Supporting Self-regulated Learning with Moodle Forums

Shiyu Liu, University of Minnesota, 56 East River Road, Minneapolis, MN 55455
Email: liux0631@umn.edu

Abstract: The present study investigates effective approaches to facilitate college students' self-regulated learning. Moodle forums were employed as a platform for students to develop metacognitive skills in the learning of psychology, and digital concept mapping was used to measure their conceptual knowledge. The findings suggest that discussions on Moodle forums enhanced students' awareness of their learning processes and facilitated the development of metacognitive skills. Active participation in such discussions promoted knowledge construction in concept mapping.

1. Introduction

Self-regulated learning is crucial in successful knowledge acquisition. It refers to self-directed actions in which learners transform their mental abilities to attain goals (Zimmerman, 2000). To learn in a self-regulated manner, learners need to monitor their effectiveness and improve their methods of learning accordingly. Since self-regulated learning processes require in-depth reflection and sufficient motivation, they can be challenging for individuals to achieve. Powerful learning environments can be facilitators for the acquisition of self-regulatory skills (Boekaerts, 1999). Research has shown that technology-enhanced learning environments can help promote self-regulation in structuring knowledge and incorporating new information (Dabbagh & Kitsantas, 2005). However, it is still uncertain how we can effectively make use of them to facilitate self-regulated learning. Thus, the present study aims to answer this question by employing a widely used online learning management system, *Moodle* (Modular Object Oriented Dynamic Learning Environment).

Based on the basic account of social constructivism (Bauersfeld, 1995), *Moodle* supports a variety of online activities to make it easier for students to interact in real-time as a learning community, give each other feedback on their learning difficulties and provide support among themselves (Martin-Blas & Serrano-Fernandez, 2009). While most previous work on Moodle mainly focuses on its usability, few studies have evaluated Moodle's impact on students' learning processes. With an emphasis on self-regulated learning, the present study explores how to utilize Moodle to enhance learners' metacognitive skills and improve their conceptual learning. In particular, *Moodle forums,* an important tool for collaborative activities are used in this study to answer two research questions: 1) How do students' self-regulated learning strategies develop via participating in Moodle forum discussions? *and* 2) How does the development of these learning strategies relate to students' knowledge learning?

2. Methodology

Twenty-three college freshmen in a major Midwestern university participated in this study (mean age=17.5). They were enrolled in an introductory psychology course and none of them had taken any psychology classes before. All students were admitted into a special program in the university for being recent immigrants or from low SES families. The majority students were non-native English speakers (18 Hmong, 2 Chinese, and 3 African Americans). Over a span of 16 weeks, the students attended lectures twice a week, and each week they learned one chapter in the textbook *Psychology* by David Myers (10^{th} Eds). They were required to finish weekly homework that consisted of two components: Moodle forum discussions and concept mapping. First, a Moodle forum was designed each week for students to reflect on and share their study strategies as well as giving each other feedback. Upon completion of the discussions, students were expected to construct a concept map (Novak & Gowin, 1984) with the Cmap Tool (http://cmap.ihmc.us/download/) based on the content they learned in the corresponding week.

Students' self-regulated learning skills were measured by their discourses on the forums. The forum posts were entered into a spreadsheet and analyzed with the *grounded theory* approach (Glaser & Strauss, 1967) to identify the self-regulation strategies employed. To evaluate students' conceptual learning in psychology, the weekly concept maps were analyzed with the *relational scoring methods* (McClure & Bell, 1990). The propositions were entered into a spreadsheet and then scored based on their completeness and correctness. Computer-based concept mapping provides learners interactive access to knowledge elements and resources represented by means of diagrams, and learners cognitive processes are thus exteriorized and visualized, which makes it more convenient to structure knowledge and regulate learning (Jonassen, 1992). Therefore, using concept maps as an assessment tool in this study can help obtain information regarding students' conceptual understanding and levels of knowledge management.

3. Results and Discussions

On the basis of previous work by Zimmerman and Pons (1986), six strategies emerged from the analysis of students' forum posts (see Table 1). Preliminary results reveal that, throughout their participation in the forum discussions, students' self-regulation gradually transitioned from concerns regarding external factors (e.g., distractions in the environment) to internal factors (e.g., improving content learning skills). In particular, during the first three weeks, most participant students initiated their discussions with a heavy emphasis on concerns about time management and how to avoid external distracters. While a few students shared their strategies for content learning, the majority showed uncertainty about applying effective basic study skills. This trend was gradually replaced by increasing discussions that tap into the learning of course content. Starting from the fourth week, students became apparently more aware of evaluating each other's study strategies, and sharing their own experience in understanding a certain challenging topic or applying mnemonics to memorize vocabulary.

Table 1: Self-regulated Learning Strategies Used by the Participant Students

Categories of Strategies	Example Responses
Time Management	*I didn't have enough time to finish the reading. I should start early next time.*
Avoiding External Distractions	*It's better that you go to the library to study as it is much quieter there.*
Seeking others' help	*I want to join a study group as studying with others helps me understand the textbook better.*
Keeping Records	*I jot down things I do not understand during lecture and look them up later*
Rehearsing and Memorizing	*I reread the textbook twice to help me remember the vocabulary.*
Using Complementing Materials	*I'd suggest you use flashcards together with the study guide.*

Based on the frequency of emerged self-regulation strategies being discussed in the forum posts, students were categorized into two groups: High Self-regulation and Low Self-regulation. Preliminary analysis of students' concept maps shows that, although there was no significant difference between the two groups in the number of propositions included in the concept maps, the high self-regulation group scored significantly higher than the low self-regulation students. In other words, students who more actively shared their study strategies and evaluated others' learning showed better understanding of the concepts and their relationships. In comparison, those who were experiencing difficulty monitoring their own learning or commenting on others' posts tended to have more wrong propositions in their concept maps. Besides, the structure of their concept maps showed fewer knowledge connections and hierarchy than the high self-regulation students.

The present study takes a first step to exploring Moodle's role in facilitating students' self-regulated learning. The findings, although preliminary, reveal how engaging in Moodle forum discussions may influence the development of self-regulated learning strategies. More importantly, by introducing digital concept maps as an assessment tool for learning outcome, this work provides important implications for postsecondary teaching and learning in the subject of psychology.

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