

Mobile Learning for Education: Benefits and Challenges

¹Yousef Mehdipour , ²Hamideh Zerehkafi

¹Phd Scholar, Institute Of Advanced Study In Education, Osmania University, Hyderabad, India. E-

²MBA, College Of Commerce And Business Management, Osmania University, Hyderabad, India

ABSTRACT

Education and training is the process by which the wisdom, knowledge and skills of one generation are passed on to the next. Today there are two forms of education and training: conventional education and distance education. Mobile learning, or "M-Learning", offers modern ways to support learning process through mobile devices, such as handheld and tablet computers, MP3 players, smart phones and mobile phones. This document introduces the subject of mobile learning for education purposes. It examines what impact mobile devices have had on teaching and learning practices and goes on to look at the opportunities presented by the use of digital media on mobile devices. The main purpose of this paper is to describe the current state of mobile learning, benefits, challenges, and it's barriers to support teaching and learning. Data for this paper were collected through bibliographic and internet research from January to March 2013. Four key areas will be addressed in this paper: 1. An analysis of Mobile Learning. 2. Differentiating E-Learning from Mobile Learning 3. Value and Benefits of Mobile Learning 4. Challenges and Barriers of Mobile Learning: Study showed that M-Learning as a Distance learning brought great benefits to society include : Training when it is needed, Training at any time; Training at any place; Learner-centred content; Avoidance of re-entry to work problems; Training for taxpayers, and those fully occupied during university lectures and sessions at training centres; and The industrialisation of teaching and learning. And also, notebooks, mobile Tablets, iPod touch, and iPads are very popular devices for mobile learning because of their cost and availability of apps.

KEYWORDS : Education, Learning, M-Learning, Mobile, Teaching,

I. INTRODUCTION

The term **M-Learning** or "Mobile Learning", has different meanings for different communities, that refer to a subset of E-Learning, educational technology and distance education, that focuses on learning across contexts and learning with mobile devices. Mobile learning has many different definitions and is known by many different names, like M-Learning, U-Learning, personalized learning, learning whilemobile, ubiquitous learning, anytime / anywhere learning, and handheld learning. One definition of mobile learning is, "any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies" (MOBilearn., 2003). In other words, with the use of mobile devices, learners can learn anywhere and at any time (Crescente and Lee, 2011). Mobile learning is considered to be the ability to use mobile devices to support teaching and learning.

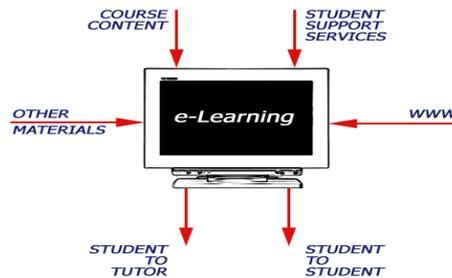
'Mobile learning' is certainly not merely the conjunction of 'mobile' and 'learning'; it has always implicitly meant 'mobile E-Learning' and its history and development have to be understood as both a continuation of 'conventional' E-Learning and a reaction to this 'conventional' E-Learning and to its perceived inadequacies and limitations. It is the 'mobile' aspect of mobile learning that makes it stand apart from other types of learning, specifically designing learning experiences that exploit the opportunities that 'mobility' can offer us. M-Learning focuses on the mobility of the learner, interacting with portable technologies, and learning that reflects a focus on how society and its institutions can accommodate and support an increasingly mobile population. This is because mobile devices have features and functionality for supporting learners. For example, podcasts of lectures can be made available for downloading. Learners are to expect to engage with these learning resources whilst away from the traditional learning spaces. 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 (Singh, 2010).

