

# Evidence-based Approaches for Self-Regulated Learning

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*Abstract: Developing the self-regulation capacity of learners has been a focus of educational inquiry for several decades. Research outcomes from such studies indicate a variety of approaches to enhance the ability of students to effectively regulate their learning behaviors. This article provides an overview of research related to the development of self-regulated learning skills and abilities, with a particular emphasis on successful strategies for the enhancement of such skills in learners.*

*Keywords: Distance education, self-regulation, interactive television.*

*Resumen: El desarrollo de la capacidad de auto-regulación ha sido un tema de varios estudios de investigación en educación por varias décadas. Resultados de estos estudios indican una variedad de tendencias para fortalecer la habilidad de los estudiantes de regular efectivamente su proceso de aprendizaje. Este artículo provee una revisión general de la literatura relacionada con el desarrollo de habilidades y destrezas en auto-regulación del aprendizaje, con un énfasis específico en estrategias exitosas para el fortalecimiento de estas destrezas en los estudiantes.*

*Palabras clave: Educación a distancia, auto-regulación, televisión interactiva.*

## Introduction

Developing the self-regulation capacity of learners has been a focus of educational inquiry for several decades. Research outcomes from such studies indicate a variety of approaches to enhance the ability of students to effectively regulate their learning behaviors. Schunk (1998) suggests that to promote students' self-regulated learning, teachers should provide students with opportunities for self-reflective practice that improves student's skills to monitor, evaluate, and adjust their performance during the learning process. The self-reflective practice eventually helps students find their own learning strategies that enhance their achievement most effectively. Investigations that demonstrate effective

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strategies for the development of self-regulation skills can serve as valuable references for educational practitioners. This article provides an overview of research related to the development of self-regulated learning skills and abilities, specifically focusing in the areas of overt strategy training, embedded strategy usage, and additional instructional design considerations for the enhancement of self-regulation.

## Self-Regulated Learning and Academic Achievement

Researchers have developed various strategies or instructional models to regulate motivation, cognition, and behaviors (Garcia & Pintrich 1994; Ley & Young, 2001; Zimmerman & Martinez-Pons, 1990). Students' motivational beliefs significantly affect all phases of self-regulated learning. Thus, not only training students to use self-regulatory skills, but also create classroom environments that increase a student's motivation to use such strategies are important.

### *Self-Regulated Learning Strategies*

*Motivational strategies.* Motivational strategies help students enhance and sustain their motivation to engage in academic tasks (Wolters, 1999). Self-consequating refers to promising oneself an extrinsic reward as a consequence of completing academic task (Zimmerman & Martinez-Pons, 1990). A longitudinal study revealed that high school students who used a self-consequating-strategy were more likely to receive high school diplomas and pursue their degrees in higher education (Nota, Soresi, & Zimmerman, 2004). Interest enhancement is also a motivational strategy in which students manipulate materials to make them more interesting or challenging. For example, students may change a task to a game format or use a different strategy to solve problems. Research shows that college students use this type of strategy to increase their interest (Sansone, Wiebe, & Morgan, 1999). Self-talk refers to verbal self-encouragement (Wolters, 1998). To motivate themselves, students emphasize a reason for completing a task such as receiving a good grade. College students tend to use self-talk strategies frequently when they are studying for a test or working on difficult or boring tasks. Research shows that students who use self-talk strategy are more likely to use cognitive and metacognitive strategies (Wolters, 1998).

Wolters (1999) examined high school students' motivational regulation strategy use and its impact on motivation, effort expenditure, cognitive and metacognitive strategy use, and academic achievement. In his study, he identified two different types of self-talk. Mastery self-talk emphasizes mastering materials, whereas performance self-talk emphasizes receiving good grades. Several other motivational strategies such as self-consequating are also examined. The results

showed that high school students used performance-self talk most frequently to regulate their motivation. Environmental control and self-consequating were the second most used strategies. Motivational strategy use as a group was positively correlated to effort expenditure and cognitive and metacognitive strategy use. Among all motivational strategies examined in this study, performance self-talk was the strongest predictor of high academic achievement. Mastery self-talk strategy use was not related to cognitive strategy use, but strongly related to metacognitive strategy use (Wolters, 1999).

