



The Role of E-Learning Standards in Education Technology

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The Role of e-Learning Standards in Education Technology

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Abstract

This paper aims to examine the standardization of e-learning technologies and to consider potential changes in the future. In order to achieve a global standard for e-learning activities, the paper reviews existing standards, the e-learning process workflow, market needs, and trends and identifies the best path forward. The paper presents a generic model of e-learning that is not specific to any particular software or hardware solutions and focuses on key necessities such as reusability and interoperability of content and technologies. The paper also revises the current standards regarding these two aspects and provides a detailed presentation of the most popular infrastructure models. In addition, the paper references the committees and organizations involved in the standardization process. Finally, the paper provides insights into a global standard that covers all aspects of e-learning and outlines the steps required for the successful configuration and deployment of such a standard. The benefits of this approach are also highlighted.

Keywords: E-learning, e-learning standards, SCORM, LTSC, LTSA

I. Introduction

E-learning, also known as online learning or digital learning, has become a popular alternative to traditional classroom-based education. E-learning provides students with flexible and convenient access to educational content and resources and has the potential to improve the quality and accessibility of education. However, the widespread adoption of e-learning has raised concerns about the standards of e-learning and the need for consistent and effective guidelines to ensure the quality and effectiveness of online learning. Figure 1 shows the life cycle of an e-learning solution. It is said that the standardization process is experimental, imperfect, and evolving more quickly. Standards, on the other hand, grow gradually and are far more decisive. In order to guarantee that the materials, products, processes, and services are appropriate for their intended use, defining E-learning standards is frequently used as rules, guidelines, or definitions of features. Standards are typically produced in the context of e-learning technology to be utilized in systems, design, and implementation in order to ensure interoperability and reusability [3, 4]. Both the systems themselves and the content and metadata they maintain should have these characteristics. These standards should also reflect widespread acceptance, be applicable for regulatory purposes, and be used to produce effective and high-quality results in e-learning. The capacity to build the functionality of interoperability between many systems and the reuse of learning objects is one of the key advantages of standardized online education (interoperability

of resources). The two primary goals of e-learning standards are interoperability and increasing efficiency [2].

In this research review, we will examine the existing standards and guidelines for e-learning, and discuss their strengths and limitations.

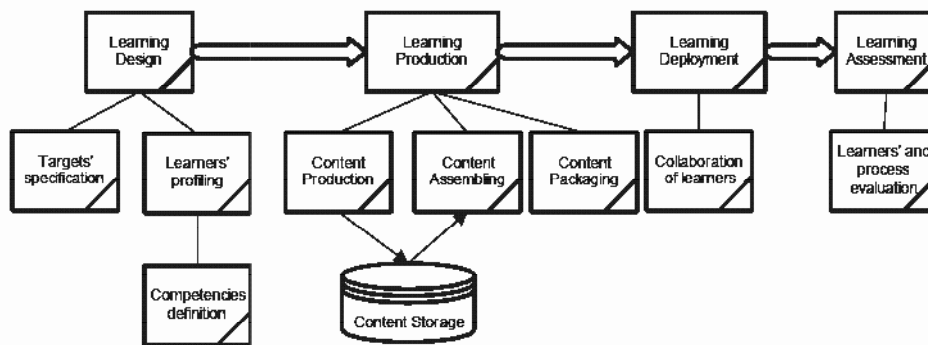


Figure 1: e-Learning Life cycle [1]

II. e-Learning Management Systems

The "learning objects" are the fundamental components of an electronic learning system (Wiley, 2002). These are the fundamental definition of reusability, interoperability, and flexibility, as well as the key to comprehending the structure of an e-learning system. Learning objects are data chunks that are employed by e-learning systems from a functional standpoint. They are written, kept, indexed, put together, sent, and assessed. Consider a learning object as a digital component of a course that can range in size and complexity from a single graphic to the full course itself for a more practical perspective. Learning was structured in older approaches by lessons and courses with predetermined goals. In order to satisfy a learner's need for "just enough" and "just-in-time" information, recent paradigms mandate the breakdown of content into considerably smaller, self-contained chunks of knowledge that can be used alone or built dynamically into Learning Objects.