The research that has been done on the use of mobile apps like these has been very promising. For example, a recent study funded by the Department of Education, looked at the link between learning, and the PBS Kids educational gaming app, Martha Speaks Dog Party. The study found that after children had used the app every day for two weeks, the vocabulary of Title 1 children between three and seven years old improved by as much as 31 percent. A similar study, conducted at the Abilene Christian University, centered upon the use of the Statistics 1 app. Students used it in and out of the classroom and remarked that they understood the content better, and were more motivated to do well, when using the app. The instructors agreed with this observation, and added that the students were also better prepared for classes. According to a report by Ambient Insight in 2008, "the US market for Mobile Learning products and services is growing at a five-year compound annual growth rate (CAGR) of 21.7% and revenues reached \$538 million in 2007. The data indicates that the demand is relatively immune from the recession." (Adkins, 2008). The findings of the report indicate that the largest demand throughout the forecast period is for custom development services, content conversion, and media services and that the healthcare sector accounts for 20% of the total US market for mobile learning.

1.1. EDUCATION; CURRENT AND FUTURE

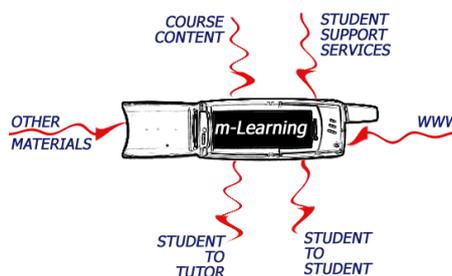
There is now little doubt that the World Wide Web is the most successful educational tool to have appeared in a long time. It combines and integrates text, audio and video with interaction amongst participants. It can be used on a global scale and is platform independent. While largely an asynchronous medium, it can be used also for synchronous events. It is not surprising, therefore, that trainers, lecturers, distance education providers and teaching institutions at all levels are increasingly using the Web as a medium for delivery. The statistics showed that: The number of Americans accessing the mobile web went up 107% last year; Mobile Web Access is growing around 15-20% a month; Mobile internet growth is 8x greater than PC-based growth; and Mobile social networking sites are getting more popular, mobile Facebook has 4 million users a day (Adkins, 2008). In this section we will map the evolution from the wired virtual learning environment of today, to the wireless learning environment of tomorrow. The wired learning environment of today might be presented diagrammatically thus:

Figure 1: Wired Virtual Learning Environment of Today



The study seeks to put in place a new virtual learning environment which might be represented thus:

Figure 2: Wireless Virtual Learning Environment of Tomorrow



The studies should evaluate each of these technology models on the six major dimensions of distance education provision:

- The provision of course content to off-campus students
- The provision of feedback to off-campus students
- The provision of student support services to off-campus students
- Links to the WWW and other resources
- Student-to-student interactivity
- Student to tutor and institution interactivity.

Each of these dimensions should be analysed and evaluated on a four point grid for decision makers:

- 1) Student userfriendliness 2) Didactic effectiveness
- 3) Technical feasibility 4) Cost effectiveness.

1.2. Current Capabilities And Applications Of Mobile Phone

Subject	E-Learning	M-Learning
Place	lecture in classroom or internet labs	learning anywhere, anytime
Pedagogical Change	More text- and graphics based instructions	More voice, graphics and animation based instructions
	lecture in classroom or in internet labs	learning occurring in the field or while mobile
Instructor to Student Communication	Time-delayed (students need to check e-mails or web sites)	Instant delivery of e-mail or SMS
	passive communication	Instant communication
	Asynchronous	Synchronous
	Scheduled	Spontaneous
Student to Student Communication	Face-to-Face	Flexible
	Audio- teleconference common	Audio- and video-teleconference possible
	e-mail-to-e-mail	24/7 instantaneous messaging
	private location	no geographic boundaries
	travel time to reach to internet site	no travel time with wireless internet connectivity
	dedicated time for group meetings	Flexible timings on 24/7 basis
	poor communication due to group consciousness	Rich communication due to one-to-one communication, reduced inhibitions
Feed back to student	1-to-1 basis possible	1-to-1 basis possible
	Asynchronous and at times delayed	Both asynchronous and synchronous
	Mass/standardized instruction	Customized instruction
	Benchmark-based grading	Performance & improvement-based grading
	Simulations & lab-based experiments	Real-life cases and on the site experiments
	Paper based	Less paper, less printing, lower cost
Assignments & Tests	In-class or on computer	Any location
	Dedicated time	24/7 Instantaneous
	Restricted amount of time	Any amount of time possible
	Standard test	Individualized tests

