Chapter 2

A Novel E–Learning Management System for Appropriate Recommendations on the Learning Contents

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ABSTRACT

Educational organizations are able to bridge organizational gaps due to the rapid advances in science and technology. Specifically, e-learning drastically reduces the learning time compared to the traditional classroom setting. The challenges in e-learning are the organization of learning contents, characteristics of the learning individual, technological constraints, and performance evaluation. Moreover, the success of the e-learning environment is greatly influenced by the factors like appropriate recommendations of learning contents, content delivery, performance evaluation, and the maintenance of the psychological level through identification of the learning styles of the learners. The continual process of performance evaluation is commonly attributed by the challenging issues of Ontology Construction and Alignment in order to enhance the semantics of the evaluation documents. In the rest of the chapter, a novel rule-based e-learning management system is discussed as a solution for appropriate recommendations of the learning contents based on the psychological understanding of the learners for learning using fuzzy logic and the subsequent evaluation of the learners using Ontology Construction and Ontology Alignment technique using deontic logic. The experiments have been carried out on evaluating the learning of C programming language using an e-learning framework.

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1. INTRODUCTION

Learning environment focuses on increasing the individual performance, thereby increasing the organizational progress. E-learning is a terminology that represents an inventive shift in the field of learning, providing rapid and meaningful access to information and knowledge. An efficient E-learning management system is influenced by two major components, namely learning system and the subsequent evaluation system (Carver, Howard & Lane, 1999). The major goals of e-learning are reduction in the necessity for classroom training, constant progress monitoring of the target audience, track training effectiveness, bridge between training and knowledge management, time-management, cost-effective, improved task performance, high supported business objectives, flexible and convenient learning environment. E-learning is defined technically as “Anytime and Anywhere learning” thus reducing the performance factors with respect to time, effort and cost. The purpose of E-learning is fivefold namely flexibility, personalized learning, updated knowledge, intelligent tutoring system and continual assessment of learners’ progress. Moreover, the success of e-learning environments is greatly influenced by the factors like learning objects, content delivery, relevant information retrieval, performance evaluation and the maintenance of the psychological level through identification of the individual learning styles of the learners. The psychological level of the learners in an e-learning environment is greatly attributed by the learning styles of the learners involved in learning. A deep understanding of one’s own way of learning can lead to a great personal empowerment and self confidence. This kind of deep understanding can be known by analyzing the behavior of the learners involved in an e-learning environment (Sanders, & Suso, 2010). Since, the learner is independent of a tutor in e-learning, the learning style is absolutely vague in nature. An understanding of learning styles can be used to identify and implement best teaching and learning strategies. Learning styles have also been shown to have an impact on the effectiveness of online learning.

Semantic Web (Lee, Hendler, & Lassila, 2001) focuses on effective management of documents intelligently which are present in the Web by considering the properties of the entities (terms) and the relationships involved among them. This conceptual organization is facilitated by building ontology pertaining to a particular domain (Perez, Lopez, & Corcho, 2003). One of the major areas of research in retrieving the web information intelligently is the provision of learning course contents through online (E-learning) (Deborah, Baskaran, & Kannan, 2011; Bateman, 2010). The prerequisite of the semantic-driven resource management and content delivery in E-learning web service has been facilitated in such systems by building Ontology. Therefore, this kind of technique can be utilized for the performance evaluation component of the learning management system.

1.1 Impact of Learning Styles in Learning

Learning Style is defined as a particular way in which an individual learns. A deep understanding and analysis of the e-learners, learning styles can be used to implement better teaching–learning methodologies (Dunn, 1990; Budny, & Paul, 2003). Accordingly, learning styles are “characteristic, cognitive, affective, and psychological behaviors that serve as relatively stable indicators of how learners perceive, interact with and respond to the learning environment” (Carver et al., 1999). An understanding of learning styles can be used to identify and implement best teaching and learning strategies. Intelligent web-based systems, such as INSPIRE (Papanikolaou, Grigoriadou, Magoulas, & Kornilakis, 2002), ARTHUR (Gilbert, & Han, 1999), AES-CS (Triantafillou, Pomportsis, & Georgiadou, 2002), Tangow (Paredes, & Rodri-
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