*Cognitive strategies.* Cognitive strategies include learning strategies to enhance memory such as rehearsal, imagery, elaboration (Garcia & Pintrich, 1994) and transformation or organization of materials (Zimmerman & Martines-Ponz, 1986). Rehearsals help students sustain information in their working memory (Garcia & Pintrich, 1994). For example, students may repeatedly write down new vocabulary words in their notebooks to remember spelling. They may also read aloud a text over and over to memorize phrases. Imagery refers to mental pictures that students form to enhance their memory. For example, to remember a group of vocabulary words, students may create a fictional story that represents the meanings of each vocabulary word. Students who use elaboration strategies relate a new concept to an old concept they learned previously. Transforming and organizing strategies include summarizing, outlining, or rearranging materials to make learning easier (Zimmerman & Martines-Ponz, 1986). For example, students may create a table to organize concepts they learned in class. They may write outlines before writing a term paper. Effective note taking is also an organizing strategy; while listening to a lesson, students identify and write down key ideas (Zimmerman & Martines-Ponz, 1986).

Although knowledge of these cognitive strategies is essential to enhance learning, students may not use such strategies effectively in an academic context. Various motivational factors such as self-efficacy and intrinsic interest significantly influences cognitive strategy use (Garcia & Pintrich, 1994).

*Metacognitive strategies.* Metacognitive strategies generally involve planning, monitoring, and regulating. The most important planning strategies are task analysis and goal setting. These activities help students plan their cognitive strategy use and organize information, and also activate prior knowledge related to the task (Garcia & Pintrich, 1994).

Commonly used monitoring strategies are self-recording and self-experimenting (Zimmerman, 2000). Many researchers view self-monitoring as the most critical process in self-regulation (Butler, 1997; Butler & Winn, 1995; Lan, 1998; Schunk & Zimmerman, 1997). Schunk (1983) examined the effects of self-monitoring on student achievement in elementary math class. The results showed that students who self-recorded their progress performed better and produced a higher level of self-efficacy and persistency than other students. Effectiveness

of self-recording has also been evidenced in high school (Zimmerman & Kitasantas, 1997). High school girls' students who self-recorded their performance of dirt-throwing regularly attained a higher achievement than those who did not self-record their progress.

Self-experimentation is used when information obtained through monitoring is not sufficient. Students systematically vary their performance and test different strategies to find the most effective one for them (Zimmerman, 2000). Self-testing is also a metacognitive strategy associated with self-monitoring and self-evaluation. Students may generate possible test questions and answer them to prepare for a test (Garcia & Pintrich, 1994). Wadsworth, Husman, Duggan, and Pennington (2007) found that use of self-testing strategies was one of the predictors of student success in college online courses. Students who received an A used more self-testing strategies than students who received B or lower grades.

Self-instruction and attention focusing are strategies to monitor or control attention. Self-instruction refers to self-verbalization that students describe their learning processes either covertly or overtly as they engage in a task (Zimmerman, 2000). For example, students may verbalize the steps of multiplication while solving a math problem. Self-instruction is one form of rehearsal strategy that helps students focus on a task and enhance their encoding and retention of materials (Schunk, 1998). Research shows that self-instruction is most effective when it is used at the earlier stage of learning new skills or when students face difficulty in learning materials (Schunk, 1982). Attention focusing is a strategy to eliminate distraction in order to concentrate on a task (Garcia & Pintrich, 1994). This is probably one of the most important self-control strategies in current adolescents' learning environment because students need to manage so many distractions to concentrate on study (Zimmerman, 2002). Kuhl (1985) found that low achieving students are easily distracted during tasks and tend to ruminate about prior failure more than high achieving students. Strategies to control mind state and screen out extraneous events enhances student achievement (Corno, 1993; Kuhl, 1985).

Finally, regulating strategies refer to the regulation of cognition and behavior for improving learning (Garcia & Pintrich, 1994). General self-regulatory strategies in academic learning can fall into this category. For example, when students face difficulty with understanding materials, they may go back and read a particular chapter in the textbook or review class notes. Test taking strategies such as skipping a difficult question and going back later are also regulating strategies (Pintrich & Schrauban, 1992).

*Resource management.* Resource management strategies generally include control of study environment, time management, and help seeking (Garcia & Pintrich 1994). Self-regulated learners can manage their study environment effec-

tively and choose a less distracting place to complete assignments (Zimmerman & Martinez-Pons, 1986). A student's management of academic study time also influences academic achievement (Zimmerman, Greenberg, & Weinstein, 1994). High achieving students usually have effective time management skills. They know how much time is needed to complete a task, so they allocate more time for difficult tasks and less time for relatively easier ones. To improve time management skills, self-recording is generally used. Students trained to use effective time-management skills tend to continue to use such skills and maintain higher grades even after the intervention (Zimmerman et al., 1994).

