

Chapter 2

E-Learning and the Semantic Web: A Descriptive Literature Review

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ABSTRACT

A number of 3.0 e-learning systems have been proposed in the literature to capture the numerous benefits that the Semantic Web has to offer to the higher education sector. These 3.0 e-learning systems identify some essential Semantic Web characteristics that are either discussed as stand-alone factors or tend to revolve around the complexities of the Semantic Web technology and its implementation, often disregarding users' needs. Conversely, a comprehensive analysis of e-learning models for higher education in the literature revealed several Critical Success Factors (CSFs) that are relevant to the Semantic Web but often overlooked in 3.0 e-learning models. Consequently, this chapter provides an overview of the CSFs of e-learning relevant to 3.0 e-learning systems as well as an overview of the main Semantic Web characteristics for e-learning to define a new and combined set of 3.0 e-learning characteristics that will holistically represent 3.0 e-learning systems capturing the needs and expectations of users. The new initial 3.0 e-learning model proposed is evaluated within the higher education sector in Mauritius.

INTRODUCTION

E-learning has been integrated in many universities as a modern, efficient and effective alternative to learning, especially to assist in the increased demand in higher education. With the rapid development of information and communication technologies (ICT) and the increasing needs for empowering students with critical thinking and analytical skills, it is considered a must to revolu-

tionise current e-learning practices (Karunasena, Deng & Zhang, 2012). Efforts are being directed at building 3.0 E-learning systems in line with the Semantic Web. In fact, *Semantic Web* is seen as a promising technology to meet E-learning requirements, as it promises the best capabilities for composition and reuse of materials and contexts within E-learning. This chapter seeks to identify and integrate essential *E-learning* and *Semantic Web* characteristics from the current literature

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to develop a new *3.0 E-learning model* which aims to provide a holistic representation of 3.0 E-learning. A comprehensive literature review will be conducted on current E-learning models as well as current Semantic E-learning models to identify a new and collective set of *3.0 E-learning characteristics* from users' perspectives.

E-LEARNING AND THE SEMANTIC WEB: LITERATURE REVIEW

Effect of Technology on Teaching and Learning

Constant development in Information and Communication Technology (ICT) has significantly enhanced teaching and learning processes. Students are no longer regarded as consumers of information provided to them by instructors and undertaking academic activities in isolation or in isolated local groups (Keats & Schmidt, 2007). Rather, the shift is towards more interaction between students and lecturers and between peer-to-peer students. The key to supporting this evolving learning environment is the Internet. In fact, the Internet is believed to have transformed, if not revolutionised teaching and learning processes (Mering & Robbie, 2004). It has paved the way to a web-based education system and provides the platform for numerous technologies to assist in enhancing the teaching and learning process.

Evolution of the Web

The World Wide Web (WWW) has seen some important changes over the last few years. It has changed from being "an access technology" into a "participating technology" with the advent of Web 2.0 (Keats & Schmidt, 2007, p. 2). While Web 1.0, commonly considered as the 'Read Only' web, is considered as the first generation of the web, Web 2.0 or the 'read-write web' refers

to a loose collection of technologies (podcasting, blogs, wikis, social networking services, social book marking, file sharing) designed to facilitate collaboration and sharing between users (Kennedy et al., 2007; Naik & Shivalingaiah, 2008). With recent developments in web technologies, efforts are now being directed to make the web more intelligent to provide higher-level services to users - namely Web 3.0 (also referred to as the Semantic Web). This undeniably has several implications for the educational world, especially with regards to web-based education.

Web-Based Education System

Web-based system to higher education has numerous advantages, including classroom and platform independence, availability of authoring tools to develop web-based courseware, cheap and efficient storage and distribution of materials, hyperlinks to suggested readings and digital libraries" (Devedzic, 2004, p. 165). However, efforts are ongoing to improve such a system to meet some of its challenges, namely more adaptivity and intelligence. While intelligent web-based educational systems introduce some amount of adaptivity and intelligence in web-based teaching and learning, it is believed that the Semantic Web will further contribute in meeting these challenges (Devedzic, 2004).

The Semantic Web

Semantic Web encompasses efforts to build a WWW architecture where content is enhanced with formal semantics, creating an environment where automated agents are able to perform tasks efficiently on behalf of users (Stojanovic, Staab & Studer, 2001). The motivation behind the Semantic Web is largely because the current web is "not smart enough" to provide users with required information (Devedzic, 2004, p. 166). This is due to the large amount of information available on the

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