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Article *in* Educational Psychology Review · June 1990

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Educational Psychology Review, Vol. 2, No. 2, 1990

Self-Regulating Academic Learning and Achievement: The Emergence of a Social Cognitive Perspective

Barry J. Zimmerman[1]

For three decades, social cognitive researchers have studied children's development of self-regulation as an achievement of socialization processes. I recount historically the emergence of a social cognitive perspective on self-regulation and identify its unique features. Two essential characteristics of students' self-regulated academic learning have been identified – their use of strategies and perceptions of self-efficacy. A social cognitive model of academic self-regulated learning is proposed that integrates triadic determinants of self-regulated learning (personal, behavioral, and environmental) on the basis of a strategic control loop. When students monitor their responding and attribute outcomes to their strategies, their learning becomes self-regulated, and they display increased self-efficacy, greater intrinsic motivation, and higher academic achievement.

KEY WORDS: self-regulation; achievement; social cognition.

INTRODUCTION

The forces of change have confronted American educators with an increasingly difficult challenge: Advances in technology are transforming the economic base of our society from industrial goods to information. In this age of information, a person's knowledge and skill have become the primary source of good jobs, self-confidence, and social prestige. The quickening pace

[1]Graduate School and University Center, City University of New York, Box 445, 33 West 42nd Street, New York, New York 10036.

of technological change places more demands on citizens to assume greater responsibility for learning new competencies. There is a growing pedagogical need to understand how students develop the capability and motivation to regulate their own learning.

Approximately three decades ago, social cognitive researchers[2] began to study various components of self-regulation such as response inhibition (e.g., Walters *et al.*, 1963; Walters and Parke, 1964), adoption of self-regulatory standards (e.g., Bandura *et al.*, 1967; Bandura and Kupers, 1964; Mischel and Liebert, 1966), delay of gratification (Mischel, 1961; Bandura and Mischel, 1965), and rule induction and use (e.g., Bandura and Harris, 1966; Bandura and McDonald, 1963). This research has led to the development of a unique triadic view of human self-regulation, involving personal, behavioral, and environmental dimensions. This perspective has proven to be useful to researchers interested in diverse aspects of self-regulated functioning, such as motivation (e.g., Bandura and Cervone, 1983, 1986), physical health control (e.g., asthma, obesity, smoking, heart disease, and diabetes) (e.g., Bandura, 1986a; Clark and Zimmerman, 1989; O'Leary, 1985), mental health improvement (e.g., phobias, sleep disorders, stress management) (e.g., Bandura *et al.*, 1982; Rosenthal and Downs, 1985; Rosenthal and Steffek, 1990), acquisition of physical skills (e.g., strength, sports, and tool use) (e.g., Bandura and Cervone, 1983, 1986), career choice and development (Betz and Hackett, 1986), complex decision-making and organizational functioning (Bandura, 1988a; Bandura and Wood, 1989; Wood and Bandura, 1989a, 1989b), and academic success (e.g., studying and test preparation and performance) (e.g., Schunk, 1984; Zimmerman and Martinez-Pons, 1986, 1988).

In the present article, I describe historically the emergence of a social cognitive perspective on self-regulation and identify unique features of the approach, delineate the essential characteristics of self-regulated academic learning, and, finally, propose a social cognitive model to explain self-regulated academic learning and achievement.

HISTORICAL OVERVIEW OF RESEARCH ON SELF-REGULATION PROCESSES

From the inception of the theory, social cognitive researchers have viewed self-regulation as an achievement of socialization processes (Bandura and Walters, 1963). Initial interest in this topic focused on self-control, which was defined as "the ability to control one's own actions in the absence of immediate external constraints" (Thoresen and Mahoney, 1974, p. 2). It was

[2]Prior to his 1986 text, Bandura referred to his view as social learning theory.

assumed there are demands, customs, and taboos in all cultures that require a member to exhibit self-control. This achievement was theorized to be the result of an *internalization* process that began with modeling and explanation of self-controlled behavior by parents, involved children's imitative performance and direct reinforcement by the parent, and eventuated in the independent display of the behavior by children outside the presence of their parents. Bandura (1977b) described it this way:

> At first, control is necessarily external. . . . As children mature, social sanctions increasingly replace physical ones. Parents cannot always be present to guide their children's behavior. Successful socialization requires gradual substitution of symbolic and internal controls for external sanctions and demands. After moral standards of conduct are established by tuition and modeling, self-evaluative consequences serve as deterrents to transgressive acts. (p. 43)

This description of internalization has also been extended to aspirational as well as moral standards (Bandura, 1989b). It was not meant to imply that self-controlled behavior, once achieved, was impervious to direct social influence. Rather, Bandura and his colleagues sought to indicate that internal cognitive or affective processes begin to play an influential mediating role, particularly when supportive external contingencies are not immediately present.

> To be sure, the self-regulatory functions are created and occasionally supported by external influences. Having external origins, however, does not refute the fact that, once established, self-influence partly determines which action one performs. (Bandura, 1977b, p. 13)

Early social learning studies were devoted to three topics directly related to children's development of self-control: (a) resistance to deviation or response inhibition; (b) adoption of self-evaluative standards and regulation of action by self-reward; and (c) delay of gratification. In research on resistance to deviation, Walters and his students (e.g., Walters and Denkow, 1963; Walters and Parke, 1964; Walters *et al.*, 1965) studied the role of direct and vicarious punishment on children's response inhibition. With regard to adoption of self-evaluative standards, Bandura and Kupers (1964) found children who watched models self-reward with candy when playing a bowling game adopted similar standards of self-reward and applied them to their own performances when the model was absent. Even though a generous supply of rewards were available, the children in a stringent standard condition adhered to this same criterion. In a study of delayed gratification, Bandura and Mischel (1966) exposed children to a model who waited for a larger reward in preference to taking a smaller immediate reward. These youngsters emulated the model when they had the opportunity to reward themselves. These and many related studies reveal adults' modeling and social rewards or punishment influenced children's development of these three classes of self-control.

