Chapter IV
From E-Learning to M-Learning: Architectures to Support University Teaching

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ABSTRACT

The term e-learning indicates products that differ very much both in services supplied and in design. E-learning platforms do not necessarily involve networking as a fundamental component. However, networking is important both to ease access to course material and to support interaction among users. Networking should be exploited to allow remote access to students who cannot be present at lessons, to allow asynchronous learning whenever students have time, and to supply users with tools for cooperative learning regardless of their physical location. The spread of wireless networking technologies and their standardization will lead to innovations in all three of these aspects. This chapter focuses on the services whose deployment computer networks make possible in order to boost interactivity, cooperation and involvement in learning, with specific attention to ubiquitous learning and for the impact of wireless technologies on the general framework.

DEFINING THE PROBLEM

Our focus is on the services whose deployment is enabled by computer networks, services that boost interactivity, cooperation, and involvement in learning activities, with specific interest for *ubiquitous* and *pervasive* learning. Ubiquitous learning involves interaction during which tools

provide new learning opportunities by bridging space and time gaps and curtailing the relevance of the user's location. Such interaction may combine with *pervasive* learning systems, which adjust themselves to the needs and interests of each specific learner so as to continue the learning process as the user changes location while engaging in a variety of other activities.

Mobile devices are poised to bring major changes to learning systems. Although wireless technologies may provide the same services as wired networks with fewer constraints on time and location, they can also be used to supply additional services that are otherwise difficult or impossible to deploy. For example, university campuses bring together parties that cooperate with each other. In addition to students, teachers, and staff, other segments of the university community like concessions or bookstores may exchange reservations, orders, and various information. While traditional Web pages and bulletin-boards allow such exchange, mobile devices enable notices to be *pushed* to potentially interested users as soon as available, with no user effort (asynchronous and remote). Wireless can offer supplementary functions to students actually in class at a given moment, such as automated testing, gathering feedback, and immediate content sharing. Without systems, these services are extremely time-consuming and almost impossible to manage. In a classroom with computers and wired network, the results of such cooperation stay on university equipment, limiting subsequent availability. Wireless networking also brings traditional e-learning functions within ubiquitous reach.

Figure 1 represents schematically the main interactions among on-campus roles, reflecting both information type and exchange direction.

Some of the interactions shown in Figure 1 are unicast, e.g. questions transmitted from student to teacher (B), while others, like the dissemination of urgent notices, are multicast to all users interested (I).

Interactions may follow three different models:

Figure 1. Scheme of interactions among different roles