

M-LEARNING - AS A PARADIGM OF NEW FORMS IN EDUCATION

Pavel Rosman

1. Introduction

Handheld devices are emerging as one of the most promising technologies for supporting learning and particularly collaborative learning scenarios; mainly because they offer new opportunities for individuals who require mobile computer solutions that other devices cannot provide. Emerging technologies are leading to the development of many new opportunities to guide and enhance learning that were unimaginable even a few years ago.

New opportunities are starting to emerge for learning using portable devices like smart phones, PDA's, tablet PCs and laptop computers which can also be linked via communications systems like WiFi or GPRS and GSM. ICT have provided us with a whole range of interesting possibilities for the creation of new types of educational and teaching materials projects. A key role in this process is assumed by mobile ICT, which have significantly impacted upon the educational system and supported the development of new forms of studies (i.e. Distance Learning, Open Learning Education etc.). The highly personalized nature of digital mobile devices provides an excellent platform for the development of personalized, learner-centric educational experiences. In this position paper we emphasize the importance of considering learning over technology, and suggest a pedagogically based framework for developing learner-centric m-learning. Practical and effective strategies can be founded on well-established learning principles, further developed through a simple four-part activity model of mobile learning, and successfully implemented by adhering to guidelines informed by principles of computer-based resource and interface design. The evolution in education and training at a distance can be characterized as a move from distance learning to e-learning and m-learning (mobile learning) [4].

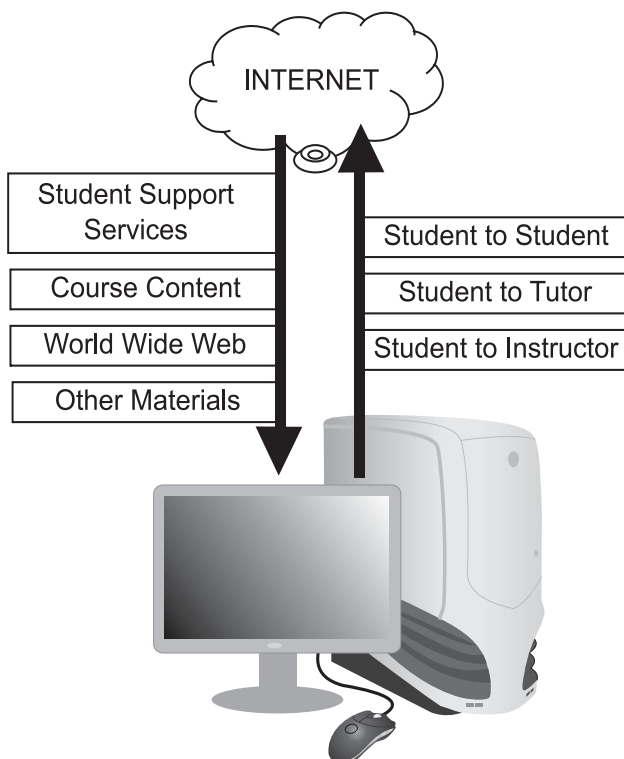
2. Definition

M-learning (or „Mobile Learning“) describes an array of ways that people learn or stay connected with their learning environments - including their classmates, instructors, and instructional resources - while going mobile. Devices utilized include: Mobile Phones, PDAs (such as a Palm or Pocket PC) - or the combination of the two in a Smart Phone (such as a Treo or Blackberry or Apple iPhone) - and digital audio players such as an iPod. This can redefine „on the job“ training for someone who accesses a lesson literally „just in time“ while faced with a new challenge and they have to turn to their mobile device for instant answers. Field research can take a wealth of knowledge and data into the field with these devices and also send back new data instantly for others to use elsewhere. This is a form of e-learning where mobility matters and the connectedness while wandering away from a desktop or laptop plugged into a wired connection extends the usefulness and timeliness of the lesson and learning experience - perhaps shared with other mobile learners. [7]

3. M-learning as Evolution in Education

There are one and a half billion cell phones in operation around the world, and a large percentage of them are in the hands of students. Yet these phones are barred in most classrooms because they interrupt lessons and can enable cheating. M-learning originated from a 3 year pan-European research and development programmer, aimed at helping young adults aged 16 to 24, who were considered most at risk of social exclusion in Europe. The group consisted largely of disaffected learners who had not succeeded in the education system [7]. They were not involved in any education or training and were unemployed, under employed, or even homeless.

