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A Review on Theories of Self-Regulation of Learning

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This article consists of a brief presentation of the main theoretical views in the study of self-regulation of learning. Despite the exponential growth of research on self-regulation of learning during the past decade, there remains considerable confusion over many issues, including what self-regulation is, what are the subprocesses involved and their relationships, and whether or not students can be taught to self-regulate. This confusion is partly due to the variety of theories that have been used to describe self-regulation and to different denominations that sometimes are given to one construct. Because helping students to become efficient self-regulators is a task that constitutes one of the greatest challenges in education nowadays, I attempted to concisely present some of the main theoretical approaches that have been used to assess self-regulation along with some current studies on the field and possible paths for future research.

Key Words: Self-regulation, knowledge, learning, metacognition

Throughout history there are several examples of individuals who despite of their humble origins, the circumstantial adversities they had to deal with in their lives, and the lack of opportunities to receive formal education, engaged in self-regulatory behaviors and educated themselves through self-determination, a strong will, and an inordinate effort. Such examples of self-disciplined practices can be found in the biographies of inspiring figures, such as Abraham Lincoln, Benjamin Franklin, and George Washington among others. Evidently, examples of self-regulation practices can also be found in the less prominent but equally enthusiastic strength of character of many ordinary people, such as, many refugee immigrants from Indochina, who have succeeded academically in the U.S.A. despite many disadvantages, such as a lack of fluency in English, poorly educated parents, and attending inner city schools with few resources and large numbers of low-achieving classmates (Caplan, Choy, & Whitmore, 1992). Similarly, innumerous people around the world demonstrate that persistence, resourcefulness, and self-reliance lead to academic success.

Self-regulated students are characterized by their attitude towards learning. They take responsibility for their own learning by believing that academic learning is a proactive activity and by engaging in several kinds of self-initiated motivational and behavioral processes (Zimmerman, 1986).

Self-regulation refers to the process whereby students activate and sustain cognitions, behaviors, and affects that are systematically oriented toward the attainment of goals (Zimmerman, 1989a). Effective self-regulation requires that students have goals and the motivation to attain them (Bandura, 1986; Zimmerman, 1989b). Moreover, it entails a dynamic interaction with and a sensitivity to the influences of one's social environments (Carvalho & Yuzawa, 2001).

Although educators do not have difficulty in identifying students who are self-regulated by their attributes, researchers have encountered great difficulty when using self-regulation as an explanatory construct (Zimmerman, 1994). This is because to identify, categorize, and define the processes that students use to self-regulate has proved to be an extremely hard task, mainly because researchers use different terminology and different theoretical paradigms to describe and explain their results.

Among the numerous theoretical paradigms used to assess self-regulation are: operant, phenomenological, social cognitive, Vygotskian, volitional, attributional, information processing, and constructivist approaches (Zimmerman & Schunk, 1989). The objective of this paper is to briefly review some of the major theories of self-regulation of learning tackling some of the main processes involved and to point out some path for future research.

The Behaviorist View

Self-determinism is an innate characteristic of human behavior that is assumed to be related to any account of self-control processes. However, the concept of self-control processes seems to vary according to the theoretical paradigm adopted. According to Mace, Belfiore, and Shea (1989), when operant behaviorists talk about self-control they are referring to one of two things: (a) attempts to provide a natural-science account of phenomena our common experience refers to as commitment, delay of gratification, or impulsiveness; or (b) actions of individuals that alter the environment at one point in time and that make more or less probable certain actions of theirs at a later point in time. This view entails a dynamic interaction between one's own behavior and this person's environment. Behaviors affect and are restrained by modifications in this environments in a reciprocal manner. Therefore, operant behavioral psychologists consider that, similarly to all kinds of behavior, self-regulatory behaviors are ultimately controlled by one's environment.

From the operant behaviorist perspective, self-control's essential features involve (a) selection among alternative actions, (b) the relative reinforcing value of the consequences for the response alternatives, and (c) the temporal locus of control for the alternatives (i.e., immediate vs. delayed consequences) (Brigham, 1982; Rachlin, 1974). The temporal locus of control is the hallmark of self-control. It is the addition of this feature that differentiates self-control from simple individual preference for one behavioral consequence over another.

