Mobile Learning: Current Trend and Future Challenges

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Abstract

Due to the thrive of mobile network and portable device, distance learning is evolved from desktop computer to mobile device. Mobile Learning is the use of mobile or wireless devices for learning while the learner is on the move. In this study, the strengths of mobile learning supported by industrial and academic projects are elaborated. These also mark the current status of mobile learning. On the basis of the characteristic and scenario of current mobile learning, challenging issues from the perspective of cognitive learning are addressed to reflect the fundamental needs for effective mobile learning. These addressed issues serve as the initiation for the needs of academic evaluation and solid theoretic framework for the implementation of mobile learning from the view of cognitive science, instead of technological evolution.

1. Introduction

Just like the relationship between e Learning and classroom instruction, the development of mobile learning is not intended to replace the classroom learning, but to enhance the value of wireless communication network. In fact, mobile learning offers another way to deliver content and to embed learning into daily life. The learning materials need to be developed in a small, consumable bytes of format, which can be delivered through wireless network. Hence, the fundamental belief of mobile learning is not to convert all PC-based learning content into a mobile format, but to consider how the mobile devices can be used to strengthen and harmonize overall learning strategy.

A similar argument is made by Advanced Distributed Learning (ADL), which is an organization defined specifications to enable the interoperability, accessibility and reusability of Web-based learning content. Regarding the discussion in the field of Mobile Learning, the concept of "Performance Aiding" (also called Performance Support) is also proposed by ADL. Performance Aiding is one of the approaches being used to support the transformation in improving human user-centered design of equipment and even the replacement of the human role through automation, as well as the new technology for job performance such as personal digital assistants, tablet PCs, so-called wearable PCs, wireless networks, and so on. ADL is investigating the application of these technologies in a manner that is consistent with the SCORM interoperability model.

Moreover, the feasibility of mobile learning can be justified from the perspective of devices and market trends. The manufacturers are now offering various Personal Digital Assistants (PDAs), cell phones and hand-held computers. A significant number of employees are already using these mobile devices to access e-mail, search the World Wide Web (WWW), read the news, access company documents, and organize personal calendars. Meanwhile, academic projects are also launched to promote pedagogical activities on campus [1]. These handhold devices now have the capabilities of connectivity and features to support learning activities. In short, the convergence of enterprise applications and wireless devices opens the doors to mobile learning.

Furthermore, recent advanced features in mobile learning, such as streaming video, color-display screens, Internet browsers and compatibility with desktop applications, make mobile learning not only possible, but practical. Companies have the opportunity to rethink how employees can use their hand-held devices to enhance productivity. Also, universities are utilizing such mechanism to improve their curriculum design. The overall advantages provided by the mobile learning are more flexible, accessible and personalized learning activities. Such advantages are hoped to keep the learners engaged in ongoing learning activities and enhance their productivity and effectiveness.

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2. Current projects

Since mobile learning is treated as one important service provided by global and local organizations, various projects are launched to pursue different goals. They will be introduced in the following section.

2.1 Non-academic projects

In Europe, the European Commission supports two mobile learning projects: MOBIlearn(http://www.mobilearn.org/) and m-Learning, which are part of the Learning Citizen Cluster (http://www.learningcitizen.net/). MOBIlearn is an European-led research and development project in using advanced mobile technologies to explore context-sensitive approaches for mobile learning. For example, one of the missions is to improve the information access through mobile communication network for workers to update their knowledge anywhere anytime, or visitors to improve the cultural experience in a museum. The m-learning Project is concerned with the development of products and services to attract unemployed or homeless young adults who do not taking part in formal education, and aims at improving their literacy and mathematics.

In Taiwan, the government is also carrying out the so-called m-Taiwan (mobile Taiwan) project (http://www.communication.org.tw/front/index.asp), which implements the mobile communication technologies to achieve two major goals. The first one is to create new services and enrich the lives of Taiwan citizens. Meanwhile, it also intends to promote the competition capability of Taiwan service industry as the second goal. Within the project, mobile learning is identified as one of the three pursued domains. It integrated the industry of manufacture of handhold device, the mobile network manufacture, the system integration vendor, and the service developer and provider into an industrial chain, which is led by the government to synthesize the overall resources and promote Taiwan global competition vantage. According to these on-going projects, mobile learning is seemed to be a booming industry sector, and represents its evolution factor in addition to the issue of learning itself.

