THE CURRENT PERSPECTIVES, THEORIES AND PRACTICES OF MOBILE LEARNING

Nilgun Ozdamar KESKİN
Anadolu University
nozdamar@anadolu.edu.tr

David METCALF, Ph.D.
University of Central Florida
dmetcalf@ist.ucf.edu

ABSTRACT
Mobile learning (m-learning) is a highly popular multidisciplinary study field around the world. It has attracted a great deal of attention from researchers in different disciplines who have realized the potential to apply mobile technologies to enchance learning. Thus, mobile learning has been defined differently by different people. This study is a review of m-learning literature for understanding and discussion of current perspectives and theories in mobile learning. Additionally, some m-learning practices that are implemented in different sectors such as corporate, university and military have been mentioned.
Keywords: Mobile learning, m-learning theories and m-learning practices

INTRODUCTION

Mobile devices are commonly used all around the world. In some countries, mobile devices are much more widely used than computers. For instance, people in Kenya are able to use mobile devices everywhere to access the internet, check e-mail, make phone calls, send SMS messages, etc. Mobile learning has come to people's attention because mobile devices are portable, ubiquitous, easily accessible and used by many people. This situation shows that there is great potential to enchance learning with mobile devices.

Mobile Learning Perspectives

Mobile learning (m-learning) is defined differently by different people. Early perspectives of m-learning were focused on technology, and defined as the delivery of training by means of mobile devices such as mobile phones, PDAs and digital audio players, as well as digital cameras and voice recorders, pen scanners, etc. For example, MoLoNET (2007) defined it as "The exploitation of ubiquitous handheld technologies, together with wireless and mobile phone networks, to facilitate, support, enhance and extend the reach of teaching and learning." Another view of m-learning focuses on mobility. Keagen (2005) suggests that m-learning should be restricted to learning on small and portable devices. According to him, mobile devices could be carried everywhere. For example, a lady can carry in her handbag or a gentleman can carry in his pocket. So this definition also relates to a technocentric perspective because of concentrating on the size of mobile devices.

Some researchers characterise mobile learning as an extension of e-learning. For instance, Kadirire (2009) defines m-learning as a form of e-Learning, which can take place anytime, anywhere with the help of a mobile communication device such as a mobile phone, a personal digital assistant (PDA), iPod or any such small portable device. But new mobile learning perspectives accept m-learning as a paradigm change. One of these perspective is the learner-centred perspective. It asserts that m-learning is any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning opportunies offered by mobile technologies (O' Malley et al, 2003). The other perspective focuses on individualism. According to this perspective, m-learning is defined as any activity that allows individuals to be more productive when consuming, interacting with, or creating information, mediating through a compact digital portable device that the individual carries on a regular basis, has reliable connectivity, and fits in a pocket or purse (Wexler et al, 2008). There are some researchers who associate m-learning with ubiquitous learning, as well (Ng et al, 2009).

Finally, there are many different m-learning perspectives in the related literature. Each definitions focus on the different features such as mobile technologies, mobility, indvualism, ubiquitous, or e-learning.

Mobile Learning Theories

Current mobile learning theories are Behaviorism, Cognitivism, Constructivism, Situated Learning, Problem-Based Learning, Context Awareness Learning, Socio-Cultural Theory, Collaborative Learning, Conversational Learning, Lifelong Learning, Informal Learning as well as Activity Theory, Connectivism, Navigationism, Location-based learning,. All of these theories will be discussed in Table 1.