Self-regulation is viewed as a process that is a result of a series of self-controlled behaviors presented by an individual. Operant behaviorist researchers have analyzed the self-regulation process into subprocesses that include self-monitoring, self-instruction, and self-reinforcement.

Self-Monitoring. Self-monitoring has been defined as a multistage process involving the observation and recording of one's own behavior (Mace & Kratochwill, 1988; Shapiro, 1984). Mace, Belfiore, and Shea (1989) suggest that self-monitoring requires an awareness of the occurrence of the target behavior that is to be controlled as well as the recording of the dimension of the target response such as its frequency, duration, or latency.

Because self-observations and self-recording provide information that may change the way in which individuals respond to reinforcement contingencies, they can be considered to be a potential basis for behavioral changes. Many variables can affect the tendency for behavior to change as a result of self-monitoring. Among them are motivation, valence and nature of the target behavior, individual goals, feedback, and reinforcement. Analyzing the functional relationships among variables in the self-monitoring process, the target behavior, and the consequences that ultimately control the target behavior is a way to assess how self-monitoring affects the relationship between behavior and its controlling consequences.

Self-Instruction. It is important to note that the operant behaviorist's self-instruction differs in many respects conceptually and procedurally from the cognitive behavioral self-instruction. It generally corresponds to either of the two types of discriminative stimuli: (a) arrangement of one's environment so as to come into contact with one or more stimuli that set the occasion for desired behavior (e.g., at night, a student may place a book that will be needed in school in the next day next to his or her school uniform in order to remember to bring the book to school); or (b) creation of individual rules that people use to control their own behavior (e.g., the creation of a checklist that should be gone through in order to assure comprehension of texts or facilitate performance on assignments or exams).

Self-Reinforcement. According to Mace, Belfiore, and Shea (1989), self-reinforcement describes a process in which a person comes into contact with a stimulus following the occurrence of a response that, in turn, results in an increase in the probability of the occurrence of the response subject to the performance standard. Contrarily to cognitive-behaviorists (e.g., Bandura, 1976; Kanfer, 1977) who believe that individuals can and do reinforce their own behavior, operant behaviorists have questioned whether self-reinforcement constitutes a true reinforcement process. Operant behaviorist researchers claim that self-administered stimulus that follows the target response is not considered a reinforcer because its access does not depend on the occurrence of the behavior (Catania, 1975; Goldiamond, 1976; Skinner, 1953).

In sum, for the operant behaviorist researchers, behavior becomes self-regulated when individuals arrange their environments in a variety of ways to alter the probability of their behavior producing reinforcing or punishing stimuli.

The Phenomenological View

The phenomenological approach is based on the assumption that the experiences of self, consciousness, and the objects of consciousness (i.e., perception, imagination, emotion, thinking, etc.) are real and can be systematically studied and verified.

Phenomenologist researchers (e.g., Eccles, 1983, 1984; Rosenberg, 1986; Westphal, 1982) view the self as the active constructor of cognitive representations and understanding of an objective world. They further assume that people's representations and interpretations of events are more powerful determinants of action than the events themselves. For example, the personal value (consequently motivation, amount of effort spent, etc.) that a person attaches to a certain learning task varies according to the individual's self-perceptions, needs, and goals related to that specific task not according to the task itself. Other variables, such as the importance of doing well, the intrinsic interest in the task, and its future utility also contribute to the overall value of the task and determine whether or not students will engage in self-regulatory processes.

According to this approach, people's beliefs are organized in self-structures (e.g., self-identity, self-worth, self-values and goals) and are formed by a variety of self-processes (McCombs, 1986). Among others, some self-processes that are important in motivation and self-regulation of learning are self-awareness, judgments regarding the importance of specific competencies, self-evaluation, self-development goals, and expectations for success or failure (McCombs, 1989).

Learning, similarly to self-development, is a generative and active process in which the self plays a key role in generating hypotheses, interpretations, predictions, and in the processing and organization of information (Wittrock, 1987 as cited in McCombs, 1989).

Previous researches have provided empirical evidence that self-regulation of learning develops naturally with the development of self-concepts, and self-processes such as self-awareness, self-monitoring, and self-evaluation.