	Usually delayed feedback	Instant feedback possible
	Fixed-length tests	Flexible-length/number of questions
Presentations, Exams & Assignments	Theoretical and text based	Practical oriented exams direct on site, hands-on based
	Observe and monitoring in lab	Observe in the field and monitoring from remote location
	Class-based presentations	1-to-1 presentations with much richer communication
	Usually use of one language	Automatic translation for delivery of instructions in many languages (possible)
	Mostly individualized, component based group work	Simultaneous collaborative group work
	Paper-based assignment delivery	Electronic-based assignment delivery
	Hand-delivery of assignments at a particular place and time	E-delivery of assignments at any place and time
	Instructor's time used to deliver lectures	Instructor's time used to offer individualized instructions and help

Mobile devices, and their technologies and systems, are eroding established notions of time as a common structure that had previously underpinned social organization and the consensual understanding of the world. Time-keeping is being replaced by the ‘approx-meeting’ and the ‘multi-meeting’ (Plant, 2000), ‘socially negotiated time’ (Sørensen *et al*, 2002), the ‘micro coordination of everyday life’ alongside the ‘softening of

schedules’ (Ling, 2004) afforded by mobile devices and Nyiri (2006:301) says, “with the mobile phone, time has become personalized”. Whereas previously our social and business relations had to be organized and synchronized by absolute clock time, now mobile technologies allow us to renegotiate meetings and events on-the-fly. However, Basic mobile phone features are: Making and receiving calls; Sending and receiving text messages; and Basic office tools e.g. calculator. Advanced mobile phone features include: Bluetooth; Camera capable of taking stills and more commonly now video; e-book readers, games; Recording audio; GPS / location aware; and Web browser to connect to the internet.

Mobile learning can happen anywhere: in a classroom, at the dining room table, on a bus, in front of a science exhibit, and anywhere. Portability is not as important as the ability of the learner to connect, communicate, collaborate, and create using tools that are readily at hand. We have got them working as part of the M-Learning project. We are using the seductive power of these new technologies to re-inspire young learners who are dropping out of traditional learning. Research and development has been ongoing for the last two years and many learners have already been trying out these approaches and contributing to their development.

1.3. How Is That Different from E-Learning?

E-Learning has come to define any dissemination of educational knowledge over the Internet. This makes E-Learning a subset of technology-based training. It also incorporates a number of learning activities conducted on the Internet, of which mobile learning is one part. Many authors (e.g., Mostakhdemin-Hosseini and Tuimala, 2005) view Mobile Learning simply as the natural evolution of E-Learning, which completes a missing component such as the wireless feature, or as a new stage of distance and E-Learning (e.g., Georgiev, et al. 2004). M-Learning is often described as occupying a sub-space within the E-Learning space, which is in turn a sub-part of digital learning.

1.4. Differentiating E-Learning from Mobile Learning

E-Learning can be real-time or self-paced, also known as "synchronous" or "asynchronous" learning. Additionally, E-Learning is considered to be “tethered” (connected to something) and presented in a formal and structured manner. In contrast, mobile learning is often self-paced, un-tethered and informal in its presentation (see Table 1).

Table 1: Differences between E-Learning and M-Learning

Because mobile devices have the power to make learning even more widely available and accessible, mobile devices are considered by many to be a natural extension of E-Learning (Sharma & Kitchens, 2004).

1.5.THE VALUE OF MOBILE LEARNING (Savill, 2010):Tutors who have used M-Learning programs and techniques have made the following value statements in favor of M-Learning.

- It is important to bring new technology into the classroom.
- Devices used are more lightweight than books and PCs.
- Mobile learning can be used to diversify the types of learning activities students partake in (or a blended learning approach).
- Mobile learning supports the learning process rather than being integral to it.
- Mobile learning can be a useful add-on tool for students with special needs. However, for SMS and MMS this might be dependent on the students' specific disabilities or difficulties involved.
- Mobile learning can be used as a 'hook' to re-engage disaffected youth.

