

## Chapter 55

# Personalised E-Learning: The Assessment of Students' Prior Knowledge in Higher Education

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### ABSTRACT

*Society's use of mobile applications that instantaneously dynamically adapt to input has had the effect of users expecting immediate feedback from all applications based on their specific needs. The traditional concept of a one size fits all approach to managing an online learning environment could perhaps be improved by the inclusion of personalised learning experiences for students based on their prior knowledge. The purpose of personalised e-learning is to tailor learning content to the specific learning requirements of individual students. The focus of this chapter is to review the topic of personalised e-learning and discuss the issues and problems educators may encounter in assessing students' prior knowledge. Information on students' prior knowledge is required to inform the process to facilitate personalised e-learning experiences based on prior knowledge.*

### INTRODUCTION

In recent years, human communication and interaction has changed dramatically. Mobile devices have played a large part in the changing communication patterns of society. For centuries people gathered around fires, or met at the cross-roads to share information and news. No longer is there a need to physically meet to communicate. Information is readily available from all over the world at the touch of a button. For many years,

players challenged each other across tables or in fields playing games. Now, gamers can challenge the wits of others through online games like RUZZLE (MAG-Interactive, 2013). And players can challenge the skills of others through online games like FIFA 14 (Fifplay, 2013), from anywhere around the world through the use of mobile devices and the Internet. Some online games are highly addictive (Chih-Chien & Yi-Shiu, 2007; McCormack & Griffiths, 2012; Wan & Chiou, 2007; Young, 2009).

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Online personalisation is rapidly increasing. Personalisation enables users to work with professionals to obtain a service best suited to their specific needs (Hartley, 2007). Many retailers store information on their customers and potential customers in order to target them with products considered necessary, suitable or desirable to that classification of individual.

One possible way to make e-learning more appealing to students is to personalise the content to suit individual students learning requirements. Chen (2009) observes that no fixed learning pathway will suit the learning requirements of all students. The objective of personalised e-learning is to provide learners with pedagogically sound content which is tailored to their specific requirements and preferences (Conlan, O’Keeffe, Brady, & Wade, 2007; Dagger, Wade, & Conlan, 2005). One of the challenges to educators today is to provide flexible, independent learning which is ubiquitously available (Huang, Webster, Wood, & Ishaya, 2006; Koper & Manderveld, 2004). Another challenge for educators is to employ the use of the semantic Web to facilitate personalised learning experiences (Huang et al., 2006; Yalcinalp & Gulbahar, 2010).

Learning Object Metadata (LOM) is the main standard in use for describing learning content (Huang et al., 2006). LOM is saved data which is used to assist easy and relevant retrieval of learning objects. Interoperability is an important factor when considering using LOM or the semantic Web for the purpose of delivering personalised e-learning. Huang et al. (2006) suggest LOM is not adopted as the standard for most Learning Management Systems.

Personalised e-learning would afford educators the opportunity to target students with content considered necessary, suitable or desirable to that classification of student. O’Donnell, Sharp, Wade, & O’Donnell (2012) in a study found that sixty percent of academics surveyed were of the opin-

ion that there is a need to personalise e-learning. Fifty-five percent of academics thought the most important student characteristic on which to base personalisation was the student’s prior knowledge and 48% thought personalisation based on prior knowledge would be the easiest to achieve (O’Donnell et al., 2012).

Chen, Lee, and Chen (2005) suggest the main research issues to be addressed in personalised e-learning systems are learner ability and cognitive overload. Traditional e-learning environments do not lend themselves to assessing individual students’ learning ability. Therefore, all students participating in a course of study were presented with the same learning content. A proportion of the students due to prior knowledge may not require access to all of this content, while others may require access to course content on some basic or threshold concepts to assist their understanding of more complex concepts. In addition, the volume of content could lead to cognitive overload in some students. The traditional concept of a “one size fits all” approach to managing an online learning environment (De Bra, Stash, Smits, Romero, & Ventura, 2007) could perhaps be improved by the inclusion of personalised learning experiences for students based on their prior knowledge. A personalised e-learning experience would facilitate the students learning ability and reduce cognitive overload by presenting students only with content which was selected to suit their particular learning requirements.

When engaging with technology enhanced learning prior knowledge can influence students interaction with hypertexts and the learning achieved, while also possibly improving effectiveness, efficiency and user satisfaction (Weibelzahl & Weber, 2002). Prior knowledge is the most commonly used characteristic in determining personalisation in Adaptive Hypermedia (AH), prior knowledge includes conceptual knowledge, competencies, and skills (Sah, 2009). Prior knowl-

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