

Chapter XIV

Open Learner Modelling as the Keystone of the Next Generation of Adaptive Learning Environments

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ABSTRACT

It is believed that, with the help of suitable technology, learners and systems can cooperate in building a sufficiently accurate learner model they can use to promote learner reflection through discussion of their knowledge, preferences and motivational dispositions (among other learner characteristics). Open learner modelling is a technology that can help set up this discussion by giving the learners a representation of aspects of the learner as “believed” by the system. In this way/role, open learner modelling can perform a critical role in a new breed of intelligent learning environments driven by the aim to support the development of self-management, signification, participation and creativity in learners. In this chapter we provide an analysis of the migration of open learner modelling technology to common e-learning settings, the implications for modern e-learning systems in terms of adaptations to support the open learner modelling process, and the expected functionality of a new generation of intelligent learning environments.

INTRODUCTION

The history of the use of computers for training and education started soon after the introduction of the first commercial computers. For some time, research and development in this area have been under the influence of two main visions: one which sees information and communication technologies as useful *tools* for improving people's access to learning resources and enhancing their teaching and learning experiences, and another one which sees computers as intelligent *agents* playing a proactive role in the educational context, much as students, teachers and tutors do. Practitioners strongly influenced by the first view have been mainly concerned with developing systems that can make the ever-evolving information and communication technologies more useful for training and education. In contrast, practitioners strongly influenced by the second view have been mostly interested in enhancing the learning experience by making computers as flexible and supportive of learning as human tutors are capable of being (ADL, 2001; Gibbons & Fairweather, 2000).

Widespread implementations of the first approach, current e-learning systems such as learning management systems based on content, metadata and web technologies, are mostly designed to make information and learning materials easily available to a broader audience, while providing a set of tools for supporting, and hopefully enhancing, human-to-human communication. Their way of supporting learning, however, usually combines two simple models: provision of a rigid and predefined path through educational and informational materials, and allowing free content browsing and choosing. The danger of this approach, of course, is to replicate the traditional and ineffective educational approaches of *one serves all* and unsupported *consumer freedom* on a massive scale. On the contrary, intelligent tutoring systems (Polson & Richardson, 1988; Wenger, 1987), as products from the second approach, have always cared for their learners

as individuals and they have used adaptation and personalisation as essential mechanisms for achieving their purpose of promoting better learning by their users (Self, 1999). Nevertheless, intelligent tutoring systems have mostly stayed in their designers' laboratories, due to the difficulty of scaling them to more realistic settings and integrating them with other educational systems (Picard, Kort, & Reilly, 2007).

Learner models, understood as digital representations of learners, have been at the core of intelligent tutoring systems from their original inception (Carbonell, 1970). Learner models facilitate the knowledge about the learner necessary for achieving any personalisation through adaptation, while most intelligent tutoring systems have been designed to support the learning modelling process: a win-win strategy that have produced many successful systems in terms of their efficacy to improve learning. Learner modelling is a *necessary process* to achieve the adaptability, personalisation and efficacy of intelligent tutoring systems. Consequently, we need to introduce this same process into modern e-learning environments, and adapt it to its new working conditions, if we want an equivalent functionality in these systems (Brooks, Greer, Melis, & Ullrich, 2006; Brooks, Winter, Greer, & McCalla, 2004; Brusilovsky, 2004; Devedzic, 2003). Furthermore, a variation of learner modelling in which the learner plays an active role in the modelling process, known as *open learner modelling* (Morales, Pain, Bull, & Kay, 1999), sets the context for system and learners (and even other actors in the learning process, such as teachers) to discuss through suitable user interfaces the knowledge, preferences, motivational dispositions and other aspects of the learner as "believed" by the system. Beliefs can be inspected and negotiated (Bull, Brna, & Pain, 1995), leading to a better picture of the learner—or, at least, to a learner model which is known by the learner and the learner agrees more with. Learner reflection and awareness of their own conditions are promoted through this process,

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