Chapter V
An Ontology-Based e-Learning Scenario

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ABSTRACT

Selecting appropriate learning services for a learner from a large number of heterogeneous knowledge sources is a complex and challenging task. This chapter illustrates and discusses how Semantic Web technologies can be applied to e-learning systems to help learners in selecting appropriate learning courses or retrieving relevant information. It firstly presents the main features of e-learning scenario and the ontology on which it is based; then illustrates the scenario ontology with the training domain and the application domain. Finally, it presents Semantic Querying and Semantic Mapping approaches.

INTRODUCTION

E-learning is a critical support mechanism for organizations and individuals to enhance their skills. The incredible velocity and volatility of today’s markets require just-in-time methods for supporting the need-to-know of employees, partners, and distribution paths. New styles of e-learning are the new challenges for the next century and will be driven by the requirements of the new economy.

Recent advances in technologies for e-learning provide learners with a broad variety of learning content available. Numerous documents resources may be used during e-learning. Some are internal and made by several actors implied in the e-learning, others are available on the web: on-line courses, course supports, slides, bibliographies, frequently asked questions, lecture notes, etc. Learner may choose between different lecture providers and learning management systems to access the learning content. On the other hand,
the increasing variety of the learning material influences effort needed to select a course or training package. Adaptive support based on learner needs, background and other characteristics can help in selecting appropriate learning and during learning.

In order to better support humans in carrying out their various tasks with the web. Semantic web technologies are used to enable machines to interpret and process information. It could offer more flexibility in e-learning systems. Many of so far developed semantic web technologies provide us with tools for describing and annotating resources on the web in standardized ways, such as XML, RDF, XTM, OWL, DAML-S, and RuleML. These offer a way to make such components mobile and accessible within the wide sea of web information and applications. Personalization is becoming increasingly important in the educational Semantic Web context by enabling shared content and services to be tailored to the needs of individual users (learners, content creators, providers, and instructors). The ambitious target is to offer manageable, extendable and standardised infrastructure for complementing and collaborating learning applications tailored to the needs of individual users.

Ontologies are a way of representing formal and shared information. They can be used to index data indicating their meaning, thereby making their semantics explicit and machine-accessible. They also can be used in e-learning as a formal means to describe the organization of universities and courses and to define services. An e-learning ontology should include descriptions of educational organizations (course providers), courses and people involved in the learning process.

This paper represents our effort toward a problem of semantic solution in e-learning system. It is organized as follows: Section 2 reviews the related works, Section 3 describes Metadata and Ontologies concepts. Section 4 shows our e-learning scenario. Section 5 describes our ontology design and representation. Section 6 shows our semantic querying and semantic mapping approach. Section 7 gives conclusions and future works.

RELATED WORKS

Among the variety of modern trends in educational technology development, the application of ontological research is probably one of the most fashioned and rapidly evolving. After the first dedicated workshop in 1999, more and more workshops and special journal issues have been brought out. Numerous papers in related conferences, journals, and books have been published.

Kay (1999) and Chen and Mizoguchi (1999) noted the advantage of using ontologies for learner/user models. Mizoguchi and Bourdeau (2000) studied how ontologies can help to overcome problems in artificial intelligence in education. Razmerita et al. (2003) proposed a generic ontology-based user modelling architecture. Mitrovic and Devedzic (2004) proposed the M-OBLIGE model for building multitutor ontology-based learning environments. The model allows domain expertise to be shared and can be used as a framework for integrating multiple tutors on the web. Moreale and Vargas-Vera (2004) developed an e-learning services architecture offering semantic-based services to students and tutors, in particular, ways to browse and obtain information through WS.

Metadata is the Internet-age term for information that librarians traditionally have used to classify books and other print documents. It has been widely used to structurally describe learning resources so that they can be better reused. At its most basic level, metadata provides a common set of tags that can be applied to any resource, regardless of who created it, what tools they used, or where it’s stored. Tags are data describing data. Metadata tagging enables organizations to describe, index, and search their resources and this is essential for reusing them.
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