Educational Technology Standards

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INTRODUCTION

The "holy grail" of e-learning is to enable individualized, flexible, adaptive learning environments that support different learning models or pedagogical approaches to learning to allow any Internet-connected user to undertake an educational program. It is also very highly desirable, from a more practical viewpoint, if this environment can also integrate into the wider MIS/student records system of the teaching institution.

A number of very different technologies in the past have been employed to try and achieve this aim, with varying degrees of success; see Hartley (1973), Muhlhausen (2003) and Okamoto and Hartley (2001) for good accounts of the development of ICT in education. However, one of the biggest stumbling blocks to date, hindering the widespread adoption of these technologies, has been the cost of developing these learning materials and their delivery systems, alongside an inability to reuse the materials.

Addressing these issues is now where much of the main research efforts within the e-learning field are focused, particularly in the developments of Learning Technology Standards.

The learning technology standardization process is leading the research effort in Web-based education. Standardization is needed for two main reasons: (1) educational resources are defined, structured and presented using various formats; (2) functional modules embedded in a particular learning system cannot be reused by another system in a straightforward way. (Anido-Rifon, Fernandez-Iglesias, Llamas-Nistal, Caeiro-Rodriguez and Santos-Gago, 2001)

Currently, a number of standards have been developed. For example, probably the three most commonly employed at present are IEEE's Learning Object Metadata—LOM (IEEE, 2001), ADL's Shareable Content Object Reference Model—SCORM (ADL, 2001) and the Open Knowledge Initiative – OKI (OKI, 2004). These standards, in turn, often incorporate other standards and specifications within them; for example, SCORM utilizes the IMS Content Packaging and Simple Sequencing specifications. The result of this is a plethora of acronyms and standards, which can prove confusing, even for some practitioners.

It is the aim of this article to clarify the aims, role and main functions of key current educational technology standards and to highlight the advantages they bring when learning environments are developed with them. The article will also address some of the aspects of e-learning not so well served by the standards and some of the current and future directions of research within the field.

The structure of the article is as follows: It will start with a brief background of e-learning, covering the main types of applications used to enable delivery of e-learning. The main section will be devoted to the considering the main learning technology standards, attempting in particular to highlight the many different standards and the roles they fulfill in enabling interoperability and compatibility between e-learning applications, but also to highlight the connections between the various standards. Finally, the article will examine some of the current issues of debate surrounding the standards.

E-LEARNING: A BRIEF BACKGROUND

E-learning is the use of the Web as a medium of delivery for educational ICT applications. The use of the Web potentially enables distance-independent, time-independent, computing platform-independent and classroom size-independent learning far more easily than alternative media of delivery, such as CD-ROM or broadcast multimedia.

In essence though, e-learning applications, like all educational ICT applications, strive to achieve two

main aims: (1) present educational content, and (2) provide facilities and tools to enable learning.

The key technology of delivery of e-learning is the Learning Environment. Commercial examples of these include WebCT and Blackboard. Any brief perusal of e-learning-related literature will quickly reveal a number of terms used to describe Learning Environments. The most common of these are: Managed Learning Environment (MLE), Virtual Learning Environment (VLE), Learning Management System (LMS) and Learning Content Management System (LCMS). While it is technically correct to use any one of these terms to describe a learning environment, each has a subtle difference in meaning; therefore, it may be useful at this point to provide a brief definition.

MLEs and VLEs are terms used to describe the two main types of e-learning application.

MLEs can be considered to be enterprise level, large-scale e-learning applications. They aim to provide the whole range of information services an educational institution would require to enable and support the learning process and its operation (see Figure 1). Conole (2002) describes the main function of an MLE as to "integrate a VLE with a university's management systems" and goes on to note that this "might include a wide range of functional components … (such as) … administrative information about courses, resources, support and guidance, collaboration information, assessment and feedback, evaluation."

An MLE can, and normally does, include a VLE. A VLE deals with the actual delivery of the learning material or content, including assessment, tutor-to-learner communication and tracking of student progress and activity, as well as linking to any student record or Management Information System (which itself may or may not be part of an MLE). A VLE may also, often, include a content authoring facility. In essence, a VLE is the e-learning application that delivers the course to the learner. For those interested, Conole (2002) provides a good exposition of MLEs and VLEs in more detail.

In turn, a VLE may include the functions of either an LCMS or LMS or of both. There does appear to be some confusion in much of the literature in the use of the two terms. First, often they are used to describe the applications themselves, although it would appear that most definitions of them normally refer to functionality or the services that they provide. Second, the term LMS often is used as a blanket term to describe what others term an LCMS (see Jacobsen, 2002 for a good discussion of these issues). So to clarify this point, in this article, the following definitions will be used:

An LCMS manages the learning material and the learning process. Often they track individual learning progress. Typically, an LCMS will do the following: Course preparation, course delivery, tracking and itemizing of user details; for example, the number of times a user accesses a particular section of content and for how long.

An LMS manages the student and learning events that support the administration of the learning. The functionality described by an LMS may include: hosting the course catalog, administration of the course, such as scheduling of courses, tracking and reporting completions and results for individual students.

Jacobsen (2002) provides a much more detailed definition of the two terms, but has a very simple and effective description of the difference between an LMS and LCMS. An LMS "handles what takes place outside of the course" whilst an LCMS "handles what takes place within the (virtual) classroom."

Figure 1. Structure of an MLE (adapted from JISC)
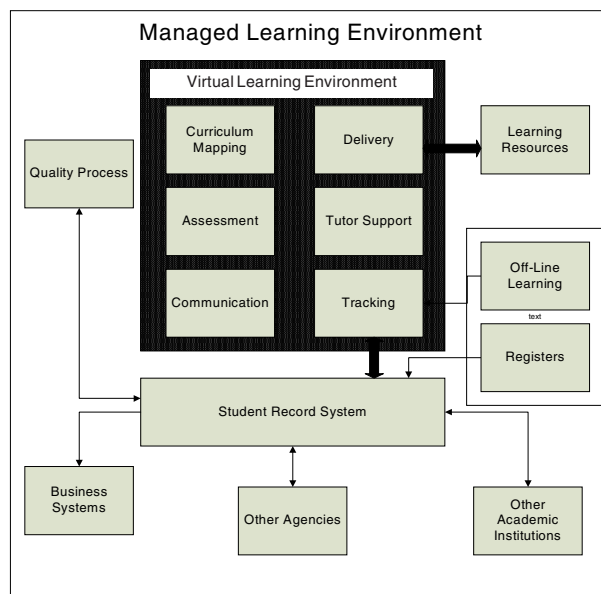
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