SCORM is a technical standard that was created and developed by ADL. This standard supports the following keys as high-level requirements: Availability, adaptability, economics, durability, interoperability, and reusability [5, 6]. In other words SCORM is a collection of related documents. The three main documents of SCORM are the Content aggregation model, runtime environment, and arrange and conduct. In fact, SCORM is a high-level set of fundamental characteristics and e-learning content standards, technologies, and related services. SCORM introduced a complex idea called sequencing, which is a set of rules that constrain a learner to fix his paths and bookmark learning object. The standard uses XML to encode a file that describes the components and resources.

The ISO/IEC SC36 has been granted a formal standardization license, and one option is to "fast-track" the standard by participating in a high-level Committee JTC1. In addition, LOM is required as a standard set out by the IEEE LTSC and the SC36 subcommittee to collaborate in the future to create the "next generation" of this metadata standard. This version demonstrates that it has a far more "minimalist" perspective toward metadata than the technically challenging, "structuralist" approach represented by the LOM.

III. e-Learning Quality Standards

The secret to learning success, in general is quality. The following observations are listed as some of the most significant concerns regarding the quality of e-learning: learner orientation, developing quality in the learning process, the importance of quality in education policy, consideration of quality services, and application of quality standards [8, 10].

The ISO/IEC 19796-1 was released in 2005 with the intention of creating and enhancing quality systems for educational activities, processes, and services. The standard is referred to in order to assist the organization's particular adaptation needs. Since 2007, this standard has evolved to meet the demands of companies and has become a reference model. It facilitates development and aids in evaluating the effectiveness of e-learning programs. A set of e-learning quality standards that aid in program design, development, management, delivery, and evaluation, as well as the caliber of instructional design, media production, technology, and online tutoring.

Another important standard, ISO 9126, offers a framework for evaluating e-Learning programs for academic institutions and teachers. The goal is to support decision-making by adding quality attributes like consistency, simplicity, legibility, and user satisfaction as a general characteristics of the model. These attributes will also help to develop educational systems and support decision-making regarding evaluating the quality of current systems. In 2010, the ISO 9126 model was chosen as the gold standard for assessing course management systems in the disciplines of design, development, and delivery of e-Learning content, as well as measuring the outcomes of e-learning. Furthermore, by incorporating new traits into the existing quality models, the ISO 9126 model is modified to define acceptance criteria and assess B2B (Business to Business) applications.

IV. e-Learning Communities Standards

IMS is a collaboration that creates and supports open specifications for allowing so-called "e-learning," or online distributed learning activities. The K–12 sector's standards for school representation have only been developed by IMS. Governmental representation from the education ministries is part of this representation. Contributing members have the right to cast a vote on the IMS technical board for the acceptance, rejection, or change of draft specifications before standards are created.

On the other hand, AICC was first developed to standardize computer training for use in the airline industry; the AICC standard is currently utilized for reusability and interoperability in online learning and applications such as health care, financial services, higher education, and telecommunication. AICC implemented all computer-based training, and this includes providing, regulating, delivering, and tracking the outcomes of management systems training and online courses [10]. AICC published three different categories of papers, including AICC recommendations and guidelines, technical publications and AICC reports, and Working materials for AICC.

V. IEEE (Learning Technology Standard Committee) LTSC standard

One of the IEEE publications is this standard. It is distinguished by the emergence of LOM (Learning Object Metadata). Guidelines are advised for educational and training systems, particularly for software elements, instruments, and technological advancements that permit development and upkeep. The standard, which standardizes five categories, defines a high-level model of e-learning system design but does not support details concerning implementing particular technologies [4]. It helps to learn more about content, data, metadata, management systems, and applications in general.

The e-learning LTSA standard was developed by the Institute of Electrical and Electronics Engineers (IEEE) in collaboration with other organizations and experts in the e-learning field. The standard was first published in 2003 and has since been updated to keep up with the latest advancements in e-learning technology. The LTSA standard is based on a service-oriented architecture (SOA) approach, which allows for the creation of a modular and flexible e-learning system that can be easily customized to meet specific learning objectives and requirements [11]. The LTSA standard also supports different types of e-learning content, including text, multimedia, and interactive simulations. In addition, the standard provides guidelines for the creation of accessible e-learning content, ensuring that learners with disabilities have equal access to educational materials [8]. The LTSA standard has been widely adopted by educational institutions and e-learning providers worldwide, contributing to the growth and development of the e-learning industry. This standard defines a framework for integrating various components of e-learning systems, such as content management systems, learning management systems, and assessment systems [9]. The LTSA standard allows for the easy exchange of data and content between these different systems, enabling learners to move seamlessly between different learning activities and resources. This standard also promotes the development of reusable learning objects that can be shared across different e-learning systems, reducing the time and cost of developing new content.

