

## Chapter 14

# Improving Students' Computing Skills and Attitudes toward Learning via Web-Mediated Self-Regulated Learning with Feedback in an Online Problem-Solving Environment

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### **ABSTRACT**

*Online learning is generally a solitary process without teachers' on-the-spot assistance. To help students achieve sustained learning effects, the authors conducted a quasi-experiment to explore the effects of web-mediated self-regulated learning (SRL) with feedback on enhancing students' computing skills, and their attitudes toward blended learning through online problem-solving. In this study, two cases were studied and compared, one a class deploying web-mediated SRL with feedback and the other without. The results showed that students who received web-mediated SRL with feedback outperformed those without feedback on computing skills and exhibited positive attitudes toward this instruction integrated with innovative teaching methods and technologies.*

DOI: 10.4018/978-1-4666-2053-7.ch014

## **INTRODUCTION AND PROBLEM STATEMENT**

Contemporary science educators suggests that students should learn to solve real-world problems, which can be viewed as classes of problem-solving tasks that are relatively more complex and ill-defined in nature, as well as creatively more demanding in contrast to those utilized in traditional textbooks (Wang, Chang, & Li, 2008). One of the key learning outcomes in problem-solving domains is the development of flexible knowledge, where learners know multiple strategies and adaptively choose efficient strategies (Star & Rittle-Johnson, 2008). A strategy is defined as a step-by-step procedure for solving a problem (Siegler, 1996). However, it challenges both instructors and students to apply strategies and learn through problem-solving in a web-based course without the teacher's on-the-spot assistance and monitoring (Shen, Lee, Tsai, & Ting, 2008). For teachers and researchers who strive to understand how to achieve successful student learning performances with learning technologies, the challenge becomes greater when new and unknown aspects are introduced to the university classroom (Ellis, Hughes, Weyers, & Riding, 2009). To respond to this challenge, the authors adopted a web-mediated self-regulated learning (SRL) with feedback approach to help students develop their computing skills and improve their attitudes toward learning in an online environment.

The following section outlines the context of vocational education in Taiwan, the need for SRL, and the need for feedback. Subsequently, we illustrate the research design and the interventions of web-mediated SRL with feedback in the blended learning (BL) environments. Finally, the main findings and implications for teachers and educators are discussed.

## **The Need for Self-Regulation Competence in Online Learning Environments**

Many vocational schools in Taiwan are suffering from insufficient student enrollment in the face of continually decreasing student population and increasing number of schools. Students with higher scores in the entrance examination used here usually choose and enter the national or traditional universities, while those with relatively poor grades are mostly admitted to the poorer performing institutions or private vocational colleges. In this regard, most students in these private vocational schools are low academic achievers (Lee, Shen, & Tsai, 2008a). It is also indicated that students in the vocational system tend to have low confidence and motivation in learning (Su, 2005), have low interest and negative attitude toward their learning (Chen & Tien, 2005), and do not adequately get involved in their schoolwork, (Shen, Lee, & Tsai, 2007a). Furthermore, many of the vocational students spend considerable time on part-time jobs, and do not regularly attend their classes. These conditions challenge almost every teacher in this context who tries to help develop students to be more competently skilled and competitive in the labor market.

In an online learning environment, students can learn anywhere and anytime (Chen, Wei, Wu, & Uden, 2009). However, the educational technologies have not yet succeeded in transforming our concepts and practices of teaching and learning (Wang, 2009). There is a continuing debate about the effectiveness of online learning environments designed for learning (Azevedo, 2005). In Taiwan, vocational students are generally more Internet-addicted than the general university students (Yang & Tung, 2007). It is difficult for teachers to help vocational students to be involved in an online

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