Markus and Wurf (1987) suggested that students go through three main steps when self-regulating (i.e., goal setting, planning and strategy selection, and performance execution and evaluation). They also have shown that self-development has clear implications for students' abilities to self-regulate. For example, at first, when setting goals, students must be able to define what is important to them in order to establish their objectives. On the basis of this self-awareness and self-understanding they must be able to assess their possibilities of success or failure, generate outcome expectations, make commitments, and take responsibility for their self-development. In a subsequent step of their self-regulatory process, students have the opportunity to make personal plans and select the appropriate actions to accomplish their learning goals. Note that, in order to engage into effective planning and strategy selection processes, it is essential that students have developed an adequate amount of metacognitive knowledge. Finally, the performance execution and evaluation steps require the development of both self-monitoring and self-evaluation processes. By using of a series of metacognitive processes, students must be able to keep track of their objectives and of the employment of selected strategies, and monitor the discrepancy between their actual and desired goals.

In sum, as claimed by McCombs (1989), the phenomenological perspective suggests that the best way to enhance people's self-regulated learning capacities is to understand the importance of their beliefs in themselves as self-regulators.

The Social Cognitive View

The social cognitive approach, which considers that learners' cognitions can influence the instigation, direction, and persistence of achievement-related behaviors, is another theoretical paradigm that has been used to study self-regulation.

For social cognitive psychologists, self-regulation refers to self-generated behaviors that are motivationally aroused, metacognitively sustained, and systematically oriented toward the attainment of a specific goal. It is composed of three subprocesses (i.e., self-observation, self-judgment, and self-reaction) that are intrinsically related with one another and that do not operate independently of one's environment (Bandura, 1986; Kanfer & Gaelick, 1986; Karoly, 1982).

Self-Observation. Awareness of one's own behaviors is a necessary requisite for the implementation of effective self-

regulatory measures. According to Schunk (1989), people can assess their behavior on several dimensions: quality, rate, quantity, originality, and so forth. This assessment of one's own behavior has informative and motivational functions. On the basis of these self-observations, the person can assess how well he or she is progressing toward his or her goals and, if necessary, make appropriate behavioral adjustments.

Self-Judgment. Comparing the cognitive status or level of performance to one's goals is what social cognitive theorists call self-judgments. This assessment can be influenced by many variables such as one's level of self-efficacy, the types of standards employed, the importance of goal attainment, and the attributions made for one's performance. Self-judgments can enhance self-efficacy by promoting social comparisons; they can boost and sustain motivation by acknowledging progress towards one's goals; they can also affect future performance expectancies, behaviors, and affective reaction according to the causes attributed to one's success or failure (Weiner, 1985).

Self-Reaction. The way people react to their own perceptions of goal progress exerts motivational effects on behavior (Bandura, 1986). Unlike reinforcement theories, which state that consequences alter behavior, the social cognitive perspective postulates that the anticipation of consequences enhances motivations. Self-efficacy, along with the anticipated satisfaction of attaining the goal, can sustain students' motivation (Schunk, 1989). Tangible consequences, however, can also constitute an important stimulus to boost self-efficacy and the behavioral responses to one's beliefs and expectations. External rewards are likely to enhance self-efficacy when they are tied to students' actual accomplishments, because they symbolize progress (Schunk, 1989).

Social cognitive theory also emphasizes the importance of one's environments as a determinant factor in self-regulation. The belief that one is capable of attaining a certain goal is an important part of the self-regulation process. In addition, this belief is, at a great extent, acquired in social contexts, through social relations and comparisons (Schunk, 1983).

In sum, the social cognitive theory views self-regulation as a fundamentally context-dependent self-generated process that is related to one's self-efficacy beliefs, future outcome expectations, and the use of several metacognitive strategies to monitor and control regulatory behavior.

The Constructivist View

Constructivist theories of education assume that people are inherently impelled to action by internal and external forces and that this driving force leads to an active participation in the construction of one's own knowledge. Understanding goes far beyond the information given: People impose order to their perceptions, and generalize their actions to different objects and settings. For that reason, a person's construction of reality can also bring distortions and idiosyncratic misunderstandings. However, mental representations change with development and become more refined. Some of these progressive refinements are stimulated by intrinsic reorganization or reflection; others are stimulated by physical experience, social guidance, or new data (Paris & Byrnes, 1989). Active reflection and reconstruction of previously acquired knowledge makes learning possible. Constructivist theorists also emphasize that all these processes are socially mediated and constrained by developmental factors.

