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Chapter XII

Employing Intelligent and Adaptive Methods for Online Learning

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ABSTRACT

In this chapter, we will explore the potential for employing artificial intelligence and adaptive methods into online learning applications. The existing and newly developing technologies for representing knowledge will be explored and the pedagogic implications for online learning discussed, including examining the roles of intelligent tutoring systems, decision support systems and pedagogic agents. In the wider context, the role of search engines, browsers and virtual learning environments will also be discussed in the context of intelligent systems, and the problems in implementing intelligent web based learning systems in mainstream educational practice.

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INTRODUCTION

Individuals working their way through course materials require appropriate feedback and assessment to achieve their desired learning outcomes. Providing such interactions is one of the goals for educational technologists. To be most effective, learning systems must be able to adapt to the user's individual pedagogic needs, provide appropriate sequencing of material and feedback, and use the most suitable examples for the specific learner. Creating systems that can adapt and respond to the individual learner — a machine equivalent of a professional educator for the chosen learning domain — is the subject of this chapter

Educational software falls into different categories according to the place in the educational supply chain to which it is applied: curriculum design, course design and development, learner recruitment and enrolment, course delivery (including learner support and assessment), validation and articulation (Oblinger, 2001). The IEEE Learning Technology Systems Architecture (LTSA) (Figure 1) provides a useful model of the learning technology field.

Oblinger's (2001) higher education supply chain model and the IEEE LTSA enable a complete mapping of educational software applications. For the purposes of this chapter, we will focus on those applications that are directly concerned with learning and teaching (delivery, coaching and evaluation) that have a direct impact upon the learner, and we will address those particularly pertinent to online learning.

Search Engines, Browsers and Virtual Learning Environments

In many education scenarios a significant degree of self-coaching or peer-to-peer coaching is expected and encouraged. Contemporary constructivist pedagogies also encourage the Learner-Teacher/Teacher-Learner paradigm. The LTSA model represents the porous boundary between Learner Entity and Coach by a two-way information flow. Recognising significant bi-directional movement along this axis brings a number of important systems into our discussion.

Figure 1: IEEE Learning Technology Support Architecture