Situated Mobile Learning in Higher Education

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Abstract: This study tried to identify design principles for mobile learning and identify validity of the design principles with case study. The course was designed with five design principles for mobile learning: situated learning, spontaneous and learner-driven learning, customized learning, networked learning, and flexible learning. According to those design principles, the course was redesigned. The results indicated positive. The students positively responded in improvement of formative evaluation skills, improvement of motivation, improvement of interactions among students and between students and professor, and improvement of way of learning. Therefore, the study can infer that design principles were effective for redesigning the course and for future mobile learning.

Introduction

Technology has changed our society. In the area of education technology offers innovative new ways of teaching and learning. However, the development of technology is too fast for educational theories to follow or support it. Therefore, sometimes the technologies are misunderstood and misused in the education field. Mobile learning is a representative example. Mobile learning is a theory that has emerged with the development of wireless technology. However, many researchers have defined mobile learning differently and there are no guidelines or design principles to implement mobile learning in education.

Some researchers have defined mobile learning as learning that uses mobile devices (Brwon, 2005). Others have defined mobile learning as a new way of teaching and learning that allows learners and teachers to access learning resources easily and communicate with each other using various mobile communication devices(Alamaki & Seppälä, 2002; McManus, 2002; Quinn, 2000; Trifonova & Ronchetti, 2003) However, although these definitions emphasize using mobile devices for learning, they fail to identify the unique characteristics of mobile learning. There have been many studies on mobile learning; some case studies have identified the effectiveness of the mobile PC in collaborative learning, immediate feedback, and active communication(Campbell & Rargas, 2003; Konotos, 2001). Other studies show that mobile devices are very effective in collaborative learning (Patten, Sánchez, & Tangney, 2006).Those studies reveal the effectiveness of mobile learning as an educational methodology but do not provide concrete design principles for mobile learning. Without an agreed definition and design principles, mobile learning could be misunderstood and misused.

The purpose of this study is to identify design principles for mobile learning and prove those design principles using a case study. The study reviewed previous literature, drew up design principles and developed a mobile learning course in the higher education environment according to those design principles. We then reviewed the validity of the design principles based on collected data.

The Meaning of Mobile Learning

The meaning of mobile learning differs according to different scholars and there is no agreed definition. Some scholars insist that the existing definitions are insufficient to capture the unique characteristics of mobile learning(Laouris & Eteokleous, 2005; Winter, 2006). The meaning of mobile learning could be categorized in the following four areas(Winter, 2006). First, many studies define mobile learning from a technical viewpoint. This is the dominant definition. This viewpoint defines mobile learning as learning activities that use mobile devices such as PDA, Mobile Phone, and Tablet PC. Second, mobile learning is considered an extension of e-learning. That is, mobile learning is a method of e-learning that uses mobile devices(Milrad, & Perez 2003; Mostakhdemin-Hosseini & Tuimala, 2005; Pinkwart, Hoppe, Quinn, 2000). These two viewpoints emphasize portability and the technical aspects of mobile learning (Traxler, 2005). Third, mobile learning is seen as a challenge to traditional education(Laouris & Eteokleous, 2005; Sharples, 2005). This viewpoint suggests that mobile learning could make traditional classroom teaching obsolete. Fourth, one definition of mobile learning is that it focuses on learner-centered activities(O''Malley, Vavoula, Glew, Taylor, Sharples, & Lefrere; 2003). This viewpoint emphasizes the learners' mobility and the advantages of learning opportunities that mobile technologies provide.

The first definition has too narrow a viewpoint by focusing on technicalities. As for the second viewpoint, some scholars reject the definition of mobile learning as an extension of e-learning. They insist that mobile learning has characteristics distinct from e-learning, defining it as spontaneous, intimate, situated, informal, opportunistic, bite-sized, portable, connected, and personal((Laouris & Eteokleous, 2005; Traxler, 2007). E-learning could co-exist with the objective traditional classroom paradigm, but mobile learning needs a different learning place and time from the traditional classroom. The third and fourth viewpoints emphasize fragmentary aspects of mobile learning. It is necessary to find a definition that is more integrated and encompasses the uniqueness of mobile learning.

