Self-Regulated Learning Theory:

A Foundation for Digital Badge Assessment Systems

A Review of the Literature

Cameron Wills

Northern Illinois University

Author Note

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Abstract

Self-regulated learning theory has become increasingly important in the era of asynchronous, web-based learning environments. It is important to understand what self-regulated learning (SRL) is, its related concepts, and its promise for increasing academic performance in this young field. Self-regulation is often a requirement for success in web-based learning environments and so needs to be understood in order to be taught and modeled effectively. Future instructional design, especially those directed at self-directed learning environments should be sensitive to the elements, types, and methods of self-regulated learning. This paper reviews some of the existing literature on self-regulated learning theory and its related concepts. To goal is to provide support for a theoretical framework appropriate for designing digital assessment systems in an increasingly differentiated online learning landscape.

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A Review of the Literature

How can we enable students to manage their own learning? What does it look like when students take ownership of their learning experiences? These questions are addressed in the theory of self-regulated learning (SRL). A common definition of self-regulated learners describes them as active participants in learning who employ metacognitive, motivational, and behavioral self-management strategies to achieve their goals (Zimmerman & Martinez-Pons, 1986, 1990). In other words, self-regulated students initiate and direct their efforts in attaining knowledge and developing skills. Self-regulated learning is of particular interest to educators because it has shown to be a strong predictor of academic success and motivation (Pintrich & De Groot, 1990; Yang, 2005, (Zimmerman, Bandura, & Martinez-Pons, 1992) even more so than IQ ratings (Yang, 2005). This notion caries across multiple academic groups, domains, and contexts including: elementary schools, middle schools, high schools, and secondary education (Cheung, 2004; Pintrich & De Groot, 1990; Yang, 2005, Zimmerman & Martinez-Pons, 1990); face-to-face (Cheung, 2004; Pintrich & De Groot, 1990; Zimmerman & Martinez-Pons, 1990), online/distance education (Huang, Huang, Wang, Liu, & Sandnes, 2012), and self-directed learning environments (Bergamin, Werlen, Siegenthaler, & Ziska, 2012); academic (Bandura & Schunk, 1981; Bergamin et al., 2012; Cheung, 2004; Huang et al., 2012; Pintrich & De Groot, 1990; Yang, 2005; Zimmerman et al., 1992; Zimmerman & Martinez-Pons, 1990) and fitness performance (Bandura & Cervone, 1983). Zimmerman & Martinez-Pons (1990) explains that SRL theories are unlike other learning modes in that they intend to “explain student differences in motivation and achievement on the basis of a common set of processes” (pg. 51). SRL as a

goal of education can be encouraged through a variety of methods. Notably, the generation of structured, proximal goals (and subgoals) in tandem with performance feedback greatly encourages self-regulated learning in students by increasing their self-motivation and self-evaluation (Bandura & Cervone, 1983; Bandura & Schunk, 1981). This relationship of self-motivation as a component of SRL is made explicit later in Yang (2005).

The research shows that students who are actively engaged in their own learning process through metacognitive, motivational, and behavioral means achieve greater performance gains and achievements than they would otherwise (Pintrich & De Groot, 1990; Yang, 2005; Zimmerman et al., 1992; Zimmerman & Martinez-Pons, 1990). Self-regulated learning is a strong predictor of success across disciplines, academic groups, and contexts and is further enhanced through the creation of attainable goals and subgoals in tandem with structured feedback from those goal systems (Bergamin et al., 2012; Huang et al., 2012) For these reasons, self-regulated learning theory is important in understanding how to encourage student learning autonomy and ensuring academic success.

Self-Regulated Learning as a Predictor of Academic Success

Research has shown that students who self-regulate their learning achieve greater academic success in primary schooling (Pintrich & De Groot, 1990; Yang, 2005, (Zimmerman et al., 1992)) and in secondary education (Cheung, 2004; Huang et al., 2012). Additionally, the degree to which students display self-regulated learning becomes a better predictor of achievement than IQ and students achieve more when utilizing all three forms (cognitive, motivational, and behavioral) of self-regulation (Yang, 2005). This shows educators that academic success is not determined primarily by intelligence, but rather through a skill set that can be developed. The success of self-regulated learning in increasing student motivation and

performance is demonstrated across ability levels (Huang, Huang, Wang, Liu, & Sandnes, 2012; Zimmerman & Martinez-Pons, 1986) and appears to become more developed as students age (Zimmerman & Pons, 1986). It is perhaps unsurprising that gifted students also display greater self-regulation than traditional students (Zimmerman & Martinez-Pons, 1986). This may imply that gifted students are not determined necessarily by their intelligence, but by their ability to better self-regulate their learning. Indeed, self-regulation has shown to be highly correlated with cognitive strategy use, leading to increases in academic performance (Pintrich & De Groot, 1990). However, this requires properly developed self-regulated learning strategies to actually achieve gains through the use of cognitive strategy (Pintrich & De Groot, 1990). The implication is that students must have both the will and skill to employ self-regulated learning strategies in order to empower their cognitive strategy use. The conclusion to be drawn here is that perhaps educators should focus more thoroughly on improving student self-regulation of their own learning in order to achieve greater academic success (Yang, 2005).

