Chapter XVIII
Design of an Adaptive Mobile Learning Management System

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ABSTRACT

This chapter introduces the application of an artificial intelligence technique to a mobile educational device in order to provide a learning management system platform that is adaptive to students’ learning styles. The key concepts of the adaptive mobile learning management system (AM-LMS) platform are outlined and explained. The AM-LMS provides an adaptive environment that continually sets a mobile device’s use of remote learning resources to the needs and requirements of individual learners. The platform identifies a user’s learning style based on an analysis tool provided by Felder & Soloman (2005) and updates the profile as the learner engages with e-learning content. A novel computational mechanism continuously provides interfaces specific to the user’s learning style and supports unique user interactions. The platform’s interfaces include strategies for learning activities, contents, menus, and supporting functions for learning through a mobile device.
INTRODUCTION

The rapid advancement of the global information infrastructure, mobile informational technologies, and intelligent applications is leading to a change of educational paradigm. The new paradigm is evolving similar to the way that “distance learning” evolved into “e-learning.” Now e-learning is changing into m-learning (mobile learning) and is providing new possibilities for education.

Among those possibilities are increased ability to promote student motivation through personalization and a change from teacher-centered teaching to learner-centered learning. Adaptive m-learning can support these possibilities by considering and using a learner’s diverse variables, such as abilities, attitudes, and learning styles, to promote effective learning and place the learner at the center of a more personalized experience.

Every teacher has witnessed how some students prefer visual information while others are surprised and perplexed when complex diagrams are given. Although one student may be weak in a speed test, he or she might understand a discourse more deeply than another student and be able to submit substantial and excellent reports. Learners also vary in their backgrounds and experience, and possess a diversity of abilities that cause them to learn in different ways. They are unique in their personalities and values, for example. In addition, they develop individual preferences for learning environments that support their favored modalities of learning. In general, students exhibit a wide variety of unique blends of strengths and weaknesses resulting in classrooms with a wide diversity of talents that need to be developed.

The benefits of personalizing learning are well documented in the literature on differentiation of learning (Brimijoin 2003; Stevens 1999; Tomlinson & National Association for Gifted Children 2004) and are also easy to illustrate with an example. If the classroom has as few as two different kinds of learners and only one kind of instruction used, there will be a “best and worst fit” among the students. If the same instruction is used repeatedly, then one of the students will be systematically denied access to the most effective instruction.

Understanding the different ways that children learn, interact with, and process information can help teachers modify instruction so that all students have an equal opportunity to succeed (Theroux, 2004). In order for teaching to be an intentional and planned activity that supports each student’s academic success, it is necessary to accept and utilize each learner’s features to foster the most effective learning. It follows that teachers, learning devices, and instructional programs that provide a variety of learning approaches have a greater chance of offering appropriate challenges to every student in the learning environment. However, with highly portable m-learning, the teacher’s role needs to shift to the device.

When the learning environment involves mobile devices, the variety of learners’ background, abilities, and learning styles are expected to be more diverse than in a traditional classroom environment. This is true because the mobile device can be picked up and used by anyone at anytime, with or without a teacher present. The handheld learning environment thus needs a great deal of adaptability. It must be able to support independent learning without expecting a teacher’s support and guidance. As we envision it, the mobile device itself can play an adaptive role that shapes the learning environment on the basis of a learner’s preferred style.

To capture this idea, Park developed a prototype adaptive mobile learning management system (AM-LMS) which assesses a user’s learning style, creates a learner profile, and then provides content based on decisions the learner makes while interacting with the content, continuously updating the learner profile. The chapter presents background, rationale and a functional overview of the AM-LMS.

MOBILE LEARNING

Mobile learning is based on wireless Internet connections and uses devices such as notebook computers, cellular phones, personal communication system (PCS) phones, and personal digital assistants (PDAs). The important features of
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