This study defines mobile learning with the following criteria.
- Situated learning
- Spontaneous learning and learner-driven learning
- Customized learning
- Networked learning
- Flexible learning

More detailed discussion of those criteria will be described, leading to design principles for mobile learning.

Design Principles for Mobile Learning

Situated learning

.Mobile learning should be highly situated learning. According to the situated cognition theory, human knowledge is developed in authentic activities(Brown, Collins, & Duguid; 1989; Lave & Wenger, 1990). Authentic activities mean ordinary practices of a culture; that is, everyday real life problem solving activities. Learners' mobility and the interconnection of mobile learning construct a learning place (Laouris & Eteokleous, 2005; Alexander, 2004; van 't Hooft, & Vahey, 2007). Anywhere learners stand can be a learning place. Learners can connect from anywhere to learning materials, peers, teachers and other learning resources using mobile devices. Mobile devices can make learning highly context sensitive. Therefore mobile learning should be implemented with authentic tasks in authentic contexts. From situated learning, the following specific design principles can be drawn.

Spontaneous and learner-driven learning

Real life problems are intrinsically interesting to learners. As described above, mobile learning provides authentic tasks and authentic contexts. Therefore, the learning task can be more relevant to learners' personal goals and learners will participate in learning activities more actively and spontaneously in mobile learning(Cook, Bradley, Lance, & Smith; 2007; Fryer, 2006; Laurillard, 2007).

Customized learning

Mobile learning should be learner-driven learning. Therefore, it should meet learners' needs, such as learning goals, learning content, learning methods, and learning media. It should be personalized learning rather than individualized learning. It should satisfy not only learners' knowledge but also their personal emotion.

Networked learning

Mobile technologies make a new networked learning space(Kim, S., 2007; Kim, W.,2007; van 't Hooft, & Vahey, 2007). In the case of e-learning, learners have to move to a physically fixed place to access a network. However, learners can access a mobile network anytime and in any place with mobile devices. Learners are always connected even though they are moving. This kind of mobile network changes asynchronous interaction to synchronous interaction(Kim, S., 2007; Kim, W.,2007) and enhances interconnectivity and collaboration(Nicol & MacLeod, 2005; Patten et al., 2006; van 't Hooft & Vahey, 2007; Trimmel & Bachmann, 2004; Zurita, & Nussbaun, 2004) among learners, between learners and teachers, between learners and information, between learners and experts. The mobile network also enhances the telepresence of peers and teachers, which contributes to increased interaction and learning effectiveness (Lee, 2004)

Flexible learning

Mobile technologies can form a bridge between the classroom and the real world, formal and informal education, public and private space, and individual and social learning(Laouris, Y., & Eteokleous, 2005; Traxler, 2005). Thus, mobile learning can be implemented very flexibly. Mobile learning should not be constrained by certain pedagogical theories. Mobile technologies allow learners to switch easily between individual work and collaborative work, to move both in and outside of classroom, with access to people and other resources. Therefore, mobile learning should use very creative learning models and theories. Teachers need more flexible roles. Learning content could be of any kind of form. Students should play various roles.

Case study of Mobile Learning

Course description

The course was for undergraduate students. There were two classes and 59 students. The course teaches educational technology. The task in mobile learning is to make a formative evaluation of multimedia learning materials that the students developed by themselves.
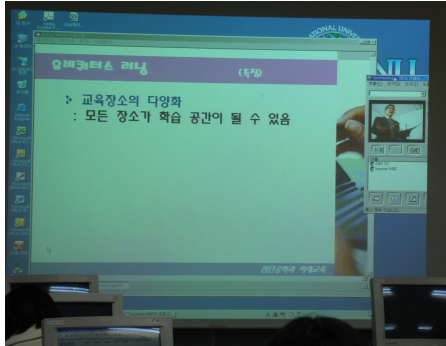
Course redesign for mobile learning

The course was redesigned in many aspects.

- Instructor-centered lecture was changed to student-centered action learning. According to the design principles for mobile learning, learner-driven learning was incorporated.