Table 1. Mobile Learning Theories

Theories	**Definitions**	**Focus**	**Examples with mobile technologies**
Behaviorist Learning	Learning has occured when learners evidence the appropriate reinforcement of an association between a particular response and stimulus (Smith and Ragan, 2005)	**Information and content delivery in mobile learning** Language learning: Test, practices, quiz, listening-practice speaking Drill and feed back: Mobile Reponse System Content delivery by text messages.	English learning applications *SMS, MMS, Voice recorder softwares* Mobile Response System: *Qwizdom, Turning Point Response System* *Tell me tech. (searching)*
Cognitivist learning	Learning is the acquisition or reorganization of the cognitive structures through which humans process and store information (Good and Brophy, 1990)	**Information and content delivery in mobile learning** Using Multimedia learning (Dual code, Cognitive Load Theory): Images, audio, video, text, animations	Multimedia (text, video, audio, animation, images) *SMS, MMS, e-Mail* *Podcasting* *Mobile TV*
Constructive learning	Learning is an activity process in which learners construct new idea or concepts based on their current and past knowledge (Bruner, 1966)	**Context and content-dependent mobile learning** Questions for Exploration Cases and examples Problem solved and Decision making applications Multiple representations Authentic contexts based information database **Collaboration and interaction in mobile learning** Collaboration and interaction between students Comunication via mobile phones	Handheld games Simulation Virtual reality Interactive Podcasting and SMS Interactive mobile TV and SMS
Situated learning	Learning is not merely the acquisition of knowledge by individuals, but instead a process of social participation (Brown et all, 1989).	**Social Context and Social participant dependent mobile learning** Authentic domain activity Collaborative social interaction Cooperative activities Expert modeling Situated mentoring Workplace learning	Natural science learning Medical education Multimedia museum Virtual experts by artificial intelligence tech. Mobile performance support system
Problem-based learning	Learning aims to develop students' critical thinking skills by giving them an ill-defined problem that is reflective of what they would encounter as a practicing professional (Koschmann et all, 1996)	**Problem based context and solved based content-dependent mobile learning** Problems – Solutions Case centred activities Collaborative social interaction	Medical education Business administration Nursing *Simulations* *SMS* *MMS* *Voice responde systems*
Context awareness learning	Context awareness means gathering information from the environment to provide a measure of what is currently going on around user an the device (Naismith et all, 2004)	**Context aware in mobile learning** Context-dependent content management Contextual event notification Context-aware communication Navigation and retrieval of learning materials User interface adapted according to time and location contexts	Multimedia museum and gallery Pre-class podcasts *Films* *e-books* *Podcasting*
Socio-cultural	Learning occurs first through	**Social Context and Social**	Mobile performance support

theory	interpersonal (interaction with social environment) than intrapersonal (internalization) (Vygotski, 1978).	**participant dependent mobile learning** Mobile experts Community of practice Workplace learning Mobile communication	system Virtual experts Mobile forum, E-mail Social network (Web 2.0 tools)
Collaborative learning	Learning is promoted, facilitated and enhanced by interaction and collaborations between students.	**Collaboration and interaction dependent mobile learning** Actively participation Social context Communication between peers via mobile phones.	Mobile Assisted Language Learning Mobile Response System Mobile computer supported collaborative learning *Forum, Web 2.0 tools, e-mail, mobile portal, games*
Conversational learning	Learning is in terms of conversations between different systems of knowledge (Sharples, 2002).	**Interaction and communication dependent mobile learning** Solving a problem Exploring an environment Communication between peers via mobile phones.	Laboratory classes Field trip Mobile computer supported collaborative learning *Calling, Interactive Voice Respond (IVR)*

Lifelong learning	Learning happens all the time and is influenced both by our environment and the particular situations we are faced with (Sharples, 2000).	**Lifelong information and interaction with education content in mobile learning** Podcasting Information resources Mobile web site	Social networks (Blogs, Wikipedia, Twitter, Youtube) Podcast E-mail Mobile Forums
Informal learning	Learning is a process of learning that occurs autonomously and casually without being tied to highly directive curricula or Instruction (Vavoula, 2004)	**Information and interaction with education content in informal mobile learning setting** Mobile information resources Mobiles in a museum setting Field Trips Science Field Work	Social networks (Blogs, Wikipedia, Twitter, Youtube) Podcast E-mail Mobile Forums
Activity theory	Learning occurs with three features-involving a subject (the learners), an object (the task or activity) and tool or mediating artefacts and human behaviour is situated within a social context that influences their actions (Vygotsky, 1987).	**User actions in social context dependent mobile learning** Actively participation Social context Activities	Museum Art Gallery exhibit via SMS, polls, calling Mobile Games Multimedia
Connectivism	Learning is process of connecting specialized nodes or information sources (Siemens, 2004).	**Diversity of information sources in mobile learning** Connecting specialized nodes Information sources Facilitate continual learning environment Knowledge management activities Decision-making	Social networks (Blogs, Wikipedia, Twitter, Youtube) Podcast E-mail Mobile Forums Diccussion Platforms Podcasting
Navigationism	Learning is a process of connecting specialized nodes or information sources (Brown, 2005).	**Complex of information sources in mobile learning** Connecting specialized nodes Information sources Facilitate continual learning environment Knowledge management activities Decision-making Manage information (identify, analyse, organize, classify, assess, evaluate, etc.) Sense making and chaos management.	Social networks (Blogs, Wikipedia, Twitter, Youtube) Podcast E-mail Mobile Forums Diccussion Platforms Podcasting
Location based Learning	Location-based learning holds promise for just- in-time learning tied to a student's physical location (Johnson et all, 2009)	**Location context in mobile learning** Conceptual knowledge Conceptual application Constructive environment Partnership with location Immersive activities	Field trips Archaeology studies Location based game Virtual world *Google Map, GPS, RFID, network triangulation*

Current Mobile Learning Practices

In this part, it will be given some current mobile learning applications developed by METIL LAB (Mixed Emerging Technology Integration Lab) in the Institute for Simulation & Training in University of Central Florida which is a world-leading center for the development, demonstration, and utilization of interactive and virtual systems for simulating operational environments and for training personnel who will utilize specific

equipment and systems in those environments. METIL produces mobile learning application and provides mobile learning research and development expertise for the public, private, and social sectors.