Fig. 1: Wired Virtual Learning Environment of Today



Source: [3]

What do many of these young people have in common? A mobile phone = inexpensive, portable and accessible to the majority of EU citizens. Students have found that going to college in the traditional way is difficult. They need innovative ways to help them study and work more efficiently in this competitive world. This encourages educators to reconsider their view of mobile technology and to imagine a pedagogy that embraces its potential. The evolution in education and training at a distance can be characterized as a move from distance learning to e-Learning to m-Learning (mobile learning). With the successful development of Bluetooth, WAP (Wireless Application Protocol), GPRS (General Packet Radio System) and UMTS (Universal Mobile Telecommunications System), the technological structures for wireless telephony and wireless computing are now firmly in place [3].

4. What is M-Learning?

M-learning is mobile learning: using mobile technologies (such as mobile phones and hand-held computers) to enhance the learning process. M-learning, or mobile learning, involves delivery of digitized content to either wireless phones hooked into work and education. The majority of students use some mobile device - laptops or PDA's. M-learning is that it allows on-the-go professionals to connect to training courses anytime and anywhere.

There are many instructional activities that can be enhanced using these hand-held devices such as note-taking, collaborative simulations, and accessing digital textbooks. Students use also smart phones for communication and education. Essentially small computers, cell phones can support language lessons, display animations of medical and chemical processes, be used for

polling and testing, serve as the gateway to larger learning resources - and so much more [3].

The term m-learning is applied to learning with many different technologies, and an equal variety of learning contexts. This technology provides students and teachers the opportunity to obtain any and all class-related material on their Palm handheld computers through a simple process of point-and-connect using infrared. The intersection of mobile computing and e-learning includes anytime, anywhere resources; strong search capabilities; rich interaction; powerful support for effective learning; and performance-based assessment. To meet student needs, many universities offer self-, or i-paced, online courses on the Web with related technologies and applications software; studies indicate that i-paced online learning can be effective. M-learning is one more step in the same direction [1],[2].

5. Differences between M-Learning and E-Learning

If e-learning took learning away from the classroom or campus, then m-learning is taking learning away from a fixed point. Where e-learning is an alternative to classroom learning (actually eLearning should/can be complementary to classroom learning) - m-learning is a complementary activity to both e-learning and traditional learning. M-learning respects that a user would like to interact with educational resources whilst away from their normal place of learning - classroom or computer.

In one sense m-learning has been around for longer than e-learning, with the paperback book and other portable resources, but technology is what shapes today's usage of m-learning. Technology now allows us to carry vast resources in our pockets and access these wherever we find convenient. Technology also allows us to interact with our peers instantaneously and work together remotely in ways never before possible. Differences between m-Learning and e-Learning are shown on Fig. 2 [4].

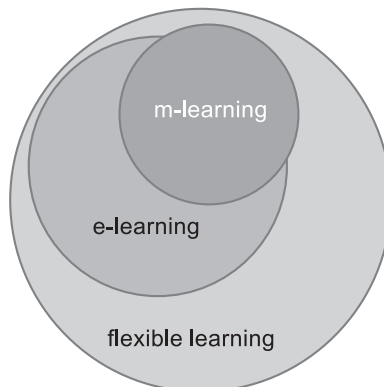
While the opportunities that m-learning devices present us with are new - the challenges are quite old, smaller screen sizes, limited processing power, reduced input capabilities. These challenges mean that adapting existing e-learning services and content to m-learning is not a trivial task.

M-Learning has been gaining appeal among younger generations who have grown up using portable video game devices and wireless technology. In this sense, m-Learning appeals not only to those who need learning portable, but to those who have grown up with a cognitive disposition towards using mobile devices whether or not they have the need for true portability in their learning [4].

