Chapter 2
Standardization in User Modeling and Learning Objects Retrieval: Recent Contributions

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ABSTRACT

Adaptation and personalization of the information and instruction offered to the users -individuals or groups- in on-line e-learning environments are considered to be the turning point of recent research efforts. The “one-size-fits-all” approach has some important drawbacks, from the educational point of view. Adaptive educational hypermedia systems (AEHSs) in World Wide Web became a very active research field and the need of standardization of user assessment, instruction material and e-learning environments arose, as the continually augmenting research efforts lacked the interoperability dimension. The main objective of this chapter is to provide a classification of some basic assessment aspects (adaptivity parameters) of an AEHS user, extracted from research work that refers to commonly accepted e-learning standards, such as SCORM. Also, the authors provide a starting point for the development of a generic architecture for the retrieval of standardized learning objects (LOs) from disperse learning objects repositories (LORs) to an e-learning environment, which can support collaboration activities. The retrieved LOs will comply with user assessment stored in the user model.

INTRODUCTION

The technologies that support the educational processes come closer to the traditional educational systems, as the Internet and the World Wide Web are developed. More and more teachers provide their teaching material to their students, groups and individuals, through simple or more sophisticated electronic means and experts in various fields continually provide knowledge to the public, usually in the form of web pages. A recent research by (Liaw, Huang, & Chen, 2007) demonstrated that instruc-
tors have very positive perceptions toward using e-learning as a teaching assisted tool. From the learner’s point of view, self-paced, teacher-led and multimedia instruction, are major factors to affect learners’ attitudes toward e-learning as an effective learning tool. In their work Brusilovsky and Pyelo, (2003) mention that Adaptive and Intelligent Web-Based Educational Systems attempt to be more adaptive by building a model of the goals, preferences and knowledge of each individual student and using this model throughout the interaction with the system in order to be more intelligent by incorporating and performing some activities traditionally executed by a human teacher – such as coaching students, diagnosing misconceptions or motivating students to collaborate.

Among many different pedagogical approaches collaborative learning is considered to be an essential element of learning. In asynchronous systems one may not expect to fulfill the effective collaboration requirement for adaptive pairing of collaborative peers on real time. The idea of human – machine collaboration for educational purpose is not new (Doak & Keith, 1986). Such collaboration software has been addressed in literature as simulated student (Vanlehn, Ohlsson, & Nason, 1994), computational learner (Dillenbourg & Self, 1992) and learning companion (Chan & Baskin, 1990). An extensive definition was given by Chou et al: “A learning companion is a computer-simulated character, which has human-like characteristics and plays a non-authoritative role in a social learning environment” (Chou, Chan, & Lin, 2003).

According to Brusilovsky and Pyelo, existing AIWBES are very diverse. The “rules” that are used to describe the creation of such a system are not yet standardized, and the criteria that need to be used pedagogically effective rule-sets (i.e. adaptivity parameters) are, as yet, poorly mentioned (Brusilovsky & Pyelo, 2003). Many experimental AEH systems have been created – each to their own unique specifications. As yet, however, no combined effort has been made to extract the common design paradigms from these systems. (Brown et al, 2005).

The scope of this chapter is to try to extract pedagogically effective rule-set suitable for adaptation and to provide a taxonomical classification of such adaptivity parameters, from research work that refers to commonly accepted e-learning standards, such as SCORM. Widely cited adaptivity parameters are considered to be among others: user knowledge and goals, learning style (LS), cognitive style (CS) (and cognitive abilities) and learning behavior. Assessment methods of the above adaptivity parameters and the connection of assessment results to e-learning standards are given.

This chapter also provides a starting point for the development of a generic architecture for the retrieval of standardized Learning Objects (LOs) from disperse Learning Objects Repositories (LORs) to an e-learning environment. Rehak and Mason (2003) consider learning object as a digitized entity which can be used, reused or referenced during technology supported learning. The retrieved LOs will comply with user assessment stored in the user model. Practically, LOs acquisition is achieved by querying LOs repositories distributed over the internet with proper criteria. This LO’s “journey” must comply with widely accepted standards. Properly adopted techniques and methods from the referenced work are suggested for application to the architecture’s foundation to provide an open, modular and distributed solution, closely coupled to given standardizations. Also, a possible expansion of the architecture is examined, i.e. creation of a virtual-co-learner, to cover some collaboration needs that promotes the learning process. It is not in the authors intentions to address important aspects of this generic architecture such as validation, techniques for integration into existing architectures and integration on a service level.

The rest of the paper is structured as follows. In next chapter a background is provided concerning the most commonly used adaptivity
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