1.6.BENEFITS OF M-LEARNING (Elias, 2011; Crescente and Lee, 2011):

- Relatively inexpensive opportunities, as the cost of mobile devices are significantly less than PCs and laptops
- Multimedia content delivery and creation options
- Continuous and situated learning support
- Decrease in training costs
- Potentially a more rewarding learning experience
- Improving levels of literacy, numeracy and participation in education amongst young adults.
- Using the communication features of a mobile phone as part of a larger learning activity, e.g.: sending media or texts into a central portfolio, or exporting audio files from a learning platform to your phone.

1.7.CHALLENGES OF M-LEARNING:

Technical challenges for M-Learning include:

- Connectivity and battery life
- Screen size and key size (Maniar and et. Al. 2008)
- Meeting required bandwidth for nonstop/fast streaming
- Number of file/asset formats supported by a specific device
- Content security or copyright issue from authoring group
- Multiple standards, multiple screen sizes, multiple operating systems
- Reworking existing E-Learning materials for mobile platforms
- Limited memory (Elias, 2011)
- Risk of sudden obsolescence (Crescente and Lee, 2011)

1.8.Social and educational challenges for M-Learning include:

- Accessibility and cost barriers for end users: Digital divide.
- How to assess learning outside the classroom
- How to support learning across many contexts
- Content's security or pirating issues
- Frequent changes in device models/technologies/functionality etc.
- Developing an appropriate theory of learning for the mobile age
- Conceptual differences between E-Learning and M-Learning
- Design of technology to support a lifetime of learning (Sharples, 2000; Moore, 2009)
- 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 (Masters, K.; Ng'ambi D. , 2007)
- Access to and use of the technology in developing countries (Masters, K., 2007)
- Risk of distraction (Crescente and Lee, 2011).

In addition to these challenges, there are some barriers to mobile learning include the high costs associated with equipment, connectivity, maintenance, technical support and teacher training; Health-related issues; a lack of policy support and governmental investment; and/or a lack of interest and awareness on the part of policymakers

and the public; and negative social attitudes that see mobile phones as disruptive devices that students use primarily to play games, chat with friends and potentially engage in inappropriate behaviors such as cheating and cyber-bullying.

1.9.MOBILE TECHNOLOGIES FOR M-LEARNING:

Mobile technologies are an attractive and easy means to maintain literacy skills and gain constant access to information. They are affordable, can be easily distributed and thus hold great potential for reaching marginalized groups and providing them with access to further learning and development. Mobile technologies facilitate distance learning in situations where access to education is difficult or interrupted because of geographical location or due to post-conflict or post-disaster situations.

Mobile devices and personal technologies that can support mobile learning include:

- E-book
- Out start, Inc.
- Handheld audio and multimedia guides, in museums and galleries
- Handheld game console, modern gaming consoles such as Sony PSP or Nintendo DS
- Personal audio player, e.g. for listening to audio recordings of lectures (podcasting)
- Personal Digital Assistant, in the classroom and outdoors
- Tablet computer
- UMPC, mobile phone, camera phone and Smart Phone

Technical and delivery support for mobile learning include:

- 3GP For compression and delivery method of audiovisual content associated with Mobile Learning
- GPRS mobile data service, provides high speed connection and data transfer rate
- Wi-Fi gives access to instructors and resources via internet
- Cloud computing for storing and sharing files

And also, We need baseline requirements for mobile technologies that support learning outside of school settings. These technologies should be:

- 1) **Highly portable:** The technology is available whenever the user needs to learn.
- 2) **Individual:** The technology can be personalized to suit the individual learner's abilities, knowledge and learning style, and is designed to support personal learning rather than general office work.
- 3) **Unobtrusive:** The learner can capture situations and retrieve knowledge without the technology becoming overly noticeable or imposing on the situation.
- 4) **Available:** The learner can use the technology anywhere, to enable communication with teachers, experts and peers.
- 5) **Adaptable:** The technology can be adapted to the context for learning and the learner's evolving skills and knowledge.
- 6) **Persistent:** The learner can use the technology to manage learning throughout a lifetime, so that the learner's personal accumulation of resources and knowledge will be immediately accessible despite changes in technology.
- 7) **Useful:** The technology is suited to everyday needs for communication, reference, work and learning.
- 8) **Easy to use:** The technology is easily comprehended and navigated by people with no previous experience using it.