Early research on external social influences on self-control was followed by investigations of the role of covert cognitive and affective factors. It was found children's internalization of self-control is sustained by intrinsic sensory consequences (Stevenson and Odom, 1964), anticipatory consequences (e.g., Bandura and Rosenthal, 1966), and evaluative consequences (Bandura *et al.*, 1967). For example, a student's piano practice might be sustained by melodic feedback (a sensory consequence), the hope for a professional career (an anticipatory consequence), and/or self-praise or self-critical statements (evaluative consequences). Bandura noted the latter cause of internalization is likely to produce the most stable self-control because it is not dependent on the anticipated reactions of external agents but rather rests on one's own standards of conduct.

In a 1969 review of research on children's acquisition of self-control, Bandura cautioned that a neglected issue in this research was "the appropriate generalization of established patterns of behavior to new situations and their persistence after the original controlling conditions have been discontinued" (p. 619). Simply transferring control of appropriate behavior from external agents to child learners will not equip them to be adaptive to dynamic conditions that may substantially alter the effectiveness, even the appropriateness, of self-controlled behavior. For example, a tennis player who learned to execute a topspin forehand during practice without further coaching must learn to use it selectively during matches for the shot to be optimally effective: There are some game situations and certain types of opponents for which topspin will be counterproductive. Bandura (1969) called this more demanding level of functioning *self-regulation,* and he suggested it entailed such processes as standard-setting, self-evaluation, and self-reinforcement in addition to a person's execution of a learned response. If a tennis player self-evaluated his topspin shots in various game situations, developed an appropriate standard regarding its use, and reinforced himself for following it during practice, his game would improve.

Of particular importance to subsequent research was Bandura's (1969) description of how self-regulation could be developed from a cognitive social learning perspective. First, desired patterns of behavior and standards for self-evaluation or self-reinforcement should be modeled by agents of change such as parents or teachers. Second, an explicit set of performance requirements should be created and perhaps linked to a graded system of incentives. As a learner is able to perform imitatively on his or her own, the expert model gradually withdraws support. However, modeling and reinforcement is not enough to achieve a self-regulatory level of functioning. Third, Bandura recommended subjects should be taught such self-regulatory functions as standard-setting, evaluation, and self-reinforcement in addition to

the target behavior. The models were advised to progressively delegate these functions to the learner during opportunities to *enact* new role behavior. Finally, he recommended attention be given to the reference group, so the newly achieved level of self-regulation will be sustained by the learners' friends and family. For example, a student's accuracy in self-evaluating his test preparation might be praised by his parents. This essential process, called *participant or master modeling* (Bandura, 1977b, 1986b), was studied in a variety of clinical, familial, and educational contexts during the following decade and found to be highly effective (Bandura *et al.*, 1975; Rosenthal and Bandura, 1978; Zimmerman, 1977).

During the late 1960s and early 1970s, social cognitive researchers conducted numerous studies of children's acquisition of a wide variety of concepts, rules, or strategies through observation of abstract models (Zimmerman and Rosenthal, 1974b). Although these investigations were not directed specifically at the issue of self-regulation, they did focus on how children acquired knowledge, linguistic skill, problem-solving strategies, and use of judgmental standards that many developmental psychologists deem important in adult functioning. Bandura (1977b) described the abstract modeling procedures used in these studies in the following way:

> Observers extract the common attributes exemplified in diverse modeled responses and formulated rules for generating behavior with similar structural characteristics. Responses embodying the observationally derived rule resemble the behavior the model would be inclined to exhibit under similar circumstances, even though observers have never seen the model behaving in these new situations. (p. 41)

This description suggests abstract modeling can provide learners with essential cognitive rules for self-regulation.

The rules taught through modeling included Piagetian concepts, such as conservation and formal operational reasoning (Rosenthal and Zimmerman, 1972b; Siegler *et al.*, 1973; Zimmerman and Rosenthal, 1974a), Bruneria an strategies for solving problems (Lamal, 1971; Laughlin *et al.*, 1969), interrogative strategies for gathering information (Denny, 1975; Rosenthal *et al.*, 1970; Rosenthal and Zimmerman, 1972a), syntactic rules for communication (Brown, 1976; Margulas and Zimmerman, 1979; Whitehurst *et al.*, 1974), and rules for rendering moral judgments and reasoning (Bandura and McDonald, 1963; Brody and Henderson, 1977; Tracy and Cross, 1973). These researchers demonstrated that children who were studied could not only display their knowledge and skill on the training task, but could generalize it to new and unfamiliar tasks. Child observers were able to induce principles underlying a model's performance, a cognitive accomplishment enabling them to produce behavior that went beyond what they had seen or heard. This body of research was reviewed in a book by Rosenthal and Zimmerman

(1978), who concluded social-learning processes played a critical role in children's acquisition and development of the highest forms of intellectual functioning.

In 1974, Thoresen and Mahoney provided the first book-length treatment of self-regulation processes from a social-cognitive perspective. Although these authors focused on developing behavioral self-control, they discussed a wide variety of processes Bandura labeled as self-regulative, such as self-evaluation, standard- or goal-setting, and self-reinforcement. The book was a seminal contribution because it distinguished a cognitive social-learning perspective on self-control from traditional willpower views and from noncognitive behavioral views. Willpower approaches were criticized for defining self-control as the triumph of an undefined inner will over a weak body or resistant environment and for advocating a nondeterministic view of human functioning. Noncognitive behavioral approaches were viewed as useful in depicting self-control in scientific, principled terms but as restricted in their range of techniques to stimulus and response self-control methods.

