A Problem Solving Using Intelligent Social Network

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ABSTRACT

Nowadays, students are becoming familiar with the computer technology at a very early age. Moreover, the wide availability of the internet gives a new perspective to distance education making e-learning environments crucial to the future of education. Intelligent tutoring systems (ITSs) provide sophisticated tutoring systems using artificial intelligence techniques in computer programs to facilitate instruction. ITSs support problem solving by providing adaptive scaffolding in terms of feedback, guidance, problem selection and other types of help. Little attention has been devoted thus far to the difference between novices and advanced students in learning from social network and ITSs. Furthermore, students can benefit from collaboration in social network environments especially when this is combined with an ITS.

KEYWORDS

cognitive load, Intelligent tutoring system, problem solving, social networks

INTRODUCTION

In modern teaching methods, learners need to construct knowledge through knowledge sharing with other learners. Without intelligent tutoring system, learners have to organize knowledge sharing them and this could induce extraneous cognitive load (Sweller et al., 2011). To optimize cognitive load, we present study combined intelligent tutoring system and social network to improve problem solving performance (Zatarain-Cabada, R, M et al., 2012).

Intelligent tutoring system (ITS) helps students to deconstruct problem solving procedures into sub-goal labeled worked examples. Deconstructing procedures into sub-goal labeled worked examples helps learners to better recognize the structural components of the problem-solving process (Margulieux & Catrambone, 2016; McLaren et al., 2016). However, this method for learning has been through passive learning methods, and passive learning methods are typically less effective than constructive learning methods. To promote constructive methods of learning sub-goal labeled worked examples, an intelligent tutoring system was used to guide learner in a social network.

A Social Network System (SNS) is an effective tool for engaging learners to make sense of new information based on prior knowledge (Mahnane, 2017). This tool is typically more effective when
learners receive some guidance, especially if they are novices, because it helps them to focus their attention on relevant information.

Following this introduction (Section 1), the paper continues with a related works in Section 2. In Section 3, the system architecture is described, while Section 4 explains the experiment of the proposed system and the results obtained from the evaluation. Finally, Section 5 summarizes the outcomes of this research and future work.

RELATED WORKS

Learning from Social Networks

The benefits of using SNSs as learning tool for students are to support collaboration and communication between students, enhance learning (especially that of language), increase students’ motivation and provide psychosocial benefits. (Henderson et al., 2010) stated that SNSs are increasingly accepted by educators due to its ability of offering strong communication and collaboration areas for the activities in classes. Additionally, (Hosny & Fatima, 2012) revealed that learning through SNS can help students to engage actively in the learning process, while eliminating the traditional lessons taught through presentation materials. (Wang C.M, 2012) reported that SNS usage in education introduces comprehensive learning that benefits both the students and teachers. It was also found that students are more serious toward online materials as opposed to conventional materials.

Apart from learning tool, SNSs are also useful in increasing students’ motivation and engagement. (Hoffman, E. 2009) stated that adapting SNSs as a learning tool provides a supportive environment and contributes positively on student engagement, motivation, and interaction. According to (Griffith & Liyanage, 2008), the motivation for students is proportional to the amount of information presented on SNSs by their teachers.

Furthermore, there are some psychological benefits for students who use SNSs as a learning tool. (Tynes, 2007) and (Griffith & Liyanage, 2008), the two psychological benefits are facilitation of identity exploration and improvement in social cognitive skills.

One of the other benefits of SNSs is “learners’ centricity” when used as a learning tool for students. In the cyber space, SNSs allow individuals to interact with others that have similar interests within a subject area.

Despite the many advantages associated with using SNS as a learning mechanism for students, naturally there are always drawbacks in a method. The major problem is the extraneous cognitive load in SNSs. In SNSs, learners need to acquire knowledge through knowledge sharing with other participants. However, without a support such as ITSs, learners have to organize knowledge sharing themselves and this could induce extraneous cognitive load (Grosseck et al. 2011).

Learning from ITSs

Intelligent Tutoring Systems (ITS) mostly provide problem-solving opportunities, but recently there have been studies investigating the effect of combining problem solving with learning from Worked Examples (WEs). Early research on WEs identified the worked example effect, where students learning from examples learnt more and faster in comparison to learning from social network (Sweller & Cooper, 1985; Sweller, 2006). Novices often have incomplete knowledge which makes problem solving difficult due to the high cognitive load, but worked examples provide solutions with associated knowledge. One of the fundamental principles of the Cognitive Load Theory (CLT). (Sweller et al., 2011) is the borrowing principle, which states that a novice learner borrows the needed information from worked examples and connects the new information with the prior knowledge. (Sweller, 2006) views worked examples as an instantiation of the borrowing principle.
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