On the other hand, Douch et al. (2010) indicated that mobile technologies can improve professional development and teacher training in several areas:

I) Communication: Mobile devices can be used in conjunction with wireless broadband and video-call services like Skype to facilitate communication between teachers and mentors.

II) Self-assessment: Video cameras can be used to record lessons, allowing teachers to reflect on their teaching practice and identify specific areas for improvement.

III) Innovation: Mobile technologies can be used in teacher education programs to challenge teachers to think creatively about mobile learning and develop the confidence to try new ideas.

UNESCO and MLW 2013 UNESCO hold the Second UNESCO Mobile Learning Week (MLW) from 18 to 22 February 2013 at its Headquarters in Paris, France. The event aims to explore mobile learning as a unique and significant contribution to achieving the Education for All (EFA) goals of increasing education access, quality and equality. MLW 2013 focuses on three particular EFA goals as they relate to mobile learning:

- Improving levels of adult and youth literacy: how mobile technologies can support literacy development

and increase reading opportunities?

- Improving the quality of education: how mobile technologies can support teachers and their professional development?
- Achieving gender parity and equality in education: how mobile technologies can support equal access to and achievement in basic education of good quality for all, in particular for women and girls?

II. DISCUSSION

Mobile learning is emerging as one of the solutions to the challenges faced by education. With a variety of tools and resources always available, mobile learning provides increased options for the personalization of learning. Mobile learning in classrooms often has students working interdependently, in groups, or individually to solve problems, to work on projects, to meet individual needs, and to allow for student voice and choice. With access to so much content anytime and anywhere, there are plenty of opportunities for formal and informal learning, both inside and outside the classroom. Study showed that notebooks, mobile Tablets, iPod touch, and iPads are very popular devices for mobile learning because of their cost and availability of apps. They are used for collecting students' responses (clickers), reading electronic books and websites, recording reflections, documenting field trips, collecting and analyzing data, and much more. One of the causes of acceptance mobile learning is that it uses devices:

- ✓ which citizens are used to carrying everywhere with them,
- ✓ which they regard as friendly and personal devices,
- ✓ which are cheap and easy to use,
- ✓ which they use constantly in all walks of life and in a variety of different settings, except education.” (Keegan, 2005:3)

but, The future of mobile learning depends largely on the level of social acceptance it receives. On the other hand, Users in developing countries have the same need for M-Learning to be mobile, accessible and affordable, as those in developed countries do. The very significance of M-Learning is its ability to make learning mobile, away from the classroom or workplace. These Wireless and mobile technologies enable learning opportunities to learners who do not have direct access to learning in these places. Many learners in developing countries have trouble accessing the internet, or experience difficulty in affording technology that enables learning in an E-Learning environment. Mobile devices are a cheaper alternative compared to traditional E-Learning equipment such as PC's and Laptops (master, 2004). The reason for the failure of mobile learning to emerge from its project status and take its place in mainstream education and training is well known. It is that mobile learning is not considered by the telecommunications operators to be a valid and attractive revenue stream. Progress is being made in a wide range of mobile applications, but education and training lag behind.

The first of solution is the use of mobile learning for academic administration on mobile phones. If it could be established that mobile learning was to become the established method for universities and colleges to communicate urgent information to their student body, a very large revenue stream would be opened up. It can be taken as a given that all students in all universities and colleges possess a mobile phone which they consult constantly. All students enrolled in higher and further education institutions today have frequent needs for information from their institutions about timetable changes, assessment deadlines, feedback from tutors and other urgent administrative details. The use of mobile telephony is a much more efficient and quicker means of communication than postal contact or email. Once this has been achieved the use of mobile learning for academic contact in colleges and universities can be added. Mobile learning academic summaries comprising 4 to 5 screen summaries of content, examination hints, assessment questions for course revision, guidelines for particularly difficult parts of a course or counseling provision for students in need will be of great benefit to all students, and can be developed for and sent out to either all students or students in a particular year or class grouping.

