

# Standardization in Learning Technology

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## INTRODUCTION

The use of computers in education has been reported since the 1970s, but the Internet is fundamentally changing the way organizations operate, and these changes are spreading fast to educational organizations as they are eager to take advantage of the new possibilities.

In this context, new terms have been created to express new concepts related to the use of technology and following this trend, the term e-learning was coined. E-learning is an all-encompassing term generally used to refer to the use of technology in learning in a much broader sense than the computer-based training (CBT) or computer-aided instruction (CAI) of the 1980s. E-learning is extensively used and can include, just to name a few examples: educational Web sites; the use of hypermedia, discussion boards, e-mail, text chat, simulations and games in an educational context; computer-aided assessment; and learning management software. Although the term is not well defined and covers many possibilities, it has been mainly used when the Web is involved in the learning process.

The rapid growth in e-learning has led the community of designers, developers and users of learning resources to a point where they have an enormous variety of tools to support their work. However, if these tools use proprietary solutions, this would make the reuse of learning content outside the scope of the system where it was created difficult. It would also be hard to provide mechanisms for searching, accessing, reusing, and integrating such resources. One way to avoid these kinds of problems is the definition and use of open specifications and standards.

A standard is a set of technical definitions and guidelines for designers, manufacturers, and users, establishing the characteristics of a product, process, or service, such as dimensions, safety aspects, and performance requirements. Standards are written by experts with knowledge and expertise in a particular field (ASME, n.d). The Internet is a very good example of the importance of having standards to support the development and wide adoption of technology. It would have been impossible to connect so many different computers around the world if there were no standards to define the connections and communication protocols. This is also the case of e-learning technology, which needs standards in order to facilitate worldwide propagation.

Once e-learning standards are defined, accepted, and used, they will bring many advantages (Duval, 2004; MASSIE Centre, 2003):

- From the point of view of users, standards will prevent them from being locked-in to a particular vendor as it will be much easier to shift between tools and platforms and increase the reuse of existing resources.
- From the point of view of the tool vendor, they will not need to develop proprietary interfaces for other existing products lowering the cost and increasing the size of potential markets.
- From the point of view of content producers, they can use a standard format that will be understood by any delivery system conforming to the standards and increase the potential market of their products.

Above all, standards are a clear signal that a technology is mature and usually are seen as a first step towards a rapid growth phase and worldwide adoption.

## BACKGROUND

It should be noted that there are different kinds of standards. *De facto* standards are developed by market—or technology-driven processes—and have come into use by general acceptance, custom, or convention, but have no formal recognition. When the standard is created by an accredited standard developing organization (SDO), it is called a *de jure* standard or an accredited standard and its scope can be national, regional, or international depending on the SDOs involved in its publication. Usually each country has a national standards body that is responsible for the adoption of standards within that country and that represents the country in international standards forums like ISO—International Standards Organization. ISO is a network of the national standards bodies of 157 countries, with one member per country and is a non-governmental organization with a Central Secretariat in Geneva, Switzerland (ISO, 2006).

When there is a product, which has been developed according to a standard, it is usually said to be conformant with the standard. If the product is tested by an external entity that verifies and attests the conformance (or conformity) of the

product to the standard, then it can be said to be certified.

The importance of a standard is usually measured by the extent of its actual acceptance and use. Nowadays, although accredited standards tend to have more credibility, *de facto* standards or even open specifications are commonly used as the need for standards is growing fast. This is the case in e-learning, where the most active standards groups are open consortia.

In e-learning, the development of standards usually follows four steps: specification, validation, standardization, and dissemination.

- In the specification phase, cooperating organizations develop initial specifications based on their analysis of the tasks accomplished during the learning process. All information exchanges and interfaces between components are specified, documented, and refined among all the participants.
- Based on the results gathered during the specification phase, pilot programs are developed to test the effectiveness of new products incorporating the initial specifications. This is the validation phase, where test-beds are established for validating conformance to the specifications and to reveal the existence of initial specifications that should be revised. Also, reference models are developed, showing how different specifications work together.
- The specifications that have been tested and proved to be valuable are then submitted for approval by accredited standards bodies that will refine, clarify, and follow the established procedures for reaching final accreditation of the specifications. In e-learning the bodies creating

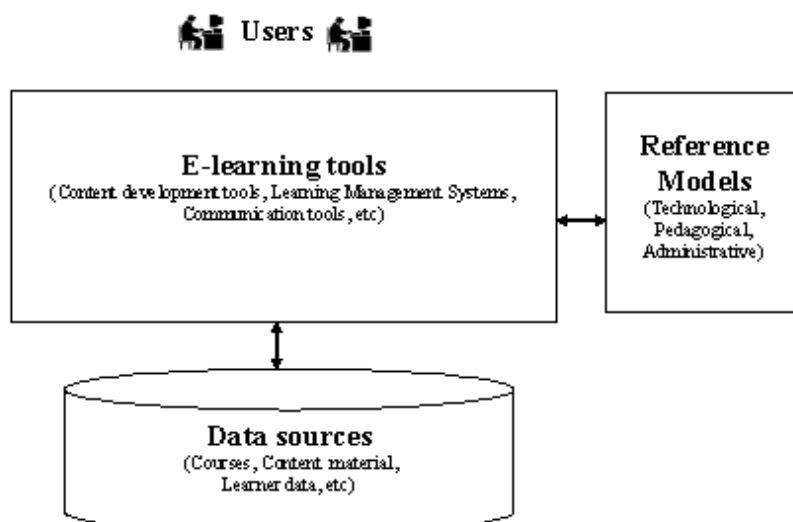
accredited standards are: IEEE Learning Technology Standards Committee (LTSC) (<http://ieeeltsc.org/>), ISO/IEC JTC 1/SC 36—Information Technology for Learning, Education, and Training (<http://jtc1sc36.org/>), and CEN/ISSS Learning Technologies Workshop (<http://www.cen.eu>). Within the bodies are working groups that address specific areas of e-learning and that coordinate all the internal process for reaching accreditation. Additional information about this process can be found in IEEE (2005).

- Finally, the last phase of the process is the dissemination of approved standards among all the stakeholders in e-learning, giving them support for understanding and correctly using the new standards.

CEN/ISSS Learning Technologies Workshop has created an observatory which reports the most important events in e-learning standardization available online at <http://www.cen-ltso.net/>.

To understand the relevant aspects that should be considered for standardization in e-learning, it is important to comprehend an e-learning environment. Figure 1 shows a simple model of the most important aspects of an e-learning environment. Users represent all the participants in the learning environment, including, for example, learners, teachers, content developers, and administrative staff. E-learning tools cover all the software and hardware systems that provide the necessary functionality for the environment and can include for instance such elements as a learning management system (LMS), content development tools, and communication tools. Data sources mean all the digital data that is needed to be able to fulfill the functionality of

Figure 1. A simplified framework of educational and training systems



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