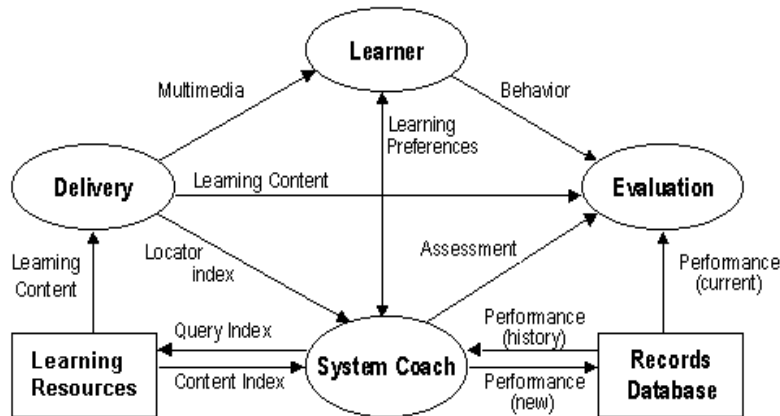


Figure2: The IEE Learning Technology System Architecture

VI. Other standards

The International Association for K-12 Online Learning (iNACOL) is a professional organization that promotes the development and implementation of high-quality K-12 online learning programs. iNACOL has developed a set of standards for K-12 online learning, which address course design, content, and technology, as well as teacher and student engagement, assessment, and support.

Educause is a non-profit organization that promotes the use of technology in higher education. Educause has developed a set of standards and guidelines for online learning, which address course design, technology, and student support, as well as accessibility and intellectual property. Educause also provides professional development and support for online instructors, and is designed to help ensure the quality and effectiveness of online learning in higher education.

The Association for Educational Communications and Technology (AECT) is a professional organization that promotes the use of technology in education. AECT has developed a set of standards for e-learning, which address course design, content, and technology, as well as teacher and student engagement, assessment, and support. The AECT standards are designed to provide a comprehensive and flexible framework for the development and evaluation of e-learning programs [2].

The fact that learning technology standards incorporate a certain level of interoperability must be emphasized. We should set standards in every procedure to ensure the seamless coordination of all e-learning components. Standards should be established by standardization committees that encompass all component of the educational process while avoiding overlap. The fact that goods claiming to be compliant with e-learning standards cannot be used together without additional tinkering is a common issue. This results in lost time and pricey service contracts. Due to this difficulty, certification programs and the creation of conformance tests are receiving more attention. Everyone must adhere to the same e-learning standards without exceptions

ormodifications (i.e. based on differences in language, country, law, customs etc.). E-Learning standards are essential for the creation and use of successful e-learning systems. Standards provide the compatibility and interoperability of various e-learning systems, enabling easy data and content transfer between them. This enables the development of strong and adaptable e-learning ecosystems that may change to meet the demands of students and instructors. Standards also encourage the creation of reusable learning items, which speed up and lower the cost of creating new content.

VII. Conclusion

The standards and guidelines for e-learning play a critical role in ensuring the quality and effectiveness of online learning. Standards also offer instructions for producing accessible online learning materials, guaranteeing that students with disabilities have equitable access to educational resources. The construction of efficient and open online learning environments depends on the existence of e-learning standards, which are crucial for the industry's expansion and development. The standards mentioned in this review, such as SCORM and LTSA, are leading the way in the development and implementation of e-learning standards and guidelines. However, the field of e-learning is rapidly evolving, and there is a need for ongoing research and development to ensure that the standards and guidelines for e-learning remain relevant, effective, and consistent. Further research is also needed to examine the impact of e-learning standards on student learning outcomes, and to ensure that they are used ethically and effectively.

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