A final tier of the strategy for the incorporation of mobile learning in mainstream education and training is represented by the development and offering to students of full modules by mobile learning. With the arrival of 3G technologies viable course modules can be developed. Offering these modules, with assignment submission, tutor contact, examination and assessment provision will provide further evidence of the validity of mobile learning as an attractive provider of revenue streams to mobile operators.

III. SUGGESTIONS:

In an epoch where humanistic values are decrementing and vision towards social progress is disintegrating, our need to promote responsible education and learning is more crucial than ever. The advent of mobile phones presents a great opportunity and offers a timely challenge to re-define and transform our educational paradigms. As wine fans claim “we cannot pour fresh wine in old bottles”, likewise,

mobile learning too requires a new philosophical framework and new educational paradigms if it is to flourish. Only then will it become ubiquitous. Below, Hence, is recommended that policy-makers:

1. Leverage existing investments

Policy-makers should take stock of existing ICT investments and approaches, and devise strategies to complement rather than replace the current infrastructure.

2. Localize policies

Policy-makers should consider the local contexts of the country or region when creating new policies or adapting existing ones, as strategies that work for one country may not be appropriate in another.

3. Support open technical standards

Policy-makers should encourage the use of open, standards-based platforms for mobile learning applications, to increase access and streamline the development process.

4. Promote intersectional cooperation and multi-stakeholder partnerships

Policy-makers should promote cooperation between different branches of government and encourage partnerships between stakeholders from a variety of sectors and levels.

5. Establish policies at all levels

Policy-makers should create or revise mobile learning policies at both the national and local levels, regardless of whether education is decentralized. National policies should provide overarching structure and guidance, while local policies direct implementation in individual districts or institutions.

6. Review and update existing policies

Policy-makers should revisit existing policies, particularly at the local level, that may be overly restrictive in regard to the use of mobile technology at schools and universities. National policies may need to be clarified or revised to give better guidance to districts and institutions.

7. Ensure inclusive education

Policy-makers should ensure that mobile learning policies promote gender equality and accessibility for learners with disabilities. This effort is essential to meeting EFA goals of providing quality education to all learners worldwide.

ICT is a powerful vehicle for enhancing learning, and mobile devices form an essential part of that vehicle. If current ICT strategies for education begin to include mobile devices along with digital learning materials, support for teachers, and guidelines on best practices, mobile learning will soon become an important part of education.

AUTHOR INFORMATION

Yousef Mehdipour is a Ph.D. Scholar in Education, the Institute of Advanced Study in Education, Osmania University, Hyderabad, India and also he is a faculty member in ZUMS; And Hamideh Zerehkafi is a student in Master of business Administration, College of Commerce and Business Management, Osmania University, Hyderabad, India.