In contrast, Thoresen and Mahoney (1974) proposed a triadic model involving environmental planning (stimulus control), behavioral programming (self-presented consequences), and covert self-control (involving cognitive, linguistic, and affective processes). Among covert processes, they considered a person's monitoring of such covert responses as compulsive thoughts or feelings (e.g., anxiety reactions) as well as his or her covert methods to control these responses (e.g., self-instruction or imaginal conditioning).

In Thoresen and Mahoney's view (1974), human problems in self-control were due to disparities in outcomes occurring along a temporal gradient: When immediate outcomes of responding were at variance with delayed outcomes, self-control was necessary. For example, self-control often is needed for academic study because the immediate outcomes of procrastination often are pleasurable (e.g., watching television), but the long-term consequences are punishing (e.g., poor grades). Self-controlling actions, such as administering self-rewards for studying, enable learners to bring immediate consequences into conformity with long-term consequences of ultimate importance.

This analysis brought into sharper relief the role of such key cognitive processes as setting delayed goals and making conscious decisions about the self-control methods needed to reach these goals. Thoresen and Mahoney (1974) concluded that "a person's ability to control his own actions is very much a function of his knowledge and control of current situation factors" (p. 8). This emphasis anticipated many contemporary efforts to describe self-regulation in terms of strategy knowledge and use (e.g., Pressley *et al.*, 1987; Weinstein and Underwood, 1985; Zimmerman and Martinez-Pons, 1986).

Finally, Thoresen and Mahoney (1974) recognized the implications of personal choice and control in motivating efforts for achieving self-control.

They suggested a person's control over the environment can motivate him or her to act: "Since a person is himself a major part of his own environment, the ability to self-control may have some rewarding value" (p. 3). This conclusion antedated Bandura's (e.g., 1977a, 1978, 1982) historic treatises on the role of human agency[3] and perceptions of self-efficacy in motivating self-regulated functioning.

Among the studies they reviewed, Thoresen and Mahoney (1974) discussed academic investigations designed to increase students' self-control of studying and deportment during class. In these studies, external methods of control (such as recording and reinforcement) were introduced to teach the skill initially; then control of these methods was shifted to the students. For example, with studying, Broden *et al.* (1971) taught an 8th-grade girl who was doing poorly in her history class to self-record her studying time during class. Her frequency of studying during class increased from approximately 30% to 80% and it remained at 70% after self-recording was discontinued. These data indicated stable increases in behavioral change even though self-recording often was unreliable and was stopped eventually. Regarding student deportment, Goodlet and Goodlet (1969) studied three disruptive 10-year olds. After baseline assessment, the youngsters were externally rewarded for appropriate classroom behavior by the teacher. During the next phase, the children were given the opportunity to reward their own performance. Data from trained observers indicated both reward systems were equally effective in substantially diminishing the youngsters' disruptive behavior. These studies revealed self-control of studying deportment could be taught systematically through the introduction of social influences and their subsequent withdrawal.

In 1977, Bandura (1977b) published another book-length description of his theory in which he greatly extended his discussion of the role of cognitive factors in self-regulation. Building upon his earlier (Bandura, 1969) discussions of standard setting, self-evaluation, and self-reinforcement, he developed a formal model of self-regulation which involved three key components: performance observation, judgmental processes, and self-reactive responses. Performance observation involved such evaluative dimensions as quality, quantity, and rate. Judgmental processes involved the use of performance standards, referential performances, and performance attributions. Self-reactive responses included self-evaluative reactions as well as tangible self-applied consequences to one's own performance.

Bandura (1977b) emphasized the role of a distinctive cognitive process in human motivation and action, *self-efficacy,* defined as the conviction that a person can successfully execute the behavior required to produce certain outcomes. He hypothesized people's efficacy beliefs will determine their be-

[3]Human agency is defined as the personal capacity to exercise control over one's thought processes, motivation, and action (see Bandura, 1989a).

havior, how much effort they mobilize on an endeavor, how long they persevere in the face of difficulties and setbacks, whether their thought patterns are self-hindering or self-ordering, and their vulnerability to stress and depression. According to Bandura (1977a, 1978), personal perceptions of efficacy play a more crucial role in human motivation and action than general outcome expectations because they take into account limitations in one's personal knowledge and skill. As a measure of human agency, self-efficacy was distinctive because it was was domain-specific in its focus: It dealt with a person's judgments of their capabilities for particular classes of activities. Even external social influences were assumed to be mediated by perceptions of personal efficacy.

In addition, to self-efficacy, Bandura (1977b) distinguished two cognitive forms of motivation related to self-regulation: (a) cognitive representation of external contingencies; and (b) self-motivation, involving goal-setting and self-evaluation. If self-regulation is expected to lead to success or to prevent failure, a person's motivation to display it will be enhanced. Specific and proximal goals were hypothesized to be more effective than nonspecific and distal goals. Regardless of the specificity of the goals, personal standards are used to judge the ultimate importance of self-observed outcomes. However, it should be noted Bandura recognized self and external sources of influence could exert complementary or opposing effects. When the two types of influences are in conflict, functioning becomes problematic. A goal of social cognitive approaches to self-regulation is to develop behavioral change procedures that ensure compatibility between self and external sources of motivation.

