Chapter XI
A Mandarin E–Learning System in Pervasive Environment

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ABSTRACT

This chapter was inspired by the work of the designers of a Mandarin language e-learning as they attempted to find the best solution to deal with the problems occurring in e-learning. E-Learning environments designated to facilitate long-distance learning are gaining popularity. Pervasive computing has a great potential for many next-generation IT applications. The authors describe pervasive computing system design and implementation for Mandarin e-learning. The authors propose a Human-centered Pervasive Computing System Model (HPC) and Layered Architecture Analysis and Design Method (LAAD). Based on the HPC model and LAAD method, a pervasive computing based Mandarin e-Learning system is designed and implemented. They particularly focus on Mandarin pronunciation learning which estimates the intelligibility of foreign learners’ speech and ranks their errors from the viewpoint of improving their intelligibility. Its design and implementation issues are discussed in details.

INTRODUCTION

Recently with the rapid development of the world, the communication between different countries has become more frequent. Subsequently learning the second language has turned into a fashion. This phenomenon has drawn attention of academic institutions, such as CALL (Computer Assisted Language Learning) which is used for people to learn the second language.

Similarly Mandarin, as the most representative cultural sign of China, has also arrested the world’s attention. More and more foreigners begin to learn Mandarin; even some of them come to China personally with the purpose of learning it. However, due to the limitation of time and region, sometimes it is not convenient for learners to study Mandarin everywhere or anytime. Considering these factors, in this paper we are trying to establish a Mandarin pronunciation
recognition and assessment system, which can be used on the Internet or in a small device. This system is aiming at providing a convenient approach for learners to study mandarin Chinese step by step and correcting their pronunciation with the help of the feedback from the system in the form of grading.

However, our investigation indicates that the teaching systems of e-Learning are lack of intelligence. They cannot interact with learners, cannot adjust the curriculum contents based on their learning situation, and most importantly cannot make the learning anywhere and anytime.

Pervasive Computing emerges as the times requires and gradually penetrates our daily life. When we talk about the main advantages of pervasive computing, we usually think of anywhere, anytime, any format, and any device (Susanne, 2006). This means:

- **Anywhere**: Global accessibility, with regard to various kinds of communication networks.
- **Anytime**: Twenty-four hours, but also independent of other services or persons.
- **Any format**: Email, public services, inter- and intranet, various data formats.
- **Any device**: (Table-) PC, Personal Digital Assistant (PDA), cell phone, etc.

Thus we can take full advantage of pervasive computing technologies to design our Mandarin e-learning system where the learner can put forward his personalized learning requests according to his knowledge structure and learning plan. Then, our system will analyze the learner’s learning history and demands, adjusting the curriculum contents, which stand for his learning requests and preferences anytime and anywhere without any restrictions.

Moreover, in order to facilitate the foreign learners and bring more and more web-based Mandarin e-learning resources and personalized learning guides, we design virtual language learning community as a major function of our system where Mandarin language learners can practice their pronunciations and interact with other learners freely. In a word, our system is a pool of Mandarin language place where you can interact with people from all around the world to share your interests and concerns about Mandarin.

This paper is organized as follows: in section 2, I will introduce the related background of Mandarin e-learning; then, I propose the design and implementation of complete system in section 3; finally, I will describe the future prospects and conclusions in section 4 and 5, respectively.

**BACKGROUND**

E-learning has changed the possibilities for a higher education for many people around the world. There has been an increasingly wide application of Internet technologies in our education. About 15 years ago, distance education using computer-mediated communication emerged for the first time, and 10 years ago Internet and email was introduced to e-education for small-scale delivery of some courses (Qing, 2005).

This is not the end. During this period there has been a significant transformation in the developed world in:

- The way in which information is published and distributed;
- The range of Internet tools and systems which are widely available to individuals and organizations;
- The ways in which people can communicate with each other.

Alongside these general changes, there have been two key developments. First, several providers of “100% e-learning” have been established. Second, a range of Government policy- and investment-initiatives are underway, all of which