Help seeking refers to students' behaviors to obtain social help from others when they encounter academic difficulties (Newman & Schwagner, 1992). Research shows high achieving students use help seeking skills more frequently than low achieving students and they are likely to go to adults to obtain academic support (Zimmerman & Martinez-Pons, 1986). Newman and Schwagner (1992) have identified factors affecting students' help seeking behaviors. High self-efficacy students tend to seek help more often than low self-efficacy students. Students who believe that their academic achievement is not controllable and who do not expect positive outcomes are less likely to display help seeking behaviors. Also, personal relationships, closeness between teacher and students, or between students, affect student's selection of helpers. In addition, a teacher's instructional strategies such as encouraging students to ask questions increase students' help seeking behavior. Classrooms with mastery goal orientation encourage students to ask for help without feeling embarrassed. The structure of the classroom, including feedback and interaction, also affects student's help seeking.

## Enhancement of Self-regulated Learning Strategies

Because research has indicated that the previously described self-regulated learning behaviors have a positive impact on student learning, approaches have been explored for the development of such strategies in learners.

### *Strategy Training*

The strategic content learning approach (SCL) is one of the instructional models to promote self-regulated learning using scaffolding techniques (Butler, 1997, 1998). In the SCL, instructors or tutors do not provide explicit modeling, but use comments or questions to help students develop their own strategy. Students receive a few hours of individual tutoring per week. Each student chooses a task from various content areas such as writing and math. At first, the instructor assists students to analyze a task and set a specific goal. If instructors detect students' misconceptions of tasks, they may help students interpret a task requirement correctly so that students can set achievable performance goals. In strategy selection, students are encouraged to use their familiar strategies first, and then if

the strategy does not work, instructors help students examine the problem and revise the strategy or try a new one. After selecting a strategy, students are asked to articulate the process in their own words. The written description of strategy helps students implement, evaluate, and revise their strategies. In addition, the instructor supports students in monitoring their progress based on their strategies used and goals. As students monitor their progresses, they may modify their strategies and goals with the instructors' assistance. Finally, the instructor helps students establish their own strategy that works best for them.

Butler (1997, 1998) used the SCL for post-secondary students with learning disabilities. He examined effects of the SCL on student achievement, self-efficacy, and metacognitive skills. Pre- and post-tests were conducted using questionnaires and interviews. The results showed that the SCL is effective to promote self-regulated learning. Students improved their academic performance, increased perceived task-specific efficacy, and strategy use. In addition, students were more likely to attribute their success to their ability, effort, and strategy use rather than to support from others.

As described above, the SCL provides students with extensive social support through tutoring sessions. Therefore, this approach may also be effective for younger children who are at the observation and emulation levels in Zimmerman's developmental models (Zimmerman, 2000). While individual tutoring may not be feasible in distance learning environments, the research on the SCL suggests that providing assistance according to individual students' needs is important to enhance student's self-regulation.

Learning to Learn is a course offered for undergraduate students at the University of Michigan (Hofer, Yu, & Pintrich, 1998). This is also one of the strategy training models to promote self-regulated learning. At the beginning of the semester, students complete the Motivated Strategy Questionnaire to learn about motivational strategies. Throughout the course, the instructor teaches various cognitive skills such as elaboration, organization, as well as note-taking skills to enhance memory. When preparing for exams, students use a self-testing strategy: writing possible exam questions and answering the questions written by other students. As in the SCL program, the Learning to Learn course also requires students to set their personal goals. In this course, however, students set both distal and proximal goals ranging from goals for life to goals for today. The instructor encourages students to focus on proximal goals and attribute their performance outcomes to controllable factors such as efforts. To enhance time management skills, students are required to keep a journal of their daily activities.

Research on the Learning to Learn course showed that students who took the course focused on mastery of materials, decreased their test anxiety, and increased self-efficacy and interest. Those factors were also positively correlated to students' self-regulated strategy use (Hofer et al., 1998). Unlike the SCL, the

Learning to Learn is a model for group instruction and the instructor teaches strategies more explicitly. Corno and Randi (1999) suggest that while self-regulated learning strategies can be taught both covertly and overtly, students with less self-regulatory skills may learn more effectively when strategies are overtly introduced. Since covert instruction requires teachers' close monitoring of individual students, overt instruction may be recommended in group learning environment.

