

Chapter 7

Building and Use of a LOM Ontology

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ABSTRACT

The increasing number of available resources that may be used during e-learning can raise problems of access, management and sharing. An e-learning application therefore shares the same problem of relevance to the Web concerning the access to learning resources. Semantic web technologies provide promising solutions to such problems. One main feature of this new web generation is the shared understanding based on ontologies. This chapter presents an approach to index learning resources semantically using a LOM ontology. This ontology was developed to clarify the concepts, and to describe the existing relations between elements of the LOM standard. The author present also our tool based on this ontology which allows to describe learning objects and helps retrieving them.

INTRODUCTION

The use of information and communication technology in the field of training gave birth to new forms of learning. The e-learning is a type of training whose context is based on the diffusion of resources through an electronic medium. It is defined as just-in-time education integrated with high velocity

value chains. It is the delivery of individualized, comprehensive, dynamic learning content in real time, aiding the development of knowledge communities, linking learners and practitioners with experts” [Drucker, 2000].

With the expansion of the web, a new form of e-learning has appeared. Online learning or web-based training, offers many possibilities of collaboration and interactivity. Teachers involved in this type of

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learning do not have the total control of the material delivered to learners. Learners may discover different learning resources, use them as such, or combine them if necessary; these resources are called learning objects (LO).

%The use of simple metadata such as LOM to describe resources is an insufficient %solution.

The increasing number of available LOs leads to problems of management and sharing as well. One solution that facilitates research, exchange and data management teaching is to index learning objects with a set of shared metadata. This metadata can be information regarding the authors of learning materials, their fields of interest, their ideas, their learning objectives, and so on.

Currently, the most successful and most used standard for describing the LO is the LOM¹ (Learning Object Metadata). However, the semantic ambiguity of some of its elements and their subjectivities, especially in the educational category, makes difficult the use of its descriptors.

To overcome this difficulty and to allow the understanding of these elements, it is necessary to add semantics. The semantics include the definition of concepts, relationships between concepts, attributes and constraints. Using an ontology for modeling the LOM may facilitate the description of resources by defining the concepts and exploiting semantic relations between them. Each resource will be described by a concept rather than words that may be ambiguous.

In this chapter, we present the metadata approach for indexing learning resources and especially the use of the LOM standard. Then, we justify why a semantic web approach is relevant to overcome the metadata limits and present the LOM ontology we have constructed. Thereafter, we illustrate how to use our ontology by means of two examples. The first example concerns the tool we developed for indexing and retrieving the LOs. The second concerns MEMORAE2.0 [Abel & al., 2008] project. Finally we conclude by presenting the perspectives of this work.

LEARNING OBJECTS INDEXING

The basic idea behind the creation of learning objects is the ability to build components or small units that can be reused several times in different learning contexts.

Adopting this concept of small reusable units, Reigeluth and Nelson explain that often when teachers or learning content creators access for the first time to a learning material, they break it down into its components, and then assemble these components in order to build a material that supports their educational goals [Nelson & al. 1996].

In order to find these learning materials to use or reuse them, they must be described efficiently. A resource that is not indexed is an unexploitable resource and is difficult to retrieve. To develop and promote standards for learning technology, the IEEE² consortium created in 1996 the Learning Technology Standards Standing Committee (LTSC).

Learning Objects

The definition of a learning object gave rise to several debates. In the document representing the LOM (Learning Object Metadata) 1.0³ standard, a learning object is defined as any digital or non-digital entity that can be used, reused or referenced during learning, education or training activities.

This definition is seen by Wiley as wide as it may include an object, a person or an idea [Wiley, 2002]. Polsani (2003) refines it by adding that a learning object is an “ independent and self-standing unit of learning content that is predisposed to reuse in multiple instructional contexts” [Polsani, 2003].

In our work, we have adhered to the Wiley definition that considers that a learning object is a learning material that can be selected, combined with another according to the needs of teachers and learners. It is also a learning content that

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