Open Learner Models in Smart Learning Environments

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EXECUTIVE SUMMARY

Smart learning environments (SLEs), like all adaptive learning systems, are built around the learner model and use it to support a variety of interventions such as mastery learning, scaffolding, adaptive sequencing, and adaptive navigation support. Open learner models (OLMs) "expose" the learner data to users through easily perceivable visual representations aiming to improve student self-reflection and self-regulated learning and also increase user motivation and even foster collaboration. This chapter presents the evolution and current state of OLMs, summarizes related research in the field emphasizing on OLM types, locus of control between the system and the user and visualizations categorized on the basis of quantized/continuous and structured/unstructured representations. OLM cases implementing typical SLEs features are described, along with representative real-life scenarios of incorporating OLMs in SLEs. Moreover, the chapter provides guidelines for designing effective OLMs and discusses current research trends in this active scientific field.

INTRODUCTION

Learner models reside at the centre of every adaptive educational system as one of its most significant elements, and is responsible for keeping track of a learner's knowledge, skills and competencies acquired during the learning process. A learner model may also represent additional information about the learner such as learning goals, personal traits, or preferences (Brusilovsky, Somyurek, Guerra, Hosseini, Zadorozhny, & Durlach, 2016). Adaptive systems use the learner model to support a variety of adaptive

learning interventions such as mastery learning, scaffolding, adaptive sequencing, or adaptive navigation support (Brusilovsky & Peylo, 2003; Durlach, 2014).

Bull and Kay (2008), and Bull (1997) support the belief that in order to increase the learners' level of engagement, stimulate the perception of their current status, and to encourage reflection in learning, a learner model can be opened to the inspection of learners and instructors. Learner models are opened through visual representations to allow interpretation of learner data in a simple way. Open learner models (OLMs) are learner models that can be viewed or accessed in some way by the learner, or by other users such as teachers, peers, or parents. Thus, in addition to the standard purpose of the learner model of maintaining data to enable adaptation to the individual according to their current learning needs, the learner model contents can also be of direct use to the user and stakeholders (Bull & Kay, 2010). In principle, any type of learner model can be opened to users, and the method of presenting the learner model may depend on the purpose of opening it, the target users, the learning context and the learning tasks to be performed (Bull & Kay, 2016).

This study presents the evolution and current state of OLMs and summarizes related research in the field, with emphasis on providing an overall listing of types and visualizations of OLMs. Moreover, the study presents cases of Smart Learning Environments (SLEs) that incorporate OLMs along with respective scenarios, and provides guidelines for designing effective OLMs. The study concludes with a discussion and recommendations on current research trends in this active scientific field that integrates a variety of related domains, such as adaptive learning, intelligent tutoring, learning analytics, information visualization, self-regulated and outcome-based learning, human factors, and more.

PROBLEM STATEMENT

The main concern of smart education is to form modern knowledge and skills in a way that makes the learner able to cope with society's needs and demands. Intelligent technology plays an important role in the construction of smart learning or educational environments. In smart learning environments (SLEs), learning has no limitation in time or space and has a variety of learning styles ranging from formal-informal and personal-social. According to Zhu, Yu, and Riezebos (2016, p.5) "learners are provided with personalized learning services as well as adaptive content, and according to their (learning) context and their personal abilities and needs. So generally, 'smart' in smart education refers to intelligent, personalized and adaptive". Therefore, it is obvious that OLMs can foster SLE's main goals as they record a learner's profile and offer many solutions to interpret what each learner prefers, needs and understands. OLM can be the key element to represent elements of adaptivity that an SLE needs.

LITERATURE REVIEW

What Is an Open Learner Model (OLM)?

The Open Learner Model (OLM), also known as Open Student Model (OSM) was introduced as a concept in the domain of Intelligent Tutoring Systems (ITSs) and adaptive learning environments to provide personalized instruction to learners. Traditionally, learner models were not accessible to learners, but this gradually changed after realizing the great educational value and benefits they could offer,