Self-Regulated Learning: Types, Elements, Methods

Elements and Types

There are three elements of self-regulated learning: SRL strategies, self-efficacy perceptions of performance skill, and commitment to academic goals (Zimmerman, 1989). These elements, in turn, relate to types of self-regulation: *cognitive, motivational, and behavioral* (Yang, 2005). These types are part of an observable framework proposed by Yang (2005) and are important for identifying elements of self-regulated learning and their relationship to academic achievement.

Self-Efficacy

Self-efficacy is described as students' perception of the effectiveness of their perceived

skills and abilities in a given situation (Bandura & Schunk, 1981). Self-efficacy helps them understand what they are capable of and informs them of what they are able to achieve by measuring their performance against a standard (Bandura & Cervone, 1983; Bandura & Schunk, 1981). The importance of self-efficacy in self-regulated learning is linked to students' understanding of their current knowledge or abilities and the level of effort they need to produce to achieve success (Cheung, 2004). Simply, students are more likely to enact self-regulation if they understand what they are capable of in a given context.

Self-Motivation (commitment to academic goals)

Commitment to academic goals relies heavily on the influence of self-efficacy both toward academic achievement and for self-regulated learning, as well as personal goal setting (Zimmerman et al., 1992). Ones' commitment to goals could be partially described as self-motivation (Bandura & Schunk, 1981). Students' perceived intrinsic value of learning materials acts as a predictor of student motivation to employ cognitive strategies and engage in self-regulated learning (Pintrich & De Groot, 1990).

Methods

Concerning SRL strategies, Zimmerman and Martinez-Pons, (1986) identify students' SRL methods as: *organization and transformation of information, self-consequencing, seeking information*, and *the use of rehearsal or memory aids*. Organization and transformation of information suggests the transfer of raw information into meaningful arrangements for the sake of synthesis and the creation of new or recombinant meaning, while self-consequence infers students' self-sentencing in the form of reward or remediation events. For example, a student may self-consequence by going to a movie after the completion of a difficult assignment or by attending additional study sessions after they failed to meet a goal. Seeking information and the

use of rehearsal or memory aids are straightforward concepts that appear to be derived from motivational influences. Commitment to academic goals relies heavily on the influence of self-efficacy both toward academic achievement and for self-regulated learning, as well as personal goal setting (Zimmerman et al., 1992).

Self-Regulated Learning Across Domains, Academic Groups, and Contexts

With the understanding of how self-regulated learning acts as a predictor of success, how does it manifest across domains, academic groups and contexts? Bandura & Cervone (1993) demonstrate that self-motivation, a critical component of self-regulation, leads to improved performance in physical activity. They also site the relationship between self-motivation and a cognitive comparison of performance feedback and goals resulting as a product of cognitive self-regulation. This finding is fortified and expanded in Yang (2005) which provides support for a causal relationship model between cognitive, motivational, and behavioral self-regulation in academic settings. Self-regulation has been successfully used as predictor of cognitive strategy use and academic success in elementary, middle, high school environments (Pintrich & De Groot, 1990; Yang, 2005, Zimmerman & Martinez-Pons, 1990) as well as secondary education (Cheung, 2004). This is consistent with Zimmerman & Martinez-Pons, (1990) which reports that students' academic self-efficacy and use of self-regulated learning strategies improved and increased over their academic careers. It should be unsurprising then that self-regulated learning theory has also been used in the design of online/distance education and in open learning environments (Bergamin et al., 2012; Huang et al., 2012) given the asynchronous delivery of materials and reliance on student autonomy. These systems rely heavily on student ability to self-regulate their learning, though it is already recognized that SRL is contingent on a number of influences including student perceptions of self-efficacy, self-motivation, and use of self-

regulation strategies (Zimmerman, 1989). Therefore, it is reasonable to conclude that these web 2.0 systems account for these elements and work to maximize their contributions to student SRL.