According to this view, self-regulation is achieved through triadic reciprocal determinism (see Fig. 1). Personal, behavioral, and environmental events are viewed as separable yet interdependent sources of influence in analyses of human functioning. Personal influences refer to covert cognitive beliefs, such as self-efficacy and self-regulative knowledge, and to affective processes such as anxiety. Bandura (1977b) rejected simple countercontrol views of self-regulation, which depict individuals as reacting to independent environmental events. Instead, he theorized environments must be activated by human behavior to be influential. Because of reciprocal determinism, self-regulatory practices enable people:

> . . . to direct their courses of action toward valued goals by arranging the environmental conditions most likely to elicit appropriate behavior and by creating cognitive aids and self-reinforcing consequences to sustain it. Individuals may be told how to go about this process and be given some initial external support for their efforts, but that does not argue against the fact that self-produced influences contribute significantly to future goal attainment. (Bandura, 1977b, p. 205)

Spurred by Bandura's (1977a, 1978) treatises on self-efficacy, social-cognitive researchers turned their attention to reciprocal relationships between

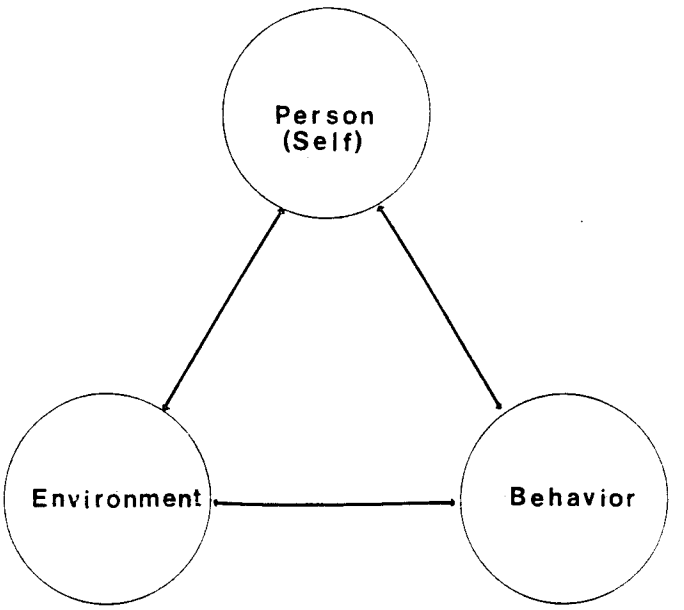

Fig. 1. A triadic analysis of self-regulated functioning.

this key personal process and people's behavioral functioning. Their research efforts spanned many areas of human functioning, including physical health and exercise (e.g., O'Leary, 1985; Bandura and Cervone, 1983), clinical dysfunctions (e.g., Bandura *et al.*, 1982), and occupational pursuits, such as teaching (Ashton, 1985). A significant strand in this research was devoted to academic learning (Schunk, 1984; Zimmerman, 1986).

For example, Bandura and Schunk (1981) studied the effects of goal-setting and instructional training. The reported elementary school youngsters displaying gross deficits and low motivation in arithmetic improved their performance when they set proximal goals for themselves. Students who set page-completion goals daily for their mathematics classwork displayed better motivation, higher perceptions of self-efficacy, and more acquisition of arithmetic skills than students who relied on longer-term goals. In addition, goal-setting students displayed greater intrinsic interest in mathematics as measured by their free choice of this activity.

Zimmerman and Ringle (1981) reported both vicarious and direct outcomes of problem-solving affected young children's perceptions of self-efficacy as well as their subsequent motivation. The task used in this study involved separating two interlocking wires of an unsolvable puzzle. Compared to control group children, youngsters who witnessed an optimistic (but unsuccessful) model displayed significantly higher levels of self-efficacy and

longer problem-solving efforts. They also surpassed the efficacy and problem-solving persistence of youngsters who witnessed a pessimistic model. Interestingly, these self-efficacy effects were generalized to a new puzzle that involved finding "hidden" words embedded in a grid. Together, these studies indicated self-efficacy measures were useful predictors of students' persistence during problem-solving, intrinsic task interest, and ultimately, their achievement. Furthermore, the Zimmerman and Ringle study revealed self-efficacy perceptions generalized to a new problem-solving task.

In his most recent text, Bandura (1986b) summarized nearly a decade of research on perceptions of self-efficacy. He discussed studies indicating high correlations between peoples' perceived efficacy and their demonstrated skill as a source of convergent validity for the construct. He also considered the discriminant validity of the construct: From both a theoretical and a psychometric vantage, people's perceptions of self-efficacy are assumed to be distinctive from their actual underlying skills. Bandura (1986b) cited a number of investigations supporting this assumption. For example, Collins (1982) studied a group of students who had the same level of mathematical ability but differed in terms of mathematical efficacy. This investigation indicated students who were high in self-efficacy displayed more positive attitudes and more effective problem-solving than students who were low. These outcomes support the triadic view that self-efficacy operates as a cognitive source of motivation separate from, but reciprocally related to, a person's actual skills.

In Bandura's (1986b) view, accurate perceptions of self-efficacy are heavily dependent on self-appraisal skills, and often young children or inexperienced learners are at a disadvantage because they lack the ability to observe or judge multiple sources of efficacy during performance, such as the difficulty of the task, the role of attending circumstances, and characteristics of their performance and its effects. Although social sources provide useful information for accurate self-appraisal as well, a learner's *judgments* of self-efficacy ultimately must be integrated with the outcomes of personal *performance*—two key components of self-regulation.

In his 1986 textbook, Bandura (1986b) made an adjustment to his three-component model: The judgmental process and self-reaction process labels were retained; however, he renamed the performance component as *self-observation,* perhaps to emphasize his conclusion that the process of self-monitoring is not simple a mechanical audit of one's performances. "Pre-existing self-conceptions exert selective influence on which aspects of one's ongoing behavior are given the most attention, how they are perceived, and how performance information is organized for memory representation" (p. 337). This analysis suggests accurate perceptions of efficacy are reciprocally interdependent with a person's self-knowledge and behavioral proficiency.