- **Johnson & Johnson**

The Johnson & Johnson PRD 3D University is a virtual world onboarding system for Johnson & Johnson, allowing constant new employee training and orientation from all locations worldwide while fostering communication among the employee base. Employees can launch corporate learning materials and exercises, get help from HR personnel and collaborate with colleagues across the globe. METIL continues to provide consultation and development services for PRD 3D University, along with mobile, simulations, and Web 2.0 techniques and products to help connect and streamline processes for Johnson & Johnson's global workforce.

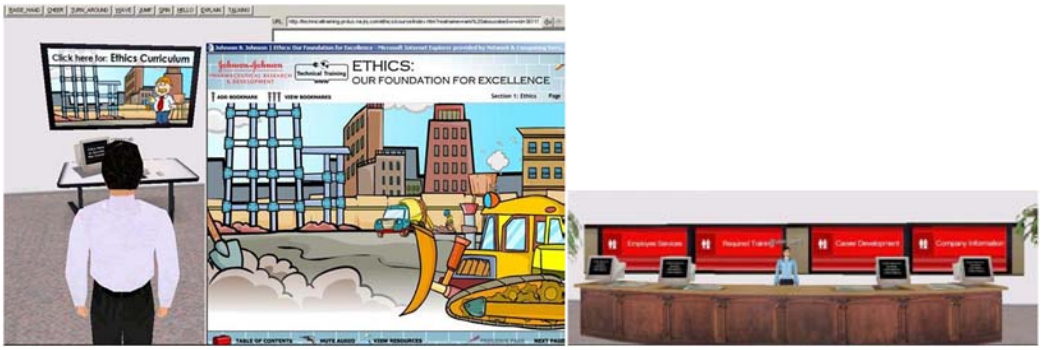

Figure 1 - Johnson & Johnson's project

- **Microsoft Mobile Course and IVR Sales Materials**

As smart phones become more common and mobile web browsing improves, the need for mobile access to learning and training materials is more in demand and has greater impact for business professionals. METIL took Microsoft's existing web courses and created a SCORM-compliant mobile web template. This allows the content from Microsoft's web courses to be easily repurposed (requiring only some modifications to media assets) for mobile access with full progress tracking and scoring.

Sales professionals in particular have a strong need for on-demand, mobile access to refresher materials on their product line. Driving, however, provides challenges to many methods of delivering mobile content, such as apps or mobile web access, due to limiting ability to look at the device's screen; this is especially true now due to stricter hands-free laws in many states. In order to allow simple, hands-free access to sales data, we developed a voice recognition IVR (Interactive Voice Response) system that allows sales professionals to navigate Microsoft's product information library and select audio for listening.

Figure 2- Microsoft Mobile Course and IVR Sales Materials Project

- **My Sports Pulse**

The My Sports Pulse project combines mobile and web technologies, STEM education, and a sports theme to create an innovative approach to bolstering understanding and interest in science and mathematics fields. Students can register with the My Sports Pulse program to receive questions, presented within the context of sports scenarios, about subjects such as physics, nutrition, algebra or geometry. Questions are delivered through

text messages or email, and can also be accessed and answered directly through the My Sports Pulse website. As students answer questions, they earn points in various knowledge areas and build up their own avatar to compete with other students and schools. The My Sports Pulse program has been piloted with several schools inside and outside of the US, with promising results.

Figure 3- My Sports Pulse Project

- **Dream Corp Alternate Reality Game**

Run as a demonstration for Elliot Masie's Learning 2008 conference, the DreamCorp Alternate Reality Game (ARG) provided an introduction to cross-media training and employee onboarding. The game involved several challenges on three different tracks: Compliance, Leadership and Flexible Workforce. Players took on the role of employees at fictional company DreamCorp and worked, sometimes alone and sometimes in cooperation with fellow players, to solve puzzles and complete the assigned challenges. Portions of the game were offered through multiple avenues and media formats: printed materials (e.g. pamphlets and newsletters), emails, text messages, in-person interaction with METIL team members acting as DreamCorp employees, and a bonus task offered in Second Life.

