The Need for Cognition and Self-Regulated Learning in Online Environments

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Abstract
For students to be successful in online courses, they must be able to understand and control their learning. These abilities are known as self-regulated learning which consists of cognition, metacognition, and motivation. A student's need for cognition refers to the tendency to purposefully engage in cognitive activities. Students with high need for cognition have been found to be more intrinsically motivated to learn and put forth more effort when faced with challenging tasks. Guided by Bandura's social cognitive theory, this study sought to describe the relationship between self-regulated learning and the need for cognition among students enrolled in an online agriculture course. The findings indicated that students are effective at structuring their learning environments and setting academic goals. Furthermore, a moderate correlation was identified between self-regulated learning and the need for cognition. Suggestions are made to research strategies and provide guidance and support for students as they engage in more online courses.

Introduction
Over the past 20 years, students have been provided additional opportunities for learning (Chumbley et al., 2015). Since 2003, online courses have realized an increase in enrollment of over 400% (Allen & Seaman, 2013). According to the National Center for Education Statistics (2016), in 2013, there were over 5.5 million students enrolled in at least one online course, accounting for over 27% of all post-secondary students in the United States. Research Priority 4, within the American Association for Agricultural Education National Research Agenda, 2016-2020 (Edgar et al., 2016), addressed the need for meaningful, engaged learning in all environments. Bain (2004) concluded the best teaching is found, in part, when teachers let students assume control of their learning. This is particularly relevant due to the self-regulated nature of online learning. Technology and online communications have become dominant in the lives of millennials, which has led to evolving student interests and motivations to learn (Edgar et al., 2016). Therefore, as the number of students enrolled in online courses continues to increase, investigating self-regulated learning in the online environment is necessary to ensure student success in this academic setting (Chumbley et al., 2015).

The ability of students to understand and control their learning is referred to as self-regulated learning (Schraw et al., 2006). Self-regulated learning is also believed to include background

knowledge, metacognitive knowledge, and various motivational constructs (Sperling et al., 2004). These constructs guide students as they develop goals and establish strategies to achieve their academic objectives (Schraw et al., 2006). Learning more with less effort and higher academic satisfaction are typical of students who display higher levels of self-regulated learning (Zimmerman, 2000). However, effective self-regulated learning is not an innate ability, and students who do not practice individual responsibility and persistence are at risk of attrition in the online environment (Hart, 2012).

Self-regulated learning consists of three primary components: cognition, metacognition, and motivation (Schraw et al., 2006). Cognition includes the skills necessary to encode, memorize, and recall information (Schraw et al., 2006). Within the cognitive component, three types of learning skills are included and are referred to as cognitive strategies, problem solving strategies, and critical thinking skills (Schraw et al., 2006). These strategies include a variety of activities to improve learning such as student-generated questions before or during reading (Chinn & Brown, 2002) or the construction of graphs and tables (House, 2002) to provide students the opportunity to view the concepts. According to Pressley and Wharton-McDonald (1997), self-regulated students are varied and flexible in their use of cognitive learning strategies.

A student's need for cognition refers to the tendency to purposely engage in cognitive activities and enjoy thinking (Cacioppo & Petty, 1982). Individuals displaying motivated behaviors to engage in cognitive activities are described as having a high need for cognition, where those who are opposite are more likely to avoid those behaviors and activities (Cacioppo et al., 1996). Individuals who have a high need for cognition are more likely to be intrinsically motivated and will explore more learning strategies to address complex tasks (Day et al., 2007). These individuals are also more likely to put forth more effort with higher performance in the face of challenging tasks (Dornic et al., 1991). Additionally, the need for cognition has been found to be of equal or more importance than metacognition when solving challenging problems (Coutinho, 2006). Those individuals with a low need for cognition are more likely to use external regulation of learning and are more likely to use simple learning strategies (Cazan & Indrecia, 2014) and thus, do not develop the deep understanding of new concepts and ideas like those who display a high need for cognition.

Need for cognition has been positively correlated with self-regulated learning strategies (Cazan & Indrecia, 2014). Investing more cognitive resources when processing information (Enge et al., 2008), and reflecting upon relevant information when solving tasks (Cacippo & Petty, 1982), along with selecting more task relevant information (Verplanken, 1993) are behaviors associated with individuals who have a higher need for cognition. These areas are also key characteristics of effective self-regulated learners.

From an online perspective, especially with younger students, effective environment structuring is a key driver in academic success (Chumbley et al., 2015). In an asynchronous, online environment managing one's learning environment is paramount to effective learning. On the other hand, similar students have indicated low levels of task management strategies (Chumbley et al., 2015). Davis and Neitzel (2011) found students with low levels of task management were more likely to resist web-based learning. These issues may be attributed to maturity or lack of online experience. However, Cunningham and Billingsly (2003) noted as students begin to

successfully regulate and transition their learning, they develop the skills to seek sources of and acquire knowledge to be successful in an online environment.

Theoretical Framework

The theoretical framework for this study is grounded in 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 an individual'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).