In addition to the importance of cognitive and behavioral dimensions of self-regulation, Bandura (1986b) stressed the role played by the social and

physical environment. He was critical of autonomous views of self-regulation which overlook the reciprocal influence of the environment in self-regulation. According to a triadic view, the environment influences self-regulation in three major ways: (a) the development of self-regulatory functions; (b) the provision of supports for self-regulation; and (c) the selective activation and disengagement of self-regulatory processes. To develop self-regulation, Bandura recommends observing social models who display self-observation, judgmental processes, and self-reactions and then trying actively to master these functions. Once acquired, self-regulatory processes will not be continued unless they produce perceived benefits to the user, such as improved health, social esteem, material gain, task mastery, or control over aversive events. Even perceptions of self-efficacy will not be sustained generally without some degree of environmental support, such as modeling and social or tangible consequences. Because the rewards and liabilities for self-regulation tend to vary on the basis of the situation, people's activation and disengagement of self-regulatory processes is selective. Self-regulation is not an autonomous control mechanism within the person as is implied by theories of internalization relying on notions such as conscience or superego.

This situational specificity or discriminative quality of human cognition and behavior has been studied for over two decades by Mischel (1968) and his associates, and it has been documented across a wide variety of tasks. The implications of this contextual specificity have been discussed with regard to a social cognitive view of personality (Mischel and Peake, 1982) and children's cognitive development (Zimmerman, 1979, 1983).

In contrast to autonomous views of self-regulation, triadic views assume cognitive regulators play a vital but reciprocally interdependent role with environmental and behavioral forces. Bandura (1986b) has emphasized three types of cognitive regulators: (a) representation and the use of knowledge; (b) thought as symbolic constructions; and (c) intentions and goals. Self-regulation entails the construction of strategies to achieve personal goals from verbal and imaginal sources of knowledge. To transform these strategies into proficient performances, learners must pay close attention initially to the details of enactment. As skills become routinized, learners shift their attention to the outcomes of enactment – an achievement termed *automatization* (LaBerge, 1981; Neves and Anderson). However, if monitoring suddenly reveals unexpected outcomes, self-regulated learners will redirect their attention quickly to the details of performing. For example, after learning to read, skilled readers no longer attend to individual words but prefer to process text in larger segments. Whenever monitoring reading comprehension reveals ambiguity or incongruity, these readers will begin to attend to each word more carefully.

A second type of cognitive regulator involves constructed knowledge, such as strategies and skills for solving problems. Bandura (1986b) draws a distinction between problem-solving skills and the representational

knowledge base on which they operate. Knowing a strategy can aid performance is an important but insufficient condition for using the skill effectively on a particular task. The latter requires triadic integration of behavioral and environmental information from specific problem-solving experiences. For example, informing a student that an effective speech requires eye contact with his or her audience is not usually sufficient for them to appear "at ease"; often practice is needed as well.

The third type of cognitive regulator (intentions) is defined as the determination to perform certain activities or to bring about a certain state of affairs. According to Bandura (1986b), an intention depends first, on a person's capacity to represent future consequences and, second, on a person's goal-setting and self-evaluative reactions to his or her behavior. Bandura views this as a form of self-motivation: "By making self-satisfaction conditional on a selected level of performance, individuals create their own incentives to persist in their efforts until their performances match internal standards" (Bandura, 1986b, p. 467). Specific, proximal, and challenging goals are more effective in influencing self-regulation than goals that are not (Bandura, 1982; Locke *et al.*, 1981). Goal-setting is assumed to be interdependent with perceptions of self-efficacy: Subgoal attainment can provide indications of task mastery and enhance a learner's sense of efficacy. In addition, high self-efficacy can sustain motivation when efforts to achieve a goal may fall short.

In summary, a triadic view of self-regulation offers a number of benefits compared to autonomous or noncognitive behaviorist views of self-regulation. Compared to autonomous views, it can explain extensive evidence of the social origins of self-control and continuing dependency of self-regulatory responses on a variety of social-context factors, such as modeling and response outcomes. Compared to noncognitive behaviorist views, it can explain pervasive evidence of the importance of cognitive factors in self-regulation, such as a person's knowledge of rules (e.g., Rosenthal and Zimmerman, 1978), use of goals and standards (Bandura *et al.*, 1967; Bandura and Schunk, 1981), and self-efficacy beliefs (e.g., Bandura and Schunk, 1981; Zimmerman and Ringle, 1981). These cognitive factors appear to play a key role in advancing children as well as adults from self-control to a self-regulated level of adaptive functioning.

CHARACTERISTICS OF SELF-REGULATED ACADEMIC LEARNING

Defining Self-Regulated Learning

The task of explaining *why* and *how* students assume personal responsibility for regulating their own acquisition of knowledge and skill, often in

the face of obstacles, provides one of the most demanding tests for theories of self-regulation. Researchers seeking to explain self-regulated learning must address issues of how students metacognitively, motivationally, and behaviorally initiate and direct their learning processes (Zimmerman, 1986). In terms of metacognition, self-regulated learners plan, organize, self-instruct, self-monitor, and self-evaluate at various stages of the learning process (Corno, 1986; Corno and Mandinach, 1983). In their motivation, these learners perceive themselves as competent, self-efficacious, and autonomous (McCombs, 1986; Schunk, 1986). Behaviorally, self-regulated learners select, structure, and create environments that optimize learning (Wang and Peverly, 1986; Zimmerman and Martinez, 1986).

In reaching a viable definition of self-regulated learning, it is important to distinguish between self-regulated learning *processes,* such as self-monitoring, and *strategies* designed to optimize these processes, such as record-keeping. It is assumed all learners will use self-regulatory processes to some degree when acquiring academic knowledge and skill; however, self-regulated learners are distinguished by their awareness of how specific strategies can influence learning outcomes and by their willingness to employ these strategies to achieve their academic goals. A student's use of these strategies is expected by social-cognitive researchers to enhance perceptions of self-efficacy, which in turn are assumed to provide the motivational basis for further self-regulation during learning. Thus, self-regulated learning involves three key elements: use of self-regulated learning strategies, self-efficacy perceptions of performance skill, and commitment to academic goals.