### *Embedding Self-Regulation Into Instruction*

Ley and Young (2001) proposed four principles for embedding self-regulated learning in instruction. They state that the four principles can apply to any instructional environments regardless of content areas, delivery methods, or a specific population. First, instructors should "guide learners to prepare and structure an effective learning environment" (p.94). Teachers may require students to record the time they spent on study and study environments, and submit the record. By doing so, students will pay more attention to environmental structuring. Teachers also should encourage students to select a quiet, comfortable, and less distractive environment for study, and provide suggestions on how to eliminate distractions (Ley & Young, 2001). Second, instructors should "organize instruction and activities to facilitate cognitive and metacognitive processes" (p.94). Teachers may use advance or graphic organizer and concept mapping, provide chapter summaries, and ask students to write outlines and identify important concepts to enhance students' organizing and transforming skills. Third, instructors should "use instructional goals and feedback to present student monitoring opportunities" (p.95). Goals and feedback are two critical factors that enable self-monitoring. The effectiveness of goal setting and self-recording has been discussed earlier. Providing frequent and systematic process feedback is important to enhance self-regulated learning. Feedback that encourages students to compare their progress with their goals facilitates students' self-evaluation processes most effectively (Corno & Randi, 1999; Ley & Young, 2001). Fourth, instructors should provide learners with continuous evaluation information and occasions to self-evaluate (p 95). Ley and Young (2001) suggest that teachers should provide corrective feedback and review the graded tests or quizzes frequently. The use of checklists is another technique that is especially effective in distance learning environments. Students may use the checklists that include measurable evaluation criteria, while working on their assignment. This allows students to make sure of the quality of their work and self-evaluate their progress. Providing information that shows students' cumulative grades or mastery of materials also support students' self-evaluation. The following instructional models are examples of embedded self-regulated learning instruction.

Lan (1998) used self-monitoring intervention in his graduate level statistics course. He developed a protocol with seventy-five statistic concepts to facilitate students' self-monitoring. Each day, students recorded the amount of time or frequency for studying statistics such as reading the text, completing assignments, and receiving help from others. They also rated their efficacy level for solving each statistical concept listed in the protocol. Students submitted their protocol sheets in each class. They were also allowed to try the questions that they missed on the test again to receive extra credit. Thus, the class focused on mastery goal orientation.

To examine effects of the intervention, Lan (1998) compared self-monitoring students with non-self-monitoring students in their academic achievement and self-regulated learning strategy use. The results showed that the self-monitoring group produced higher achievement. Self-monitoring students were more aware of the structure and organization of statistical concepts than others. In addition, self-monitoring students used other self-regulated learning strategies such as self-evaluation, memory enhancement, and environmental control more frequently than non-monitoring students. Furthermore, qualitative data indicated that the protocol helped students reflect the class content, identify their weak points, manage their time, decrease anxiety towards the class, and increase interest in the content (Lan, 1998).

Consistent with earlier studies on self-monitoring (Schunk 1983; Zimmerman & Kitsantas, 1997), Lan's (1998) study supports that self-monitoring facilitates student's self-regulated learning. However, he points out that even if teachers provide assistance for self-monitoring, such as providing a self-monitoring sheet, it may be difficult for students who do not usually self-monitor to change their old learning style. He observed that some students did not use the protocol sheet regularly or did not use it at all. Therefore, he states that at first, the instructor may need to force students to initiate self-monitoring. And also, to encourage students to self-monitor, students may need to see benefits of self-monitoring. This indicates that self-monitoring may be incorporated into the course structure as a requirement. If self-monitoring tools such as a self-recording sheet provided by teachers are well designed, students should be able to find it useful and see improvement of their performance, which in turn, motivates them to continue self-monitoring.

