The Relationship Between Metacognitive Awareness and Self-Regulated Learning

Introduction/Need for Research

Metacognition has been defined in numerous ways however, Brown (1978) suggested two components: knowledge of cognition and regulation of cognition. "Knowledge of cognition refers to how much learners understand their own memories and the way they learn" (Sperling, Howard, Staley, & DuBois, 2004, p. 118). The knowledge of cognition component of metacognition can be divided into three distinct areas including declarative knowledge, procedural knowledge, and conditional knowledge (Paris, Cross, & Lipson, 1984). Metacognitive knowledge or awareness is generally believed to be a factor related to self-regulated learning (Sperling, et al., 2004). However, this may not always be the case, Sperling et al. (2004) also found conflicting data which suggested negative a relationship between academic management and metacognition existed. As a result of the contradictory data, which exists regarding this issue, continued investigation into this phenomenon is warranted.

Theoretical Framework

The theoretical framework for this study is grounded Bandura's (1986) social cognitive theory, particularly personal factors. At the center of Bandura's theory is the concept of reciprocal determinism suggesting that learning is the result of personal, environmental, and behavioral factors (Bandura, 1986). Personal factors include a learner's beliefs and attitudes that affect learning and behavior (Bandura, 1986). Researchers have applied Bandura's (1997) social cognitive theory to academic learning. As a result, self-regulated learning theory emerged which contends learning is directed by an interaction of cognitive, metacognitive, and motivational components (Zimmerman, 2000). Within this context, metacognition refers to the "skills that enable learners to understand and monitor their cognitive processes" (Schraw, Crippen, & Hartley, 2006, p. 112).

Methods

Participants for this case study were selected from enrollees in an online agricultural science course at an institution in the southwest United States university during the spring semester. Specifically, the students were enrolled in an online dual enrollment crop science course and through direct administration, 52 students completed the instrumentation used to measure motivation and online self-regulated learning. Student metacognition was measured using the Metacognitive Awareness Inventory (MAI) (Schraw & Dennison, 1994). The MAI is a 52 item instrument using a true/false format to measure eight constructs of metacognition: declarative knowledge, procedural knowledge, conditional knowledge, planning, information management systems, comprehension monitoring, debugging strategies, and evaluation. Self-regulated learning in online courses was measured using the Online Self-Regulated Learning Questionnaire (OSLQ). The OSLQ is a 24 item instrument using a five-point Likert-type scale to measure six constructs of self-regulated learning in online environments: environment structuring, goal setting, time management, help seeking, task strategies, and self-evaluation.

Findings

Students enrolled in the dual enrollment agricultural science course tended to have the highest level of self-regulated online learning within the construct of environment structuring (*M*=3.73, *SD*=.89). Students tended to have the lowest levels in time management (*M*=3.30, *SD*=.96). These data can be found in Table 1. In regard to metacognition, the mean score was 60.9 (*SD*=9.2) with a range of between 52 and 87 points for the lowest and highest scores respectively. This indicates a moderate metacognitive awareness. A Pearson Product Moment Correlation was calculated to determine the relationship between the two variables. Metacognitive awareness had a substantial negative correlation (Davis, 1971) with self-regulated learning in online courses (r= -.50, p = .01).

Table 1
Self-regulated learning of online dual enrollment students

Construct	*M*	*SD*
Environment Structuring	3.73	.89
Goal Setting	3.51	.73
Help Seeking	3.39	.98
Task Strategies	3.39	.98
Self-Evaluation	3.32	.92
Time Management	3.30	.96
Scale total:	3.45	.80

Conclusions

Students in this course were more likely to create an adequate learning environment for themselves to focus on completing their work than they were to manage their time. Although the students were able to manage their learning environment, they were only moderately aware of their cognition. Since the students were in high school, this finding could be attributed to their age and maturity. Metacognitive awareness was negative correlated with self-regulated learning. This conclusion was not surprising, as Schraw and Dennison, 1994 found similar findings. Similar to Schraw and Dennison, this finding should be viewed with caution as the sample characteristics and limited participation may have an impacted the results.

Recommendations

Although the negative correlation between metacognition and self-regulated learning was not surprising, it still stands in contrast to conventional wisdom. Continued research should examine consistency among measures of metacognition (Sperling et al., 2004). As well, future research in this area should employ multiple measures of cognition and other self-regulatory constructs to better define this relationship.

References

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice- Hall, Inc.

Bandura, A. (1997). Self-efficacy: The exercise of control. New York: Freeman.

Brown, A. L. (1978). Knowing when, where, and how to remember: A problem of metacognition. *Advances in Instructional Psychology, 1*, 77-165.

Davis, J. A. (1971). Elementary survey analysis. Englewood Cliffs, NJ: Prentice-Hall

Paris, S., Cross, D. R., & Lipson, M. Y. (1984). Informed strategies for learning: A program to improve children's reading awareness and comprehension. *Journal of Education Psychology, 76,* 1239-1252.

Schraw, G., Crippen, K. J., & Hartley, K. (2006). Promoting self-regulation in science education: Metacognition as part of a broader perspective on learning. *Research in Science Education, 36,* 111-139.

Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology, 19,* 460-475.

Sperling, R. A., Howard, B. C., Staley, R., & DuBois, N. (2004). Metacognition and self-regulated learning constructs. *Educational Research and Evaluation, 10*(2), 117-139.

Zimmerman, B. (2000). Attaining self-regulated learning: A social-cognitive perspective. In M. Boekaerts, P. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation (*pp. 13–39). San Diego, CA: Academic Press.