Piaget, one of the most exponent constructivist theorists, predominantly uses the metaphor of children as young scientists who formulate and test hypotheses about the world. Within this perspective, self-regulation consists of organization and adaptation, based on self-perceptions.

Some central features of children self-regulation of learning are (a) self-competence beliefs, which involve understandings of their own academic skills, personal agency, and control beliefs, (b) theories about effort, and (c) theories about strategies.

Self-Competence Beliefs. The development of children's perceptions of their academic abilities declines abruptly during school years (Nicholls, 1984). Children enter school with positive views of their own competence (Benenson, & Deweck, 1986; Stipek, 1981) and, until second grade, most of them believe that effort can compensate for ability and that effort and practice lead to greater ability. However, it seems that social factors and external evaluations gradually replace effort as the basis of self-perceived competence. As a consequence, by fourth or fifth grade, there is an increasing emphasis on social comparison, grades, normative feedback, and a growing realization that effort does not compensate

entirely for ability (Paris & Byrnes, 1989).

Another aspect of self-competence beliefs that changes along the years is personal agency, which means that people gradually take responsibility for their actions and attribute their successes and failures to the goals they choose, the resources they mobilize, and the effort they expend. In this aspect, perceived self-efficacy plays an important role, because it determines goal setting, outcome expectations, and motivational levels.

Paris and Byrnes (1989) asserted that control beliefs are the expectations that individuals hold about the likelihood that they can attain desired outcomes. Further, they claim that certain outcomes become desirable or unattainable according to individuals' beliefs about ability and effort. Learning problems often occur because of erroneous beliefs that students cannot control the desired outcomes of their learning.

Theories of Effort. Theories of effort yield a network of constructed beliefs and attitude about effort. They guide the self-regulation process by optimizing feelings of self-esteem while minimizing costs of work and emotional stress.

According to Dweck and Elliott (1983), young children are categorized as "incremental theorists" who believe that intelligence is a direct consequence of effort. With age, children's theories of effort become more informed by external data such as teachers' praise and behavior and more differentiated according to academic domains (Paris and Byrnes, 1989). Consequently, children evolve to a "entity theorists" stage, in which they believe that intelligence is limited and is not affected by effort.

Gradually, children become able to attribute the causes of their successes or failures to internal (i.e., effort, ability) or external (i.e., luck, other people) factors more accurately. Simultaneously, they also start to include affective reactions with attribution. For example, Weiner (1986) claims that according to children's attributions of success or failure to their expended effort or intrinsic ability they can feel pride, shame, guilty, or even anger.

Theories of Strategies. Strategy knowledge and effective use of strategies are two of the main characteristics of self-regulation of learning. Some strategies are used to organize information processing, while others are used to manage time, motivation, and emotions (Weinstein & Mayer, 1986).

Although strategies can differ in nature, specificity, and range of applicability, they all share some basic characteristics: (a) they are all intentional behaviors performed to attain particular goals; (b) they are invented or generated by the person and involve both agency and control; (c) they involve cognitive skill and motivational will that are selectively and flexibly applied; (d) they are often socially assisted tactics for problem solving; and finally (e) their developmental fate involves both automatization and transfer to a variety of tasks (Pressley & Levin, 1987).

In order to self-regulate, children first develop an awareness of what strategies are. That is, they start by developing declarative knowledge about the functions and purposes of a repertoire of strategies. Next, children learn how to use the strategies learned. They develop procedural knowledge about strategies. Finally, children learn about when and why to apply those strategies. They start to develop a conditional knowledge that will help them in choosing between more and less efficient strategies and in generalizing the learned strategies to different settings.

Pressley, Borkowski, and O'Sullivan (1985) claim that these three types of knowledge are coordinated by "metamemory acquisition procedures" that help children to fill gaps in instructions, monitor strategy effectiveness, and switch strategies when necessary.