Azevedo, Cromley, Thomas, Seibert, and Tron (2003) found that adaptive scaffolding is effective to facilitate self-regulated learning. In adaptive scaffolding, a teacher provides learning goals and continuously assesses a student's understanding of materials to provide support during the learning process. A critical factor in adaptive scaffolding is that teachers must carefully balance the amount of support they provide while enhancing student's self-regulated behaviors. Thus, too much support for relatively high self-regulated learners may

hinder student's self-regulated learning, whereas insufficient support may not foster self-regulated learning behavior of less skillful learners. Research shows that adaptive scaffolding enhanced students' self-regulated strategy use, including activation of prior knowledge, monitoring their progress using various strategies, and adaptive help seeking (Azevedo et al., 2003). Thus, the aforementioned studies suggest that to promote self-regulated learning, teachers should provide support according to individual students' needs.

### *Additional Instructional Design Strategies for Self-Regulated Learning*

In addition to the previous intervention models, it is important to emphasize that classroom structure can affect students' self-regulated learning (Ames, 1992; Corno & Randi, 1999; Eshel & Kohavi, 2003; Kinzie, 1990). Kinzie (1990) states that "provision of learner control allows students to tailor their instructional experience to suit personal needs and interests..."(p.8). Thus, perceived learner control in the classroom significantly influences students' motivation (Kinzie, 1990). In their recent study on classroom control, Eshel and Kohavi (2003) found that perceived student control and perceived teacher control in the classroom are more likely to have an additive effect on students' academic achievement. Their research shows that when students perceive both a high level of learner control and a high level of teacher control, they produce the highest achievement. In contrast, they found that to facilitate self-regulated learning, a different balance of teacher and student control in the classroom is more effective. These results indicate that how much structure is needed in the classroom may depend on the levels of students' achievement and self-regulatory skills. Research shows that low achieving students are likely to perform better in highly structured learning environments (Kulik & Kulik, 1991). Thus, taken all together, low achieving students with poor self regulated learning skills may learn effectively in "teacher controlled" classrooms, while students with high self regulated learning skills learn effectively in learning environments which are well structured, but allow them to control their own learning.

In addition, the way teachers evaluate students' performance significantly influences students' motivational beliefs, which in turn affect their self-regulated strategy use (Ames, 1992; Butler & Winne, 1995). Corno and Randi (1999) state that when teachers provide a specific and qualitative feedback frequently and deemphasize the importance of grades, students are more likely to take challenging tasks. Furthermore, Schunk (1984) found that teacher's attributional feedback affects students' self-efficacy and attribution. He identified two types of attributional feedback, including ability feedback and efforts feedback. Ability feedback refers to teachers' feedback that focuses on students' ability, such as "you are good at this" (Schunk, 1994, p.83). On the other hand, effort feedback

focuses on students' efforts, such as "you've been working hard" (p.83). Ability feedback conveys that students' successes are due to their ability, whereas effort feedback conveys that their efforts bring success (Schunk, 1994). A study shows that students who received ability feedback perceive a higher level of self-efficacy and performed better than students who did not receive any feedback or received effort feedback (Schunk, 1984). Schunk (1984) also suggests that effort feedback is effective when it is provided for students who experienced continuous failure in the past. This is because effort feedback makes such students believe that they can be successful if they work harder next time. Consequently, students will continue to try improving their performance. Thus, Schunk's study indicates that teachers should provide ability feedback and effort feedback according to the student's achievement level (Schunk, 1984). Butler and Winne (1995) also suggest that for effort feedback to be effective, it should relate students' efforts to a specific strategy that they used to complete a task.

Finally, teachers' instructional techniques can enhance students' motivation and promote students' self-regulated learning (Pintrich, et al., 1994). When teachers assign students meaningful activities (Corno & Rindi, 1999), provide a choice of task, and allow students to work cooperatively, students increase self-efficacy and lower test anxiety (Pintrich, Roeser, & De Groot, 1994). Also, Pelco & Reed-Victor (2007) suggest that to enhance students' self-regulation, all class activities should match students' achievement level and teachers should break tasks into small pieces. Furthermore, Benbenutty and Zimmerman (2003) stress that teachers are important social models that directly affect students' motivational beliefs and self-regulated learning strategy use. Therefore, they suggest that teachers should be knowledgeable about self-regulated learning strategies and demonstrate the strategies in the class.

## Summary

As indicated by the many studies cited herein, educational research indicates a variety of effective, evidence-based approaches to assist learners in the development of their self-regulatory skills. The challenge (and also the opportunity) for academic professionals lies in the selection of strategies appropriate for the given learning context. The positive outcomes generated in this area of inquiry demonstrate great promise in our ability as educators to help students become more effective learners.

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