- **Go for the Green**

Go for the Green is a mobile web game, developed for The Willis Organization, that uses a golf theme to reinforce key sales concepts. Nine holes of the golf course are mapped to nine steps in the sales process, with each hole presenting several questions and feedback items related to that particular step. Users attempt to complete the full course by answering all questions and avoiding common "traps" in the sales process. By using streamlined mobile web development rather than creating a specific game application, we are able to deliver this content to a wide range of user devices including iPhone, Blackberry and various Symbian and Windows Mobile platforms.

Figure 4- Go for the Green

CONCLUSION

Mobile learning has a promising future as a field of study. In related literature, there are many different approaches, theories and practices. The current m-learning study field will be more understandable for new researchers if these definitions, approaches and theories are disccussed and linked to concrete mobile learning practices.

REFERENCES

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*, 32-42. http://www.exploratorium.edu/IFI/resources/museumeducation/situated.html

Brown, T.H. (2005). Beyond constructivism: Exploring future learning paradigms. *Education Today*, 2005(*2*). http://www.bucks.edu/IDlab/Beyond_constructivism.pdf

Bruner, J. (1966). *Toward a Theory of Instruction*. Cambridge, MA: Harvard University Press.

Good, T. L., Brophy, J. E. (1990). *Educational psychology: A realistic approach*. (4th ed.).White Plains, NY: Longman.

Johnson, L., Levine, A., & Smith, R. (2009). *The 2009 Horizon Report*. Austin, Texas: The New Media Consortium.

Kadirire, J. (2009). Mobile Learning DeMystified . In R. Guy (Ed) *The Evolution of Mobile Teaching and Learning*. California, USA: Informing Science Press.

Keagen, D. (2005). The Incorporation of Mobile Learning into Mainstream Education and Training. Proceedings of mLearn2005-4th World Conference on m-Learning, Cape Town, South Africa, 25-28 October 2005. Retrieved from November 18, 2008, from: http://www.mlearn.org.za/CD/papers/keegan1.pdf.

Koschmann, T., Kelson, A.C., Feltovich, P.J., & Barrows, H.S. (1996). Computer-supported problem-based learning: A principled approach to the use of computers in collaborative learning. In T.D. Koschmann (Ed.), *CSCL: Theory and practice of an emerging paradigm* (pp. 83—124). Hillsdale, NJ:Lawrence Erlbaum

MoLeNet (2007). What is the mobile learning? Retrieved from October 24, 2009, from: http://www.molenet.org.uk/

Naismith, L. , Lonsdale, P., Vavoula, G. and Sharples, M. (2004) *Mobile technologies and learning*. Retrieved from November 18, 2008, from: http://www.futurelab.org.uk/resources/publications-reports-articles/literature-reviews/Literature-Review203

Ng, W., Nicholas, H., Loke, Seng. & Torabi, T. (2009). Designing Effective Pedagogical Systems for Teaching and Learning with MobileAnd Ubiquitous Devices.In T.T. Goh (Ed). Multiplatform E-learning Systems and Technologies. Mobile Devices for Ubiquitous ICT-Based Education. Hershey –Newyork, USA: Information Science Reference.

O'Malley, C., Vavoula, G., Glew, J., Taylor, J., Sharples, M. & Lefrere, P. (2003). Guidelines for learning/teaching/tutoring/in a mobile environment. Mobilearn project deliverable. Retrieved from February 21, 2009, from: www.mobilearn.org/download/results/guidelines.pdf

Sharples, M. (2000) The Design of Personal Mobile Technologies for Lifelong Learning. *Computers and Education*, 34, 177-193. Preprint available as 211Kb pdf file.

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.

Siemens, G. (2004). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*. Retrieved on November 12, 2006, from http://www.itdl.org/Journal/Jan_05/article01.htm

Smith, P.L., & Ragan, T.J. (2005). *Instructional Design* (3rd ed) . New York: Merill

Vavoula, G. (2004). *KLeOS: A Knowledge and Learning Organisation System in Support of Lifelong Learning*. Unpublished PhD Thesis, University of Birmingham, UK

Vygotsky, L.S. (1978). *Mind and society: The development of higher mental processes*. Cambridge, MA: Harvard University Press.

Vygotsky, L. S. (1987). *Collected works* (Volume 1). New York: Plenum.

Wexler, S., Brown, J. , Metcalf, D., Rogers, D. & Wagner, E. (2008) The e-learning Guild Report Mobile Learning. Retrieved from May 18, 2009, from: http://www.elearningguild.com/research/archives/index.cfm?id=132&action=viewonly