REFERENCES

- [1] Adkins, S.S. (December 2008). "The US Market for Mobile Learning Products and Services: 2008-2013 Forecast and Analysis". Ambient Insight. p. 5. Retrieved June 8, 2009.
- [2] Chet Hosmer, Carlton Jeffcoat, Matthew Davis, Thomas McGibbon (2011), "Use of Mobile Technology for Information Collection and Dissemination", Data & Analysis Center for Software, March 2011.
- [3] Crescente, Mary Louise; Lee, Doris (2011). "Critical issues of M-Learning: design models, adoption processes, and future trends". *Journal of the Chinese Institute of Industrial Engineers* **28** (2): 111–123.
- [4] Douch R., Savill-Smith C., Parker G. and Attewell J. 2010. Work-based and vocational mobile learning: Making IT work. London, LSN. <http://issuu.com/steveb123/docs/100186>
- [5] Elias, Tanya (February 2011). "Universal Instructional Design Principles for Mobile Learning". *International Review of Research in Open and Distance Learning* **12** (2): 143–156.
- [6] Georgiev, T., Georgieva, E. and Smrikarov, A. (2004). ME-Learning: A new stage of E-Learning. Proceedings International conference on Computer Systems and Technologies, CompSysTech' 2004, IV.28, 1-5.
- [7] Kahle-Piasecki, Lisa; Miao, Chao; Ariss, Sonny (2012). "Managers and the Mobile Device: M-Learning and m-business - Implications for the United States and China". *Journal of Marketing Development and Competitiveness* **6** (1): 56–68.
- [8] Keegan, D. (2005) The Incorporation of Mobile Learning into Mainstream Education and Training. Proceedings of mLearn2005- 4th World Conference on mLearning, Cape Town, South Africa, 25-28 October 2005. <http://www.mlearn.org.za/CD/papers/keegan1.pdf>
- [9] Ling, R. (2004). *The Mobile Connection—the cell phone’s impact on society*. San Francisco, CA, Morgan Kaufmann Publishers.
- [10] Maniar, N.; Bennett, E., Hand, S. & Allan, G (2008). "The effect of mobile phone screen size on video based learning". *Journal of Software* **3** (4): 51–61.
- [11] Masters, K. (2004). "Low-key M-Learning: a realistic introduction of M-Learning to developing countries"
- [12] Masters, K. (2005). "Low-key M-Learning: a realistic introduction of M-Learning to developing countries". Seeing, Understanding, Learning in the Mobile Age. Budapest, Hungary, April 2005.
- [13] Masters, K.; Ng'ambi D. (2007). "After the broadcast: disrupting health sciences’ students' lives with SMS". Proceedings of IADIS International Conference Mobile Learning. Lisbon, Portugal. pp. 171–175. ISBN 978-972-8924-36-2.
- [14] MOBIlearn., (2003) "Guidelines for learning/teaching/tutoring in a mobile environment". MOBIlearn. October 2003. p. 6. Retrieved June 8, 2009.
- [15] Mobile Learning Community. Mobile Learning History. 2010.

- [16] Mobile Learning Update. Learning Consortium Perspectives. 2008. pp. 3, 5–13, 17. Retrieved June 9, 2009.
- [17] Moore, J. (2009). "A portable document search engine to support off-line mobile learning". Proceedings of IADIS International Conference Mobile Learning. Barcelona, Spain.
- [18] Mostakhdemin-Hosseini, A. and Tuimala, J. (2005). Mobile Learning Framework. Proceedings IADIS International Conference Mobile Learning 2005, Malta, pp 203-207.
- [19] Nyiri, K. (2006) Time and Communication in F. Stadler and M. Stöltzner (eds) Time and History: Proceeding of the 28 International Ludwig Wittgenstein Symposium, Kirchberg am Wechsel, Austria 2005.
- [20] Plant, S. (2000): On the Mobile. The Effects of Mobile Telephones on Social and Individual Life. <http://www.motorola.com/mot/documents/0,1028,333,00.pdf>
- [21] Rose, Frank. "PIED PIPER ON THE COMPUTER". The New York Times. Retrieved 8 November 1987.
- [22] Savill (2010), Mobile learning in practice: Piloting a mobile learning teachers' toolkit in further education colleges. C.Savill etc..p8
- [23] Saylor, Michael (2012). The Mobile Wave: How Mobile Intelligence Will Change Everything. Perseus Books/Vanguard Press. p. 176. ISBN 978-1593157203.
- [24] Sharma, S.K. and Kitchens, F.L. (2004). Web Services Architecture for M-Learning. Electronic Journal on E-Learning Volume 2, Issue 1:203-216
- [25] Sharples, M. (2000). "The design of personal mobile technologies for lifelong learning". Computers & Education **34** (3-4): 177–193. doi:10.1016/S0360-1315(99)00044-5.
- [26] Singh, Mandeep (2010). "M-Learning: A New Approach to Learn Better". International Journal of Education and Allied Sciences **2** (2): 65–72.
- [27] Sørensen, C., L. Mathiassen, & M. Kakihara (2002): Mobile Services: Functional Diversity and Overload, presented at New Perspectives On 21st-Century Communications, May 24-25, 2002, Budapest, Hungary.
- [28] Wireless Coyote Wayne C. Grant. (1993). Wireless Coyote: A Computer-Supported Field Trip, Communications of the ACM - Special issue on technology in K–12 education, Volume 36 Issue 5, May 1993, 57-59