In sum, constructivist theories of self-regulation view students as active constructors of their knowledge. As students mature, interact with other people, and acquire more information about their own learning processes, they engage in a series of cognitive processes that lead to modification of their theories of academic competence, effort, tasks, and strategies. At the same time, they adapt their behavior to their developing theories of self-regulated learning (Paris & Byrnes, 1989).

Links to Metacognitive Research

Self-regulation has been studied in a broad variety of ways and under several theoretical paradigms. Some of the current main trends of research focus on (a) internal variables, such as motivation, self-efficacy, and achievement values; (b) external variables, such as the use of strategies, the management of environmental resources, and help

seeking processes; and (c) on the instructional aspect of self-regulation, how can it can be taught and enhanced.

Despite of the several approaches that have been used and the variety of subprocesses and functions that have been studied, a convergent point for all the studies of self-regulation concerns the necessity and importance of self-reflective thought for the accomplishment of any regulatory enterprise. Metacognition refers to this self-reflective nature of human thought, that is, the ability to reason upon one's innermost psychological processes, to monitor their validity and effectiveness in order to accomplish one's goals, and to control one's behavior (Carvalho, 2000).

Many studies have directly assessed the role of metacognitive activity in self-regulation and many teaching programs to enhance self-regulatory abilities focusing on metacognitive strategies have been proposed. One example of such metacognitive teaching strategy program is the *Informed Strategies for Learning* (ISL) developed by Paris, Cross, and Lipson in 1984. In this study, children from four different classrooms were given an experimental curriculum that was designed to enhance children's awareness of the existence and value of reading strategies, to increase their effective use, and consequently to increase learning autonomy. Along four months of strategy training, ISL provided information about declarative, procedural, and conditional knowledge about reading strategies in conjunction with practice and guided learning. They observed that children who participated in the program made larger gains than did children in control classrooms on cloze and error detection tasks. This study demonstrated that metacognition can be promoted through direct instruction in classroom, that increased awareness can lead to better use of reading strategies, and, consequently, that it can enhance learning autonomy.

Another example of how metacognition can be used to enhance self-regulatory activity is found in the domain of second language acquisition (Victori & Lockhart, 1995). In this study, Victori and Lockhart highlighted the unifying role of metacognition in all levels of learner training. Holding the premise that any self-directed program should enhance students' metacognition to prepare them for approaching their own learning autonomy, they presented two cases in which the regular assessment of students' beliefs about language learning, preferred styles, learning needs and objectives, and resources and activities for their individualized programs are extensively used. They concluded that combining intensive counseling aimed at enhancing metacognition with varying intensities of contact classes and self-access activity has resulted in the learner perceiving an increased rate of progress in learning (Victori & Lockhart, 1995).

Similarly, there are many other studies that have been carried out under completely different theoretical paradigms and that emphasize the essential role of metacognition in self-regulatory activity. Among others, some examples are: Hallahan, Lloyd, Kneeder, and Marshall (1982), under the operant behaviorist paradigm; Markus and Wurf (1987), under phenomenological paradigm; Bandura (1986), under the social cognitive paradigm; and Paris, Lipson, and Wixson (1983), under the constructivist paradigm.

Path for Future Research

According to Schunk and Zimmerman (1998), much initial research on self-regulation focused on testing theoretical predictions and specifying self-regulation components and processes. Later on, other studies focused on the development of the construct, and especially on how instructional and contextual factors affected self-regulation. Most of these studies were consistently based on one theoretical perspective, were related to respective methodological techniques, and assessed specific kinds of contents and subjects.

Although many researchers are still investigating about fundamental theories, underlying processes, and key attributes, there are a new trend of research that focus on large-scale intervention methods whose effects are broader in scope and assessed over lengthy periods of time. Furthermore, current research is becoming more naturalistic in the sense that researchers are collaborating with practioners to integrate self-regulatory instruction as part of the regular academic curriculum (Schunk & Zimmerman, 1998). Bringing together research and practice is a promising path; more research on real academic settings is highly warranted.

Another aspect that deserves attention is that until now, most of the research related to the development of self-regulation has been done with western Europeans parents, teachers, schools, and children (Bronson, 2000). A greater

diversity in subjects, as well as, more cross-cultural research is also warranted.

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