The *Pocket PC* allowed students to investigate a toxic spill by sampling chemicals in the groundwater and responding to different variables programmed by the teacher (Klopper et al., 2002). The use of virtual characters within the program allowed students to gain an experience that is close to real life, provided context, significantly reduced abstraction, and resulted in a blurring between the game and real life. For instance, in an unanticipated event, one group stopped in the middle of the game and used *Google* to search for clues. The strategy of accessing other outside resources was not only acceptable within the rules, it was perhaps advisable, given the time constraints and use of authentic chemicals and historical data. Students were able to locate information quickly and easily on *Google*, suggesting the role that a tool such as *Google* can play in transforming an educational experience.
- In designing Melbourne Law School's new building (built in 2002), a key feature was the provision of wireless networking that allowed students with mobile computing devices to access course material and conduct searches of legal databases during class, thus expanding the depth of the discussion and the learning experience for the student (Hartnell-Young & Jones, 2004).
- The medical field has applied mobile technology to remote learning in rural health education. Hartnell-Young and Jones (2004) described the use of Tablet PCs that helped students to capture and store confidential patient information, and deliver just-in-time information on clinical problems. Students kept a reflective journal using their mobile device, which was later used as a reference for discussion with their instructors (Peters, 2007).

Kukulka-Hulme, 2007, argued that mobile devices are increasingly able to carry media-rich content, and greater interaction with educational materials (e.g. the capacity to bookmark and annotate them on mobile devices) may strengthen a content-driven pedagogical approach. But at the same time, increasing possibilities for students to collect and contribute new content are creating student-generated learning. Basic handheld computer functionality is currently insufficient to support the level and richness of discussion and interaction amongst students that a more student-centered conception of teaching would envisage.

Nevertheless collaborative learning is already becoming more common, for example where learners are able to carry around their portable devices in groups and to communicate verbally.

He noted that teachers are now finding themselves in situations where they need to focus more on:

- Identifying and catering to students' specific knowledge needs
- Fostering reflection on learning processes
- Helping with the management of learning
- Monitoring performance
- Developing new strategies for consolidation of learning and assessment.

Kukulka-Hulme reported that according to experience at Strathclyde University (JISC Case Studies in Wireless and Mobile Learning, 2005), using 'personal response' technology (electronic voting) in lectures lends itself to concept teaching but it can reduce the amount of time available for more straightforward delivery of lecture material. Practitioners have to find time to understand new student attitudes, new audiences and different patterns of study as well as having to grasp the possibilities of the new technologies. Lack of time, and shifts in the ways that time is allocated and used, are recurring issues.

So why would teachers engage with this technology? Benefits that teachers are likely to see include increased student motivation and participation, better retention and achievement. In some situations there will be easier monitoring of performance, and they are likely to see higher interaction levels, which may be most noticeable in collaborative groups and in larger classes. Communication channels between staff and students, and among students, are becoming more complex but also offer a more flexible range of options, e.g. email, SMS, voice messages, online or mobile discussion forum.

Kukulka-Hulme noticed that early evidence (Plant, 2001), especially in relation to handheld computers and mobile phones, suggested that learners and users regard handheld devices as far more 'personal' than static or desktop computers. This means that mobile learning is also personal learning, which could be remote and individual, or social and collaborative. Those learners who have access to mobile and wireless technologies have an additional means of communication and are able to share information with others. However, currently only mobile phones are owned by large proportions of learners. Personal learning is also at the heart of three scenarios described by de Freitas and Levene (2003) in their report on mobile and wearable devices in further and higher education institutions: web lectures delivered on handheld devices, a campus without walls, and enhanced field trips such as museum visits and wildlife projects.

Kukulka-Hulme added that in an era when education is increasingly multicultural, global and widely accessed, we need to remember that the

experience of educators working with non-traditional university entrants, with overseas course participants and working outside Europe, North America and Australasia – will often be very different. Traxler and Kukulka-Hulme (2005) have addressed mobile learning with a view to how developing countries could use it, but other perspectives are more implicit: a Western view might be contrasted with developments in the Far East, for instance. Summarizing lessons that had been learnt from the Mobilelearn project at the CAL 2005 conference, Sharples (Vavoula et al., 2005) emphasized that they represent a "very European" perspective, because of the nature of this project and the partners who were involved in it. The key realisations emerging from the project were as follows:

- It's the learner that's mobile
- How learning is interwoven with everyday life
- Mobile learning can both complement and conflict with formal education
- Context is constructed by learners through interaction
- Ethical issues: privacy, ownership (Agnes Kukulka-Hulme, 2007).

6. Conclusion

Over the past five years, bands of enthusiastic students, educators and researchers all over the world have been watching the spread of small, mobile devices and exploring how to use these for learning. For some, this is the first real chance to achieve "one computer, one student". For others it is providing educators with powerful tools. Unnervingly for some, it is a frightening peek into a future where the students are more in control of technologies than the teachers (Stead and Tribal)

Mobile learning may currently be most useful as a supplement to ICT, online learning and more traditional learning methods, and can do much to enrich the learning experience. It is widely believed that mobile learning could be a huge factor in getting disaffected young adults to engage in learning, where more traditional methods have failed. As mobile phones combine PDA functions with cameras, video and MP3 players, and as tablets combine the portability of PDAs with the functionality of desktops, the world of learning becomes more mobile, more flexible and more exciting (Excellence Gateway).

References

- Educause Learning Initiative
(<http://www.educause.edu>)
- Excellence Gateway
(<http://www.excellencegateway.org.uk>)
- Kukulka-Hulme, Agnes, 2007, Mobile Usability in Educational Contexts: What have we learnt?, The

International Review of Research in Open and Distance Learning, Vol 8, No 2.

Peters, Kristine, 2007, m-Learning: Positioning educators for a mobile, connected future, The International Review of Research in Open and Distance Learning, Vol 8, No 2

Stead, Geoff, and CTAD, Tribal, Mobile Technologies: Transforming the Future of Learning.

Traxler, John, 2007, Defining, Discussing and Evaluating Mobile Learning: the moving finger writes and having writ, The International Review of Research in Open and Distance Learning, Vol 8, No 2.