6. Mobile Learning and Wireless ICT in Educational Process

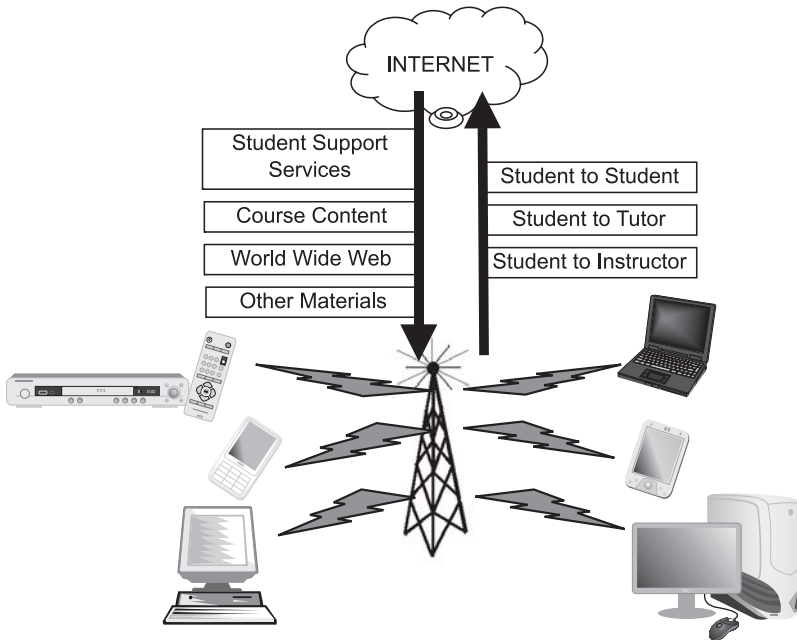
Mobile learning can be defined in many different ways. For some, 'mobile learning' connotes PDAs and cell phones; for others, iPods and media players; and even digital cameras and USB keys are indicated. In general, however, most people seem to associate mobile learning

Fig. 2: Differences between M-Learning and E-Learning



Source: [4]

Fig. 3: Wired Virtual Learning Environment of Tomorrow



Source: [3]

with the latest portable gadgets. This can make the prospect of applying mobile learning seem daunting to some educators, and perhaps rather sexy to others [4].

The technologies currently start researched in education. Mobile technologies develop very fast and violently. The wireless technologies of the mobile revolution have seen the worldwide proliferation of wireless communication devices. The idea behind m-Learning is that it allows on-the-go professionals to connect to training courses anytime and anywhere. M-learning can include anything from job aids and courseware downloaded on personal digital assistant to Net-based, instructor-facilitated training via laptop. M-Learning, allows users to access IT courseware modules via the Palm operating system.

Wireless (WiFi) communication (i.e. wireless local networks - WLAN, mobile or satellite networks, etc.) even enables the implementation of the mobile devices for example notebooks, Personal Digital Assistants (PDA), Smart phones, mobile telephone (cellular telephone), tablet PC.

All of these devices can be used as an individual resource, but are best put to use as a collaborative tool, creating new interactions between students and teachers. Very important are mobile ICT for example GRPS, EDGE, CDMA, WiFi [4]. There are two familiar approaches to the issue of mobile learning. The first points out that since the dominant mode of access to the Internet will soon be through wireless devices, e-learning simply becomes m-learning, without any particular changes in content. The way e-learning is changing to m-learning is shown in Figures 1, 3 [3].

To implement the above flexible services architecture for m-learning, the m-learning technology environment may include mobile device such as; pocket PC, mobile phone, and portable keyboard. This m-learning device will have the power of a desktop that gives access to Microsoft Pocket applications such as Internet Explorer, Outlook, Word, Excel and Microsoft media player. Among this software would be Microsoft Reader with a Clear Type kind of software. Microsoft Reader with a Clear Type kind of software program would be helpful to read

e-books or content in *.lit file format (MS Reader file format). The software would also provide opportunity to read e-books, Pocket Dictionaries, etc. to downloaded from the Internet and synchronized to the Pocket PC via the PC. One can synchronize the device with one's desktop PC to read e-mail, view attachments, update the calendar and the device can easily connect to a mobile phone via cable, infrared, or wireless technology for online browsing [6].

