Towards an Interactive Agent-Based Approach to Real-Time Feedback (IAARF) in E-Learning System

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Abstract. E-learning management systems use an interactive approach that presents the learner with learning objects to interact with during the learning process. Several interactive platforms for sharing learners' ideas, integrating mutual knowledge or providing feedback have been proposed. However, these approaches have met with limited success. Furthermore, although design education is already taking full advantage of the current state and economy of online information, online teaching materials suffer from scanty content, poor interactivity, and insufficient participation. This paper proposes an interactive agent-based approach to real-time feedback (IAARF) generation in e-learning systems for higher institutions of learning. This approach presents the possible way to use agents in an interactive manner to create learner profiles, guide the learners to set the learning goals, learner activities, and extract learner resources during the learning process. The major strength of this approach is the high level of learner engagement, with real-time feedback (RF) to the learner, shaping and transforming their learning dynamics.

Keywords: Agent-oriented, e-learning, interactive and real-time feedback.

1 Introduction

Feedback and interaction are important aspects of learning in e-learning systems [1]. Lack of interactions between learners and teachers is one of the main problems in web-based learning applications [2]. Engaging interactions are necessary because they are more likely to keep learners interested and mentally stimulated during a learning experience. During the learning process, a learner performs a number of actions where feedback is crucial in task solving [1]. An interaction in the context of this paper is a learning activity where a learner is presented with a problem or a scenario and must work to achieve a set goal. In a computer-supported learning environment, interaction plays a critical role in developing unstructured strategies and promoting learning effectiveness [3].

Several interactive platforms have been proposed for sharing learners' ideas, integrating mutual knowledge or providing feedback. These approaches still lack the

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consideration of cognitive differences among the learners resulting in very limited success [3]. Other researchers also point out that, although design education is already taking full advantage of the just in time and economy of online information, the online teaching materials suffer from scanty content, poor interactivity, and sense of insufficient participation [5]. Due to poor interactivity and sense of insufficient participation, learners can easily loose track and motivation during learning in an e-learning environment hence drop out. A major challenge facing providers of e-learning is provision of meaningful interactive courseware that is responsive to learners, allowing them to actively participate in the learning process [22]. Considering the popularity of the Internet, an automatic interactive feedback system for e-learning websites is becoming increasingly desirable [4]. More work needs to be done on the introduction of e-learning technology in a Ugandan education system especially in the use of agent technology for personalized real-time feedback generation to address the cultural diversity of the learners and their varying learner needs [11].

In an online learning environment, there is need to create a more effective interaction between the e-learning content and the learners [6]. New kinds of support systems are needed for effective interaction and to provide RF during learning process in e-learning. Agent systems can provide better support here as they can provide greater flexibility in the way learners utilize services provided by learning management systems (LMS) [7]. In this LMS, the feedback is generated by consolidating the predefined information after the learner has been assessed [2]. However, there is no mechanism in place for the feedback to reflect the learning objectives set for the overall learning content and achievements at different learning stages [8]. Furthermore, the feedback mechanisms that are used by the learners have changed with advances and growth of web-based learning systems [2]. To match with the changing learner needs, feedback mechanisms and the growth of web-based learning systems, there is need for an IAARF mechanism that will help the learners in their learning path. To provide this kind of feedback would satisfy a degree of success for individual questions, but it is difficult to customize feedback according to individual learner performance and to support continuous improvements during the learning process [8].

As the learning paradigm shifts to a more personalized learning process, users (learners, tutors, and instructional designers) need a dynamic feedback from their knowledge path [8]. A dynamic feedback addresses the changing needs of the learner because it is generated after monitoring what the learner wants at that time. The more immediate the feedback the better, because each steps of learning builds upon the previous one. If no feedback is given, then the next step may be build upon an incorrect interpretation. Learners appreciate real-time feedback that helps them improve [8]. The feedback given to the learner should be carefully phrased and timely provided in order to optimize its impact upon learning not demoralize the learner. It helps learners to maximize their potential at different stages of learning, training, raise their awareness of strengths and areas for improvement, and identify actions to be taken to improve on performance. Feedback is part of the overall dialogue or interaction between a teacher and the learner, not a one-way communication in the traditional classroom situation. Too often feedback in higher education comes after the course units are completed and too late to be of much use to learners. A new vision of learning requires a fundamental shift from current content-oriented