Role of Self-Regulated Learning Strategies in Academic Achievement

There is growing body of laboratory and field research indicating the positive effect of students' use of self-regulated learning strategies on their academic achievement. For example, Zimmerman and Martinez-Pons (1986) identified 14 types of self-regulated learning strategies used in and out of class from interviews of 80 high school students. Included among these strategies were organizing and transforming information, subgoal setting and planning, seeking information, keeping records and self-monitoring, environmental structuring, creating self-consequences, rehearsing and memorizing, seeking peer, teacher, or adult assistance, reviewing notes, tests, or textbooks. The students were asked to describe the methods they used in six learning contexts and to rate their consistency in using each method. The students' use of these strategies was highly correlated with their academic placement: Student placement in advanced achievement tracks was predicted with 93% accuracy. Furthermore, the students in an advanced achieve-

ment group used 13 of the 14 self-regulated learning strategies significantly more often than youngsters in the other tracks.

In subsequent research, Zimmerman and Martinez-Pons (1988) investigated the construct validity of their structured interview for assessing student self-regulated learning using teacher ratings of their students. Teachers can observe not only students' use of many self-regulated learning strategies but also many aspects of their motivation, such as their promptness, comprehensiveness, and commitment in completing assignments or preparing for class. Zimmerman and Martinez-Pons developed a scale for use by teachers, which dealt with students' strategy use as well as intrinsic interest in academic tasks. The teachers' ratings were factor-analyzed along with students' scores on a standardized test of mathematics and English, and a single factor measuring self-regulated learning outcomes was found that accounted for nearly 80% of the explained variance. Student reports of using self-regulated learning strategies during the interview correlated 0.70 with the obtained factor. This self-regulation factor was separate from, but correlated with, a student-achievement factor. The latter results indicated students' use of self-regulated learning processes played a distinctive role (from other factors such as content knowledge) in their academic achievement.

It should be cautioned, however, that training research has often shown acquisition of learning strategies is insufficient to prompt their effective use. For example, in a comprehensive review of the literature on metamemory, Schneider (1985) concluded there is no single relationship between memory knowledge and memory behavior: it depended on the type of metamemory process. Ghatala (1986) has suggested that monitoring, which she viewed as a metacognitive process, is critical to continued strategy use.

In research devoted to this issue, Pressley and colleagues (Pressley *et al.*, 1984a, b) provided subjects with information concerning the relative effectiveness of two strategies, one of which was chosen for its greater effectiveness. These studies of spontaneous strategy-monitoring indicated not even mature learners monitored differences when they were actually executing the strategies. However, adults could derive and use strategy-effectiveness information when prompted to monitor their performance on a recall test after studying with differentially effective strategies. Older grade school children could derive, but did not spontaneously use, strategy-effectiveness information; and young children could not even derive strategy-effectiveness information (e.g., Moynahan, 1978). Thus, a developmental pattern was suggested in children's ability to profit from strategy-monitoring (Ghatala, 1986).

To combat this monitoring deficiency in young children, Ghatala *et al.* (1986) specifically taught three procedures to enhance continued use of a strategy: (a) monitoring of one's performance; (b) attributing performance outcomes to use of a strategy; and (c) making decisions based on perfor-

mance outcomes and strategy attributions. Compared to students who did not receive all three components, those who were fully trained displayed greater use of the more effective of two strategies during a test for maintenance on the following day. However, the researchers reported it was necessary to remind the students to think back to their monitoring training before these benefits were realized. The results indicated the importance of strategy attributions as well as monitoring.

In recent research, Borkowski *et al.* (1990) focused on the key role strategy attributions play in linking metacognitive functioning to academic outcomes. The development of these attributional beliefs is assumed to be closely tied to perceptions of self-efficacy, intrinsic motivation, and other self-system constructs. Students who believe in themselves and their ability are more likely to apply their strategic knowledge in appropriate situations.

To test their model of metacognitive development, Borkowski and his colleagues employed structural equation procedures. Two hundred fifteen elementary school children were classified as underachievers and achievers, using a complex formula for equating ability and achievement. The students' metacognitive knowledge, attributional beliefs, self-esteem, and reading awareness were assessed as well as their reading test performance. Metacognitive systems for both achievers and underachievers were highly similar, with the exception of the relation between ability and attribution components: Unlike underachievers, achievers displayed a significant path from ability to attributions, and in turn from attributions to self-esteem, reading awareness, and performance.

These correlational outcomes were tested in a subsequent training study. Fifty-two underachieving students were taught reading-comprehension strategies through modeling and enactive practice. In a strategy-plus-attribution condition, students were taught the strategies in five steps, and were told by the instructor their effort in applying each step would affect their success (an effort attribution). Other students received either strategy-only training or no training (control). After 3 weeks, the students were posttested. Not only did the strategy-plus-attribution training promote the maintenance of comprehension strategies, it increased their generalization to the classroom. As expected, students in this condition also showed gains in reading comprehension. However, students who were given strategy training without attributional prompts displayed increases in strategic knowledge but not in reading comprehension.

These field and laboratory studies revealed that students' awareness of the effectiveness of strategies to self-regulate their academic learning had many benefits: It increased their motivation to learn, it sustained their use of these strategies, and it improved their achievement in school. Particularly important to the development of theories of self-regulated learning was evi-

dence that strategy attributions, which are closely linked to self-efficacy beliefs as well as other self-system processes, play a key role linking metacognitive processes and academic outcomes.

These findings are concordant with the results of training studies focusing on linkages between perceptions of efficacy, intrinsic motivation, use of self-regulated learning processes, and academic achievement. Schunk and Zimmerman and their colleagues have conducted a number of studies using such social-learning procedures as goal-setting, attribution-training, mastery and coping models, and self-verbalization, and found them effective in promoting not only children's learning but also their perceptions of self-efficacy.

