

Chapter I

Technology Enhanced Learning Tools

Goran Shimic, University of Belgrade, Serbia

Inside Chapter

This chapter emphasizes the variety of today's e-learning systems. They have both positive and negative characteristics. Several useful tools are common for these systems. The main part of this chapter contains a detailed description of e-learning systems and their tools. If a system is appropriate for the needs of the learner then it has more intelligent behavior and its tools are more specialized. Some systems have separate tools that act as standalone applications. Others contain built in tools. In this chapter, the e-learning tools are grouped by their functions. Owing to standardization efforts, the differences between the e-learning tools become their advantages, and the e-learning systems become interoperable. The intelligent learning management systems (ILMS) become a new way to integrate the benefits of the different e-learning systems. At the end of the chapter there is a short description of an ILMS named Multitutor. This represents a possible way of future e-learning systems development.

Introduction

Using current Internet technology to support learning in the classroom is recently becoming much easier and much more feasible than it used to be. If a network of computers or workstations is available in a classroom (the same is on the global network), it is easy to install and use Apache, Tomcat, or another Web server. It can distribute HTML pages generated statically or dynamically by an educational application. Client computers/workstations should only have an Internet browser. Hardware and software requirements for the client machines are minimal. TEL tools are strongly related to e-learning (as the other technology enhanced tools are related to e-commerce, e-banking, e-government).

There are three groups of the e-learning systems which are the most frequently used on the Web: adaptive systems: adaptive hypermedia (AH), intelligent tutoring systems (ITS), and nonadaptive systems (learning management systems, or LMS). The AH systems are focused on adaptable structure of the educational materials (Brusilovsky, 2003). They provide different adaptation techniques: conditional or stretch text, variations of pages and fragments, and frames linked to the concepts. There are many good examples of the AH systems. ISIS-tutor (Brusilovsky & Pesin, 1994) has adaptability based on the directed graph of concepts. The concepts are *based-on* and *is-basis-for* relations. KN-AHS (<http://wwwis.win.tue.nl/ah94/Kobsa.html>) has implemented the presentational adaptation. The learning materials are composed by-fly. In the Hyperflex (<http://www.cs.mdx.ac.uk/staffpages/serengul/HYPERFLEX.htm>), the navigational adaptation is implemented in the system. The student has a full list of topics, but the order of items is changeable.

While the AH systems have a compact system design with high coupled components, the ITS have high-level modularity. ITS provide user (student) oriented design and much more pedagogical knowledge implemented in the system. These systems are focused on problem-based learning (PBL). The Cognitive Tutor (Ritter, 1997) is designed for learning math; the LISP TUTOR [naci referencu] is focused on the using of LISP programming language, while the SQL Tutor helps students master the structured query language (SQL). PBL requires a precisely defined student profile and a high level of interaction between the system and the student. Therefore, the behaviour of ITS is more intelligent than in the other e-learning systems. Both of them (AHS and ITS) are focused on the specific area of one domain.

LMS represent the domain independent systems. They enable the teachers the possibility of composing their courses of newly created and existed learning units or so called learning objects (LO). These objects are modelled and described by standard structure and metadata. This means that LO would be reused in many courses and for different purposes. Teachers can use a LMS to develop Web-based course materials and tests, to communicate with students, and to monitor their students' progress. Students can use it for learning and collaboration The LMS are much more

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