Learning content and the communication component of a learning environment include resources (articles on the web, references to other resource materials), online access to the discussion forum with the possibility quick access for reading in the Forum and writing contributions, and e-mail for individual communication with instructor and fellow students and for submitting assignments. Assignments may be submitted as text-based e-mail, voice-based mail or as Word or Text or voice attachments.

7. M-Learning - New Paradigm in Education

The application of new, mostly mobile, technologies to distance learning involves new problems that require new and innovative solutions from both pedagogical and technological points of view. Handheld mobile computing devices allow for exploratory activities not bound to a special location, for example field trips, without losing the potential for taking electronics notes and retrieving information of various types.

The use of ICT in education and training has undergone several paradigm shifts over the last decade. M-learning is a new paradigm that creates a new learning environment. With the successful

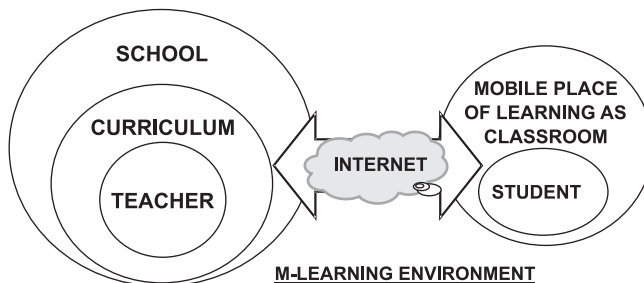
development of Bluetooth, WAP, GPRS and UMTS the technological structures for wireless telephony and wireless computing are now firmly in place. The wireless technologies of the mobile revolution have seen the worldwide proliferation of wireless communication devices. Mobile learning is unique because learners can access the course material, instructions, and other course related applications anytime and anywhere.

The use of mobile technology in education and training is changing the basic paradigms of when, where, and how school instruction can be delivered. Mobile learning is unique because learners can access the course material, instructions, and other course related applications anytime and anywhere. This increases daily attention to learning material, makes learning pervasive, and may boost the learner's motivation for lifelong learning [3].

Mobile-learning is learning supported by mobile devices, ubiquitous communications technology, and intelligent user interfaces. Moving from stationary to mobile learning allows ad hoc collaboration and informal interaction between students. Mobile technology is changing the basic paradigms of when, where, and how school instruction can be delivered. The implications for the teacher-student relationship, standards, assessments, accountability, and traditional geographic boundaries are fundamental issues with which state and local boards of education will have to wrestle. The teacher-student relationship has always been, and will continue to be, of value.

What will eventually happen in the mobile learning model is a „blended learning“ - an intelligent combination of e-learning and instructor-led training. The student will have access to multimedia learning tools, and all the information available

Fig. 4: M-learning Environment Model



Source:[6]

on the Internet. The teacher will act as a guide to the student on how best to use these tools to get the information that is required. Constructivism is the main pedagogy used in online learning. This approach is used in the form of discussions, constructivist activity and conferencing to enable the learner to build an understanding and the meaning of the issues and to construct new knowledge on the basis of information. The m-learning environment is shown in Fig. 4 [6].

Online learning and specifically m-learning is very different from the traditional face-to-face instructor-led teaching method. As shown in this figure, the learning space or classroom concept of traditional method is changed in m-learning environment. This will certainly have effects on student-teacher relationship and social issues. M-learning offers a unique opportunity for teachers and students in different kinds of learning environment settings. The unique feature of this mode of learning is that it enhances flexibility for students; however, it demands new pedagogies, and new approaches to deliver a course. If appropriately facilitated, m-learning helps learners in a great way by providing virtual classrooms on their mobile devices.

Teachers will ultimately spend more time for course-delivery and follow-up as compared to traditional classroom method. In addition, teachers will have to provide a rich learning resource and environment, which in turn, contributes to the quality of learning. To keep up with these changing phenomenon and to continue to effectively facilitate m-learning, it is imperative that online teachers learn about and adapt to the changing environments, when and where appropriate.