The Role of Goal Systems and Self-Directed Learning in Student Self-Regulation

Goal Setting

Goal systems and feedback mechanisms have shown to increase subjects' performance and motivation (Bandura & Cervone, 1983) resulting in greater gains in achievement. Students' self-efficacy perceptions are important here, as those who feel able to reach their goals but are unsatisfied with their performance are motivated to make greater gains (Bandura & Cervone, 1983). This effect dissipates if the discrepancy between perceptions of self-efficacy and performance feedback are too great (Bandura & Cervone, 1983) or if the goals are too general (Bandura & Schunk, 1981). Simply stating that one's goal is to be better at math for instance does not allow for the informative feedback necessary for motivation because of its expanded meaning- resulting in abstracted feedback. Therefore, it is important that distal goals are structured into specific and attainable subgoals in order to be effectively motivating in self-regulation (Bandura & Schunk, 1981). By combining goals and performance feedback, subjects display higher gains in both performance and effort (Bandura & Schunk, 1981) and knowledge of their perceived skills and abilities are benefited by goal systems- helping them to better self-regulate (Cheung, 2004).

Self-Directed Learning

Students in self-directed learning conditions with proximal subgoals achieve success more rapidly, sustain their mastery, develop a greater sense of self-efficacy and intrinsic interest (Bandura & Schunk, 1981) and exhibit greater self-regulated learning (Bergamin et al., 2012). Students are also more motivated when their learning is managed (Huang et al., 2012) as is the

case in well-designed goal setting systems (Cheung, 2004). This is true for both high and low performing students and is an important point in the design of self-directed learning environments (Huang et al., 2012). By structuring goal systems to account for student perceptions of self-efficacy via proximal goal setting we encourage self-motivation and provide performance feedback as a cognitive mediation component, thus enabling students to self-regulate their learning. Web-based learning contexts work well to assist in students' self-regulation in self-directed learning contexts (Huang et al., 2012) due to the greater flexibility over their learning experience (Bergamin et al., 2012).

Effective Goal Setting for Self-Regulated Learning

Students' knowledge of their perceived skills and abilities are benefited by goal systems helping them to better self-regulate (Cheung, 2004). However, goal setting is a skill that must be taught (Bandura & Schunk, 1981; Cheung, 2004). As we have seen, it is an important skill for educators to develop in students because of improved effect on student motivation and self-efficacy both which are important for self-regulated learning, and in turn academic performance (Cheung, 2004). The positive effects of goal systems begin to breakdown, however, when deficiencies in self-efficacy occur (Cheung, 2004). This is reportedly due to student perceptions of the relationship of goal setting on academic performance, goal setting experience, lack of knowledge in skills in the process of goal setting, or lack of interest in the subject matter (Cheung, 2004). Because students are normally not able to divide distal goals into achievable subgoals effectively, they must be taught or modeled this skill in order to promote self-regulation (Bandura & Schunk, 1981). New web-based technologies, such as Mozilla's Open Badge architecture, would benefit from adopting these goal systems into their design in effort to promote self-regulated learning through modeling.

Conclusion

Review

Self-regulated learning has shown to be a strong predictor of academic success across domains, age groups, and settings (Bandura & Cervone, 1983; Bandura & Schunk, 1981; Bergamin et al., 2012; Cheung, 2004; Huang et al., 2012; Pintrich & De Groot, 1990; Yang, 2005; Zimmerman et al., 1992; Zimmerman & Martinez-Pons, 1990). There are a number of elements required for students to self-regulate their learning (Zimmerman, 1989) and there are observable types of self-regulated learning that have been identified (Yang, 2005). Students who self-regulate employ specific strategies in order to control their learning experience (Zimmerman & Martinez-Pons, 1986). Importantly, self-regulation is not a universal ability and relies on students' self-efficacy within a particular domain (Bandura & Schunk, 1981), their self-motivation to achieve (Bandura & Schunk, 1981; Zimmerman et al., 1992) in addition to developed self-regulatory skills (Pintrich & De Groot, 1990). Well-structured goal systems are important asset in assisting students in improving student self-efficacy and motivation to promote self-regulation (Bandura & Cervone, 1983; Bandura & Schunk, 1981; Cheung, 2004).

Future Research

The achievement boons self-regulated learning offers across domains, contexts, and age groups makes it an excellent foundational theory for the development of digital badging assessment systems. Areas for future research should include modeling SRL strategies in web 2.0 systems; including investigation into goal and feedback systems that promote SRL as well as the structural modeling of these systems to promote SRL behaviors. There is also promise in the use of external goal recognition systems (e.g., Mozilla's Open Badge architecture) to verify goal achievement in a structured and flexible manner which may promote the SRL elements described

by Zimmerman (1989). With the rise and growth of web-based learning environments it is clear that self-regulated learning theory will need to be a major consideration for future educators and instructional designers.

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