Chapter 8.10
Mobile e–Learning for Next Generation Communication Environment

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ABSTRACT

This article develops an environment for mobile e-learning that includes an interactive course, virtual online labs, an interactive online test, and lab-exercise training platform on the fourth generation mobile communication system. The Next Generation Learning Environment (NeGL) promotes the term "knowledge economy." Internetworking has become one of the most popular technologies in mobile e-learning for the next generation communication environment. This system uses a variety of computer embedded devices to ubiquitously access multimedia information, such as smart phones and PDAs. The most important feature is greater available bandwidth. The learning mode in the future will be an international, immediate, virtual, and interactive classroom that enables learners to learn and interact.

INTRODUCTION

The development of new approaches and technologies to support distance learning are undergoing now. In particular Web-based and mobile asynchronous learning environments and virtual classrooms via the Internet have been adopted widely. Static information as an instructional delivery method is the current trend in e-learning. Learners using these kinds of conventional learning methods are only able to browse through the mass static information. This is passive learning by reading online.

In the last decade, technologies enabling e-learning have increased learning location flexibility. Wireless communication technologies further increase the options for learning location. Advances in wireless communication technologies have provided the opportunity for educators

to create new educational models. With the aid of wireless communication technology, educational practice can be embedded into mobile life without wired-based communication. With the trend in educational media becoming more mobile, portable, and individualized, the learning form is being modified in spectacular ways (Gang & Zongkai, 2005).

In the third generation cellular system (3G) environment (such as Universal Mobile Telecommunications System, UMTS), the data rate reaches 2Mbps while the user is standing and 384Kbps while the user is moving slowly. Multimedia streaming, video conferencing, and online interactive 3D games are expected to attract increasing numbers of users. Such bandwidth is not sufficient for these increasingly popular applications and would be the major challenge for wireless networks. The 3G bandwidth has great problems with interactive teaching (Bos & Leroy, 2001).

In the future, wireless network traffic is expected to be a mix of real-time traffic such as voice, music, multimedia teleconferencing, online games, and data traffic such as Web page browsing, instant messaging, and file transfers. All of these applications will require widely varying and very diverse quality of service (QoS) guarantees for the different types of offered traffic (Dixit, 2001).

For these reasons, a fourth generation improved mobile communication system is necessary. The 4G system can support more bandwidth than other systems. It has advantages like authentication, mobile management, and quality of service (QoS). How to implement future distance learning environments for the fourth generation mobile communication system is the question. In this article, we distinguish four kinds of interactive courses, virtual online labs, interactive online tests, and lab-exercises training platform to deliver over the fourth generation mobile communication system. The fourth generation mobile communication system can use a variety of computer embedded devices to ubiquitously access multimedia infor-

mation, such as smart phones and PDAs. Most important is that have more bandwidth. Hence, it supply ubiquitous learning environment (Girish & Dennett, 2000).

These new functions can improve the latency and location limits during transmission. Our proposed Next Generation Learning Environment offers learners the opportunities to use all kinds of mobile nodes that can connect to an Internet learning equipment system for access using All-IP communication networks. The Sharable Content Object Reference Model (SCORM) is used to compose information. Hence, as you can imagine, the condition of the learning mode in the future will be an international, immediate, and virtual interactive classroom that enables learners to learn and interact.

The article is organized as follows. We first describe the environments for mobile learning, followed by the virtual online classroom. The 4G testbed system design analyses are dealt with, and then the mobile e-learning results are discussed. The last section concludes the article.

ENVIRONMENTS FOR MOBILE LEARNING

Several investigations have focused on how to support great service for mobile e-learning. How many services will be able to fill the bill? In this session, we are introducing that mobile e-learning environment possesses many unique characteristics as follows (Tony, Sharples, Giasemi, & Lonsdale, 2004).

- Better adaptation to individual needs
- Ubiquitous and responds to urgent learning need
- Flexibility of location and time to learn
- Interactive knowledge acquisition
- Efficiency due both to re-use and feedback
- Situational instructional activities

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