- The goals of course were changed from classroom knowledge to context sensitive knowledge. To learn the process of formative evaluation of designed materials, the professor needed to observe students' formative evaluation processes with subjects and provide real-time feedback, because the processes are very context sensitive. In the previous course, the professor could provide feedback not for evaluation processes but just for results of evaluation. The main dissatisfaction that students had with the previous course was that they did not get feedback for their working processes. Mobile learning allowed the professor to connect to students' private working processes and interact synchronously. The situated learning principle and customized learning principle were applied to achieve the course goals.

- The course changed from classroom-based learning to integrate both inside and outside classroom learning. One of the student teams left the classroom and moved around the university campus. The team conducted the formative evaluation with their friends on campus and broadcast the activities synchronously to the classroom. The professor observed the team's activities and provided immediate and adaptive feedback or corrections for incomplete implementation. Other classmates observed interactions between the professor and the team, and learned vicariously. The principles of flexible learning and networked learning were applied.

Mobile Technology

The main mobile device used was the Wireless Tablet PC. The Wireless Tablet PCs allowed students to move around a campus that has many other users. They made every campus area a learning space. To broadcast students' activities to the classroom synchronously, a videoconferencing program (NetMeeting) was used. The Wireless Tablet PCs also made multimedia communication possible. Students got handwritten feedbacks and/or annotations on the developed design prototypes from users with pen-based input systems. The Wireless Tablet PCs made a distributed peer collaboration environment possible through these multimedia communication and sharing systems.

<Figure 1> Video conferencing

<Figure 2> Peer collaboration

Results of Mobile learning

To identify the effectiveness of mobile learning, the study developed a questionnaire. The questionnaire contained four categories: improvement of formative evaluation skills, improvement of motivation, and improvement of interactions among students and between students and professor, and improvement of way of learning. The study also conducted one-to-one interviews with the students and the professor to get their qualitative feedback.

The results indicated 3.80 for improvement of formative evaluation skills; 4.0 for improvement of motivation; 3.77 for improvement of interactions among students and between students and professor; and 3.92 for improvement of way of learning(for an average of 3.0 on a scale from 1 to 5). The students reported positive responses for all categories.

Improvement of motivation gained the highest score among the categories. Interview results were positive for all four categories. In particular, the students reported that mobile learning was very interesting because it is a new way of learning. The students were also satisfied with the professor's live and adaptive feedbacks on very context sensitive problems that they confronted during the formative evaluation. The professor reported some unanticipated technical problems in implementing mobile learning, such as delayed data transfer and hang-up of the program.

Conclusion

This study has tried to identify design principles for mobile learning and to identify the validity of the design principles with a case study. The course was designed with five design principles for mobile learning: situated learning, spontaneous and learner-driven learning, customized learning, networked learning, and flexible learning. According to those design principles, the course was redesigned. The course adopted student-centered action learning and taught context sensitive knowledge. The professor observed the team's formative evaluation processes and provided immediate and adaptive feedback or corrections for inaccurate implementation. Mobile learning afforded the professor the ability to connect to students' private working processes and to interact synchronously. The Wireless Tablet PCs made a distributed peer collaboration environment possible through multimedia communication and sharing systems.

The results were positive. The students responded positively in terms of improvement of formative evaluation skills, improvement of motivation, improvement of interactions among students and between students and professor, and improvement of way of learning. Therefore, the study can conclude that the design principles were effective in redesigning the course and can be useful for future mobile learning.

References

Alamäki, H. & Seppälä, P. (2002). Experimenting with Mobile Learning in a University Environment.. The 2002 World Conference on E-Learning in Corporate, Government, Healthcare, & Higher Education, Quebec, Canada, 67-74.

Alexander, B. (2004). Going nomadic: Mobile learning in higher education. *EDUCAUSE Review, 39*(5), 29–35.

Brown, J. (2005). *Mobile industry status-where we are and where we are going*. Training 2005 Conference. New Orleans, Louisiana, 216.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated Cognition and the Culture of Learning. *Educational Researcher*; 18(1), 32-42.

Campbell, A. B., & Pargas, R. P. (2003). *Laptops in the classroom*. The 34th SIGCSE technical symposium on Computer science education, Reno, NV, 98-102.