For example, Schunk (1981) found modeling training increased students' perceptions of efficacy and academic achievement. He compared modeling and didactic forms of instruction in arithmetic division with low-achieving elementary school children. After instruction, students were asked to solve a series of division problems on worksheets. Half of the students were told by the experimenter their learning outcomes were attributable to how hard they worked. Although modeling and didactic instruction led to significant increases in self-efficacy, skill, and task persistence, modeling produced greater acquisition of division skill. Surprisingly, attributional feedback did not exert significant effects on any of the dependent measures. However, it should be noted that these attributions, unlike those taught by Borkowski *et al.* (1990), were focused on *effort* not on *strategy use.* Path analyses of these data revealed that self-efficacy played an important role in linking the effects of instructional treatments to students' task persistence during learning and to their acquired skills. These self-efficacy outcomes will be of particular interest to educators because underachieving students, even gifted ones, report poor self-images and feelings of inferiority (Dowdall and Colangelo, 1982).

There is evidence also that perceptions of self-efficacy are related to children's display of intrinsic motivation, which is widely assumed to be essential for self-regulated learning (e.g., McCombs, 1984). In a laboratory investigation of this issue, Blom and Zimmerman (Zimmerman, 1985) studied two common indices of intrinsic motivation with 5th-grade students—free-choice activities and task ratings. They hypothesized rewards indicating efficacy or competence would be more effective in increasing students' perceptions of self-efficacy and intrinsic motivation than rewards indicating mere task completion. The training was conducted using the problem-solving puzzles, and, afterward, the students had an opportunity to use the puzzles or alternative tasks during a free-choice period. Children rewarded for efficacy chose puzzles more frequently, had higher puzzle ratings, and higher self-efficacy judgments during immediate and delayed posttesting (1 week later)

than youngsters given rewards for task completion. The students' intrinsic motivation was directly related to their perceptions of efficacy but not to their reception of rewards *per se*. These results conform with a social cognitive interpretation of rewards.

In recent research, Zimmerman and Martinez-Pons (1989) studied the relationship between individual differences in grade level and intellectual giftedness, and two measures of students' self-regulated learning: their use of strategies and perceptions of academic self-efficacy. Ninety boys and girls from the 5th, 8th, and 11th grades attending a school for the academically gifted, and an identical number attending regular schools were interviewed using the Zimmerman and Martinez-Pons (1986) self-regulated learning scale. They were asked also to rate their mathematical and verbal efficacy using scales involving a series of mathematic problems and vocabulary words that graduated in difficulty. The gifted students displayed significantly higher mathematical, verbal efficacy, and strategy use than regular students. Generally, 11th-grade students surpassed 8th graders, who in turn, surpassed 5th graders on the three measures of self-regulated learning. The two measures of academic efficacy correlated 0.56; however, mathematical and verbal efficacy predicted students' use of different self-regulatory processes on situational or contextual factors and extend these conclusions to academic self-regulated learning.

In summary, this initial research on students' use of self-regulation strategies during academic functioning has revealed increased perceptions of self-efficacy were associated with greater intrinsic motivation and higher academic achievement. However, these studies revealed knowledge of strategies is often insufficient to ensure their continued use. Students must monitor their response outcomes and attribute them to strategy use in order for their learning to become fully self-regulated. When this occurs or when other efforts are made to increase students' perceptions of efficacy, such as modeling and efficacy feedback, their motivation to use a strategy is sustained or improved. Evidence that students' use of self-regulated learning strategies depends on performance outcomes is concordant with a triadic view of self-regulation.

A SOCIAL COGNITIVE MODEL OF SELF-REGULATED ACADEMIC LEARNING AND ACHIEVEMENT

The corpus of research on various components of students' self-regulation of academic learning now has reached sufficient size to permit the development of formal theoretical accounts. A variety of theoretical per-

spectives on self-regulated learning have been advanced recently (see Zimmerman, 1989b), including operant (Mace *et al.*, 1989), phenomenological (McCombs, 1989), volitional (Corno, 1989), Vygotskian (Diaz and Neal, 1990; Henderson, 1986; Rohrkemper, 1989), and constructivist (Paris and Byrnes, 1989). Social-cognitive formulations (see also Schunk, 1989) are distinguished by their assumptions of: (a) reciprocal dependency between triadic influences of the person, his or her behavior, and the environment; (b) the key processes of self-observation, judgment, and self-reaction; and (c) the role of academic self-efficacy perceptions. The proposed account (see also Zimmerman, 1989a) integrates triadic determinants of self-regulated learning on the basis of a strategic control loop.

A Strategic Control Loop

Students' efforts to regulate learning involve three classes of determinants: personal processes, the environment, and one's behavior. Strategies enable student learners to personally (self) regulate their behavior, their environment, and covert processes such as anxiety (see Fig. 2).

Self-regulated students use academic learning strategies in a cyclic manner. Cyclic use of a learning strategy depends on monitoring environmental factors (e.g., Does it produce expected material and social outcomes?), personal factors (e.g., Can I transform the material into easily remembered forms?), as well as behavioral factors (e.g., Can I carry out the self-regulated activities)? If enactive feedback indicates a deficiency in one or more of these triadic factors, a learner's perceptions of efficacy may be diminished. Although additional factors such as goal-setting and attainment (see Table I below) affect strategy decisions, they too depend ultimately on monitoring during learning via a cybernetic loop (see Carver and Scheier, 1981). With learners who are fully self-regulative, it is assumed that causation is personally (self) initiated, strategically implemented, and motivated by continuing perceptions of performance efficacy.

