A Strategy to Join Adaptive and Reputation-Based Social-Collaborative E-Learning, Through the Zone of Proximal Development

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ABSTRACT

The educational concept of “Zone of Proximal Development”, introduced by Vygotskij, stems from the identification of a strong need for adaptation of the learning activities, both traditional classroom and modern e-learning ones, to the present state of learner’s knowledge and abilities. Furthermore, Vygotskij’s educational model includes a strong bent towards social and collaborative learning. The joint answer to these two trends can be concretely implemented through a tight integration between personalized learning paths and collaborative learning activities. Along this line, the authors designed the combination of the functions of two pre-existing prototypes of web-based systems, to investigate how the above integration can merge adaptive and social e-learning. LECOMPS is a web-based e-learning environment for the automated construction of adaptive learning paths. SOCIALX is a web-based system for shared e-learning activities, which implements a reputation system to provide feedback to its participants. The authors propose a two-way tunneling strategy to integrate the above prototypes. The result is twofold: on the one hand the use of the student model supported by LECOMPS in an adaptive e-learning course is extended to support choosing exercise activities delivered through SOCIALX; on the other hand the reputation and the skills gained during social-collaborative activities are used to update the student model. Under the social perspective induced by the integration, the authors present a mapping between the student model and the definition of Vygotskij’s Autonomous Problem Solving and Proximal Development regions, with the aim to provide the learner with better guidance, especially in the selection of available social learning activities.

Keywords: Adaptive E-Learning, Group Modeling, Reputation System, Social Collaborative E-Learning, Zone of Proximal Development
1. INTRODUCTION

Among the key factors to reach good quality and effectiveness, personalization of the learning experience is universally recognized to play a special role. This is even more crucial in the context of web-based learning, where maintaining the motivation and involvement of learners is a continuous challenge. Learner Centred Design (Quintana, Carra, Krajcik, & Elliot, 2001) requires considering a variety of learners’ characteristics, including different personal learning strategies, different experiences in the learning domain, and different motivations in undertaking the learning task. Activity delivery according to an accurate learner’s model is important, since learner’s motivation can be greatly influenced by the experienced success or frustration. It is then necessary to pay particular attention to the amount and quality of aids that are provided and to the acknowledgement of the improvements attained. The provided aids must be tuned on the learner’s assessed abilities, in order for the former to be neither oversized, which would dull the learners’ initiative and efforts, nor undersized, which would be useless if not counterproductive. Learning experiences devised according to LCD aim at filling the gulf of expertise between the learner and the learning domain (Quintana, Carra, Krajcik, & Elliot, 2001), by making the learner acquire all the knowledge and abilities related to a given topic. In this context, it is necessary that technological issues rely on a consolidated educational theory (Soloway et al., 1996).

The constructivist theory is widely adopted nowadays, recognizing learning as a process concretely involving the active participation of the learner. Following the “learning by doing” strategy, the learner is guided to cognitively manipulate the new learning material and to create cognitive links between newly acquired and prior knowledge. According to this approach, any task must always be included in an actual and collaborative context, where learners should be assisted in finding their personal way to construct and refine concepts. To this aim, social confrontation with learning companions and teachers must be supported. In this way, learners take responsibility for their learning, while becoming more aware of their own knowledge. The social perspectives on the learning process expressed by “situated learning” (Anderson, Reder, & Simon, 1996), have further extended the constructivist approach. A situated view of learning implies that effects of learning activities will depend on the context in which they are performed, with all the components of a learning environment (people and artefacts) interacting and contributing to the learning process. An amalgam of the principles of constructivism and situated learning is often referred to as “socio-constructivism”.

From an operative point of view, accepting and putting into practice the above considerations means that, given a common topic, the learning contents of a course, for different persons are likely to differ. In the context of a personalized learning path, the selection of contents is tailored to the specific learning characteristics and preferences of a person, so to make them more acceptable and, above all, more comprehensible. This is expected to increase motivation and active collaboration during the learning activity, and in general to originate beneficial effects on learning efficiency and learner’s satisfaction. Therefore, research is presently focusing on suitable automated construction, maintenance and delivery of adaptive e-learning courses. On the other hand, collaborative learning is considered a winning methodology to allow the development of critical thinking. In a collaborative environment, learners can be supported in sharing common training experience, in combining their skills, and eventually in preparing for team-based working activity (Cheng & Ku, 2009). E-learning should enter a social dimension, as a community in which social activities take place and social interaction skills are developed by the participants (Wenger, 1998; Wenger, 2001). Within the social dimension, it is important to consider the concept of reputation. A reputation system is able to capture and make evident to the community the contributions of each learner to the group, to the class and to the course. In this respect,
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