Cook, J., Bradley, C., Lance, J., & Smith, C. (2007). Generating learning contexts with mobile devices. In: Pachler, N. (Ed.), Mobile learning: towards a research agenda. London: WLE Centre, IoE. From http://www.socialscience.t-mobile.hu/2005/Sharples_final.pdf

Fryer, W. (2006, June 14). Digital kids, school relevancy, poverty, and school reform. *Moving at the speed of creativity.* From http://www.speedofcreativity.org/2006/06/14/ digital-kids-school- relevancy-poverty-school-reform/ .

Kim, S. (2007). *Homo mobilicus: Cultural ecology of mobile media*. Seoul, Korea: Samsung Economy Institute.

Kim, W. (2007). *Mobile revolution*. Seoul, Korea: DaZili

Kontos, G. (2001). The laptop university: A faculty perspectives. *AACE Journal, 9*(1), 32-47.

Laouris, Y., & Eteokleous, N. (2005). *We need and educationally relevant definition of mobile learning*. The 4th world conference on mLearning, Cape Town, South Africa. From http://www.mlearn.org.za/CD/papers/Laouris%20&%20Eteokleous.pdf

Laurillard, D. (2007). Pedagogical forms for mobile learning. In: Pachler, N. (Ed.), Mobile learning: towards a research agenda. London: WLE Centre, IoE. From http://www.socialscience.t-mobile.hu/2005/Sharples_final.pdf

Lave, J., & Wenger, E. (1990). *Situated Learning: Legitimate peripheral participation*. Cambridge, UK.: Cambridge University Press.

Lee, J. (2004). *Mobile media and mobile society*. Seoul, Korea: Communication Books Inc.

McManus, T. (2002). Mobile What? The Educational Potential of Mobile Technologies. The 2002 World Conference on E-Learning in Corporate, Government, Healthcare, & Higher Education, Quebec, Canada, 1895-1898

Mostakhdemin-Hosseini, A., & Tuimala, J. (2005). *Mobile Learning Framework*. The IADIS International Conference Mobile Learning 2005. Qawra, Malta, 203-207.

Nicol, D. J., & MacLeod, I. (2005). Using a shared workspace and wireless laptops to improve collaborative project learning in an engineering design course. *Computers and Education, 44*(4), 459-475.

O'Malley, C., Vavoula, G., Glew, J.P., Taylor, J., Sharples, M., & Lefrere, P. (2003). *Guidelines for Learning/Teaching/Tutoring in a Mobile Environment*. From www.mobilearn.org/results/results.htm.

Patten, B., Sánchez, I., & Tangney, B. (2006). Designing Collaborative, constructionist and contextual applications for handheld devices. *Computers and Education, 46*(4), 294-308.

Pinkwart, N., Hoppe, H. U., Milrad, M., & Perez, J. (2003). Educational scenarios for cooperative use of Personal Digital Assistants. *Journal of Computer Assisted Learning, 19*(3), 383-391.

Quinn, C. (2000). *m-Learning: Mobile, Wireless.* In-Your-Pocket Learning. LiNE Zine. From http://www.linezine.com/2.1/features/cqmmwiyp.htm

Sharples, M. (2005). Learning as conversation: Transforming education in the mobile age. Conference on Seeing, Understanding, Learning in the Mobile Age. Budapest, Hungary. 147-152.

Traxler, J. (2005). *Defining Mobile Learning*. The IADIS International Conference Mobile Learning 2005, Malta, 261-266.

Traxler, J. (2007). Defining, Discussing, and Evaluating Mobile Learning: The moving finger writes and having writ…. *International Review of Research in Open and Distance Learning, 8*(2), 1-12.

Trifonova A., & Ronchetti M. (2003). Where is mobile learning going? *E-Learn 2003 Conference*, Phoenix, Arizona, 1794-1801.

Trimmel, M., & Bachmann, J. (2004). Cognitive, social, motivational and health aspects of students in laptop classroom. *Journal of Computer Assisted Learning, 20*(2), 151-158..

van 't Hooft, M., & Vahey P. (2007). Introduction to special issue on highly mobile computing. *Educational Technology, 47*(3), 3-5.

Winter, N. (2006). What is mobile learning? In M. Sharples (Ed.). *Big issues in mobile learning*. University of Nottingham.

Zurita, G., & Nussbaum, M. (2004). Computer supported collaborative learning using wirelessly interconnected handheld computers. *Computers and Education, 42*(3), 289-314.