2.2 Academic projects

With regard to academic projects, Chen and his colleagues build a bird watching learning platform based on the proposed unique characteristics held by the mobile learning environment [2]. These characteristics include urgency of learning need, initiative of knowledge acquisition, mobility of learning setting, interactivity of the learning process, situating of instructional activity, and integration of instructional content. Such learning system uses the mobile communication network to provide environment-oriented learning materials to arouse learner's interest. In addition, it also forms an interaction interface among the instructor, the expert, and the learners for bird-watching and bird-searching.

As Chen et al presented a mobile learning system for scaffolding learners' learning about bird-watching, this system is proclaimed two purposes. The first one is to evaluate the possible roles and aids offered by mobile learning system in a field learning environment, which is bird-watching activities. The second one is to investigate the benefit provided by mobile learning system based on its natural characteristics: mobility, portability, and individualization.

As for laboratory courses, which rely heavily on hand-on learning to create cognitively meaningful experience for learners, the implementations are treated as the least possible courses can be offered over the Internet. Such challenge is being overcome by Porter and Morgan at Texas A&M University [3]. They evaluated the available mature technologies and chose an appropriate course content to realize the mobile learning for hand-on laboratory learning activity.

According to their project, Porter and Morgan also point out the issues of the enabling technologies for mobile learning of an academic laboratory course is not just the combination of the mobile communication networks and handhold devices. In addition to the wireless local area network (WLAN) which provides access to the Internet, and Personal Assistant Device (PDA) which replaces the computer for interaction between learner and learning material, two more technologies are adopted. They are the interfacing technology for program download and remote control, and the real time development module for learners to verify their experimental program codes. Conclusively, the laboratory learning is achievable with the integration of wireless networking capability and real time data acquisition and control system. Furthermore, the web camera technology is proposed to simultaneously monitor the execution of experiment in the remote laboratory by Porter and Morgan. The above projects provide the evidence that mobile learning can be more successful with the integration of learning resources and other advanced technologies.

3. Current communication mechanisms & scenario of mobile learning

Various mobile communication mechanisms support versatile strength for mobile learning, and three of them are elaborated here. The first one is the voice communication, and it provides this essential means of communication between learners, and between tutor and learners for support and collaborative purposes. The second one is to access the learning portal in the Internet, where the learning management system provides lean content to support the continuity of learning activities. The third one is learning through text messaging (Short Message Service, SMS). The instructors can send reminders and alerts to students as a powerful way to support their students and help to keep them on the right learning track. The SMS can also be sent as a daily message to learners as a daily dose of learning.

One of the practical examples in SMS is executed by the British Broadcast Company, who has joined forces with China's leading media and internet services company, Sina, to launch a unique English learning service through the SMS. Moreover, advanced mobile phones can support multimedia messaging service (MMS), which incorporates an color image or video clip within the message. MMS opens up additional mechanism can be utilized by the mobile learning service.

An application of current mobile learning scenario is provided here to show the advantages of mobile learning. In the retail store, training new staff is time consuming and costly; however, well-trained employees is crucial to the custom satisfaction. To address the training issues, the retailer may use the mobile learning system to train new sales associates. Traditionally, new employees spend several hours in a back office reading a binder or accessing a web learning portal to study various products, which are not in front of the trainee, and there are usually hundreds of products to be understood and memorized. If the store utilizes the mobile learning mechanism by equip the sale associates with a hand-held PDA and bar code scanner, employees can start and finish their training on the sales floor where the products are shelved. During down time, employees find a product, scan a bar code, and take a minute-training in front of the product.

In addition, equipped with portable devices, the employees can do learning when servicing a customer. When a customer expresses interest in two products and asks about their differences, the sales associate scans the bar codes of the two products, observes their differences, and assist the customer make a decision. Meanwhile, the employer can introduce new products, and improve the quality of the customer relationship. The mobile learning mechanism makes client-facing sale teams well informed and more responsive to client needs.