From a social cognitive perspective, individuals learn to become self-regulated by progressing through four levels of development: observational, imitative, self-controlled, and self-regulated (Zimmerman, 2000). Observational learning is associated with modeling while imitative learning is focused on social guidance and feedback (Schraw et al., 2006). These factors tend to rely on external factors for development. On the other end of the spectrum, as students develop, they begin to rely increasingly on internal, self-regulatory skills (Schraw et al., 2006). As students become more self-controlled, they will develop "internal standards for acceptable performance and become self-reinforcing via positive self-talk and feedback" (Schraw et al., 2006, p. 112). Finally, at the self-regulatory level, learners possess strong self-efficacy beliefs, which allows them to utilize a variety of cognitive strategies to self-regulate their learning (Schraw et al., 2006).

Objectives

The purpose of this study was to describe the relationship between self-regulated learning and the need for cognition among students enrolled in an online agriculture course. The objectives guiding the study were:

1. Describe the need for cognition among students enrolled in an online agriculture course.
2. Determine the levels of self-regulated learning among students enrolled in an online agriculture course.
3. Describe the relationship between the need for cognition and self-regulated learning of students enrolled in an online agriculture course.

Methods

Participants for the study consisted of a convenience sample of students enrolled in an online dual enrollment agronomy course during the spring semester. Through a single direct administration, data were collected from 52 students who completed the instrumentation. The students were mostly male (58%) and predominately Hispanic (41%), with Caucasian (30%), Native American (19%), and African-American (10%) students completing the remainder of the sample. Due to the methods employed to collect data, no follow-up procedures were followed to assess non-respondents.

The Need for Cognition Scale measured students' tendency to engage in cognition (Cacioppo et al., 1984). The 18-item, five-point Likert-type scale ranges from strongly disagree (1) to strongly agree (5). As recommended by Cacioppo et al. (1984), scores on nine items were reverse coded. Items were summed for an overall need for cognition score. The Need for Cognition Scale has a reported Cronbach's alpha coefficient of .90 (Stedman et al., 2009).

To measure self-regulated learning in online agriculture courses, a short form of the Online Self-regulated Learning Questionnaire (OSLQ) was used (Lan et al., 2004). The OSLQ short form is a 24-item scale employing a 5-point Likert-type format with responses ranging from strongly disagree (1) to strongly agree (5). Barnard et al. (2008) indicated higher scores on the OSLQ indicated better self-regulation in online learning. Within the OSLQ, self-regulated learning is delineated into six constructs: environment structuring, goal setting, time management, help seeking, task strategies, and self-evaluation. The OSLQ has a reported Cronbach's alpha coefficient of .96 (Chumbley et al., 2015).

Findings

Describing the need for cognition among students enrolled in an online agriculture course was the was the purpose of the first objective. The Need for Cognition Scale was used to determine the participants' levels of need for cognition. The theoretical range of the scale equals 18 to 90. The mean score on the Need for Cognition Scale was 57.43 (SD = 7.41) with a range of 46 to 77 points indicating low need for cognition and high need for cognition, respectfully.

Objective two was to determine the self-regulated learning scores of the students enrolled in an online agriculture course. Students enrolled in the 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.

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

Objective three was addressed by using Pearson's Product Moment correlation coefficient to explore the relationship between online self-regulated learning and the need for cognition. A moderate correlation was identified between self-regulated learning and need for cognition (r = .37, p <.05).

Conclusions/Recommendations

Similar to previous studies, of the online self-regulated learning, environment structuring received the high scores. From this, it can be implied that students in an online environment understand their cognitive needs to the degree that they can create an atmosphere most conducive to their learning. Conversely, students still struggle with self-evaluation and time management. However, it should be noted the students participating in the study were still enrolled in high school and, due to maturity, these skills may not be fully developed. However, with the moderate correlation between need for cognition and self-regulated learning, it is apparent that the previously mentioned skills are important to success in an online environment. Stedman et al. (2009) noted a discrepancy when attempting to articulate when individuals develop the need for cognition among traditional college students. If there is a question about this concept among students of that maturity, it could be conceivably implied that the students in this study have yet to reach that point in their lives and, are thus, still developing the cognitive skills and awareness to evaluate their learning and develop more specific skills to address their learning needs.

With the daily advances in technology, it can be reasonably implied that distance learning will remain a staple in the educational fabric of this country. However, compared to traditional teaching and learning, this platform is still in its infancy. Teachers of online courses must be engaged with their students to the degree that they can assist with the development of the self-regulated skills needed to successfully complete distance classes. Further development of time management and self-evaluation skills among the enrollees in these courses is a must if meaningful learning is to take place. Incorporating problem-based learning and authentic assessment opportunities for students in these environments will further aid them as they continue to mature and develop into fully self-regulated learners.

Continued research must be conducted to aid researchers in understanding the personal, behavioral, and environmental factors that impact self-regulated learning. Since the need for cognition plays a moderate role in self-regulated learning, developing a model that delineates the factors influencing the need for cognition is warranted. Furthermore, developing an understanding when students begin to develop a need for cognition may provide teachers and researchers the necessary baseline date to begin aiding students to become more engaged in online learning.

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