8. Conclusion

Mobile technologies are a future in e-Learning technologies. The evolution in education and training at a distance can be characterized as a move from distance learning to e-Learning and m-Learning (mobile learning). There is little doubt that in the future learning solutions and services will be integrated into a whole host of mobile technologies (for example mobile phones, PDA's, Tablet PC, notebook, smart phones, etc.). In the US, using PDA's in schools and for workers on the move has already been adopted with significant results in terms of improved learning effectiveness. In Europe, mobile learning is beginning to

develop. The universities aspire to promote new technologies in learning and mobile technologies develop quickest. The majority of students can use their mobile device for education. M-learning is that it allows on-the-go professionals to connect to training courses anytime and anywhere. Useful Papers and Articles are on web sources below.

References:

- [1] ATTEWELL, J., SAVILL-SMITH, C. *What is m-learning?* [online]. Dostupné z: <<http://www.m-learning.org/>> [cit. 2007-03-05].
- [2] FOJTÍK, R. M-learning. In *Information and Communication Technology in Education 2005*. OSU Ostrava: Sborník příspěvků, Rožnov p. Radh. 20.- 22. 9. 2005, p. 57 - 60. ISBN 80-7368-081-5.
- [3] KRISTOFFERSEN, S., LJUNGBERG, F. *Representing Modalities in Mobile Computing: A Model of IT-use in Mobile Settings* [online]. [cit. 2006-09-06]. Dostupné z: <http://www.nr.no/documents/imedia/publications/work_in_the_future/mopas_kristoffersen.pdf/>
- [4] LOW, L., O'CONNELL, M. *Learner-centric design of digital mobile learning* [online]. [cit. 2007-03-07]. Dostupné z: <https://olt.qut.edu.au/udf/OLT2006/gen/static/papers/Low_OLT2006_paper.pdf/>
- [5] OREBSKY, M. *What Can You Learn From a Cell Phone?* [online] [cit.2006-09-06]. Dostupné z: <<http://www.pjb.co.uk/m-learning/articles.htm/>>.
- [6] TRIFONOVA, A., RONCHETTI, M. General Architecture to Support Mobility in Learning. In Proc. of ICALT 2004. IEEE Computer Society Press, 2004, p. 26-30, ISBN 0-7695-2181-9.
- [7] Wikipedia. Portal Wikipedia, the free encyclopedia. M-learning [online] [cit. 2007-03-07]. Dostupné z: <<http://en.org/wiki/M-learning/>>.

Ing. Pavel Rosman

Univerzita Tomáše Bati ve Zlíně
 Fakulta managementu a ekonomiky
 Ústav informatiky a statistiky
 rosman@fame.utb.cz

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ABSTRACT**M-LEARNING - A PARADIGM OF NEW FORMS IN EDUCATION****Pavel Rosman**

Mobile technologies are a future in e-learning technologies. The paper presents the details of using mobile devices and wireless technologies that could be used for m-learning in education and training. Mobile devices can have more processing power, slicker displays, and more interesting applications than were commonly available on desktop machines ten years ago, and educators are quickly realizing their potential to be used as powerful learning tools. However, the application of mobile technologies to learning contexts must take into account a number of factors. Above all other things, we must consider how mobile learning can be used to provide learners with better opportunities and enhanced learning outcomes. This paper is concerned about the problems of using mobile devices and wireless technologies, a differentiation between learning and technology as the driver for mobile learning approaches and than the classification of mobile learning activities. M-learning is the exciting art of using mobile technologies to enhance the learning experience. Mobile phones, PDAs, Pocket PCs and the Internet can be blended to engage and motivate learners, any time and anywhere.

Handheld devices are emerging as one of the most promising technologies for supporting learning and particularly collaborative learning scenarios; mainly because they offer new opportunities for individuals who require mobile computer solutions that other devices cannot provide. The highly personalized nature of digital mobile devices provides an excellent platform for the development of personalized, learner-centric educational experiences. In paper is emphasized the importance of considering learning over technology, and suggest a pedagogically based framework for developing learner-centric m-learning. The evolution in education and training at a distance can be characterized as a move from distance learning to e-learning and m-learning (mobile learning).

Key Words: *education, e-learning, mobile devices, m-learning, PDA, personal digital assistant, pocket pc, flexible learning, wireless communication*

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