4. Discussion: future challenges

Nowadays, mobile learning has been employed in various fields, it still faces several challenges for its future development. It is well understood that the success of nowadays companies is directly linked to the skills, abilities, and performance of individual employees and groups of employees working together. These employees include mobile workers, representing a growing segment in the developed nations. In addition, they often drive top-line performance of companies. Hence, the use of mobile learning in addressing the training need for their performance support is urgent and will grow.

In addition to the technology issues, such as the convergence of wireless infrastructure with handheld devices, the smoother delivery of learning content, and the innovations in content creation, this study will discuss some cognitive challenges of mobile learning.

The first challenge originates from the concept of adaptive learning, where the instructional strategies and learning content should be designed to adapt to learner's profile and personal needs. Since the wireless network enable the learners to be engaged into the learning anytime anywhere. The learner may pursue learning at any locations, where the learners hold various mood and motivation. Under such circumstance, the learners' location should be taken into consideration for the design of adaptive learning. For examples, if a learner requests for the topic of the third generation (3G) wireless network while he is at the subway, the adequate learning content for the learner might be the definition for such terminology. However, if the same request is submitted by a learner in the library, the replied message should include advanced reference for such terminology.

The second challenge is the limited text display in support the learning. An exploration of methods need to be done; hence, the communication technology can support the learning content in guiding learners to be involved in active learning process without the support of rich or multiple external representations for providing the cognitive functions of complement, constrain, and construct [4]. Therefore, the mobile learning should play a supportive role in providing continuous learning activity during the learning

courses, or a self-clear and stand alone learning module. For example, spacing multiple opportunities of studying, learning, and being tested on the learning subject over time is a powerful method of enhancing learning performance [5]. Mobile learning can extend such opportunity from the instructor's lecture to the learner's daily life.

The last challenge is due to the characteristic of instant communication in mobile network. For the issue of cooperative learning over the Internet, the web learning not only supports better academic interaction among learning peers, but also provides individual learners with higher satisfaction. The related factors are the location and response time. Location means where the learners use their computers to access the web learning. Tu and McIsaac stated that learners have the senses of privacy, relaxing atmosphere, and familiarity with their personal computers, and greater control and flexibility of their own schedules [6]. As to the second issue of response time, it is also critical to the asynchronous mode of cooperative learning. If the message sender did not receive the comment within the expected time frame, he might feel frustrated and perceive less social presence, which in turn resulting in less engagement in learning. Such problem can be solved by mobile communication network by utilizing the prompt notifications of message reception. That is, the learning management system or personal email server can send SMS to notify the learner upon the receiving of specific email. From this perspective, this prompt interaction among learning peers will benefit the learners in building their positive social presence. However, the overall evaluation of such instant notification mechanism should be conducted to fully understand its effect upon the learning interaction among instructor, peers, or invited exporters over the Internet.

5. Conclusion

With the evolution of computer network and wireless network technologies, the learning has evolved from face-to-face learning, distance learning, to mobile learning. It is also clear from this study that one of the factor fostering the evolution is not the learning itself; instead, it is the service needed for utilizing the mature information technologies and wireless networks. Organizations utilize the mobile learning to support employee's training needs and enhance their business vantages. With the assertion in place, a new world of content delivery and communication will empower organizations to create a competitive workforce. The learner uses various access terminals and wireless networks to interact with the instructor, learning content, and peers to construct the fundamental interaction relationships [7]. Under such learning scenario, the design of instructional strategies is believed to be deeply affected by the implemented wireless communication technologies.

With regard to the understanding of how people learn, the progression of behaviorism, cognitive science, and constructivism serves as the foundation in guiding the migration of implementing technologies in learning and, thereafter, distance learning. Nowadays, the feasibility of mobile learning is proved conceptually in this study by quoting non-academic and academic projects, and the developing trend of industry in information technologies and communication networks. However, these technologies only provide interactive mechanism among the learners, the instructors, and the learning material, and the effective learning should only happen when the learner is engaged actively and cognitively in the learning activities.

With such understanding, this study proposes three cognitive concerns in implementing the mobile communication mechanism for learning. They are location oriented learning content, cognitive effectiveness of information, and effect of instant interaction upon learning interaction. It is for sure that further studies are needed to clear these issues by making solid theoretical framework and provide practical guideline for curriculum developers, programmers, and education administrators to follow.

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