This triadic analysis is not limited to explaining the functioning of fully self-regulated learners: Assumptions of reciprocal causation permit the explanation of external efforts to develop self-regulated learning as well. For example, Schunk and Hanson (1985) presented a coping model to teach self-verbalization of a subtraction strategy. The model, who gradually improved during her performance, increased the learners' perceptions of self-efficacy and their use of the strategy when learning alone. According to social cognitive theory, information about changes in students' self-efficacy during learning are critical to understanding their motivation to continue on their own.

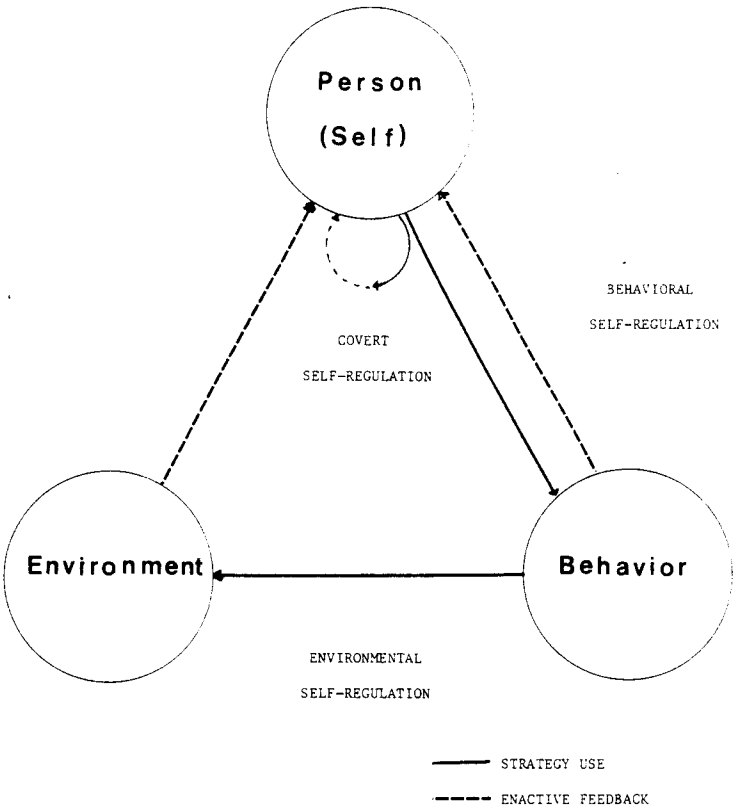

Fig. 2. A social cognitive view of reciprocal determinism. From Zimmerman (1989), adapted by permission.

Determinants of Self-Regulated Learning

Major sources of personal, environmental, and behavioral influence are listed in Table I. Self-efficacy is included among the key person (i.e., self) influences, and self-observation, judgment, and self-reaction are depicted as major categories of behavioral influence. From social-cognitive theory and research, two major classes of environmental influence were identified: the physical context, and material and social resources. In addition to self efficacy, a learner's goals or intentions, knowledge, metacognitive and affective processes are assumed to play a vital role in self-regulation.

Turning first to the role of a learner's knowledge in self-regulation, a distinction is made between representational and constructed forms of

Table I. Determinants of Self-Regulated Learning

Learning environment influences	Person (self) influences	Behavioral influences
Physical context Task features External outcomes	Knowledge Declarative Self-regulative	Enactment of self-regulatory activities Self-obervations Self-evaluations
Material and social resources	Self-efficacy beliefs	Self-reactions
	Goals or intentions	Environmental structuring
	Metacognitive processes Planning Behavior control	
	Affective processes	

knowledge (see Bandura, 1986b). *Declarative* knowledge refers to information represented in terms of abstract propositions, such as subject and predicates; it is separate form context factors and metacognitive control processes (Siegler, 1982). An example of declarative knowledge is the lexical definition of "beauty" (e.g., that which is pleasing or satisfying). In contrast, *self-regulative* knowledge is constructed during learning episodes and retains procedural and conditional qualities from them (see Paris *et al.*, 1984; Zimmerman, 1983). Students' use of this form of knowledge depends directly on specific properties of the learning context, such as task features, and on external outcomes of action. One of the most common ways of depicting self-regulative knowledge is in terms of strategies and judgmental standards. An example of a self-regulation strategy is self-evaluation – for example, intentionally checking subtraction problems using an addition algorithm (Zimmerman and Martinez-Pons, 1986). Although conceptually distinctive, declarative and self-regulative forms of knowledge are interdependent. For example, declarative knowledge of addition facts will contribute to students' ability to evaluate their solutions to subtraction problems.

In my view, a learner's metacognitive functioning operates at two levels. At a more generic level of self-regulation, task analysis or *planning* has been proposed to describe decisional processes for selecting or altering self-regulatory strategies (Bandura, 1982b; Mischel, 1968; Zimmerman, 1983). Planning is dependent on both declarative and self-regulatory knowledge as well as on self-efficacy and goal-setting, on task features, material and social resources, and on enactive outcomes of behavior control. At a more specific level of self-regulation, *behavior control* processes guide attentiveness, execution, persistence, and monitoring of strategic and nonstrategic responses in specific contexts (see Corno, 1989; Kuhl, 1982, for a similar distinction). Strategic planning by self-regulated learners guides their specific efforts to control learning and depends reciprocally on enactive feedback

from these efforts. For example, when self-regulated students decide to use the self-instruction spelling rule, "*i* before *e* except after *c*," they must plan when and how to use it. To carry out (i.e., control) this strategy, students may scan previously written text to locate words with *ie* or *ei* combinations, repeat the spelling rule, and judge the adequacy of each word. If monitoring reveals that the strategy is effective in locating and correcting misspelled words, it will be continued. If monitoring reveals previously written words are already spelled correctly (which may eventually occur), learners will discontinue the strategy.

Metacognitive decision-making depends also on a learner's delayed goals or intentions according to the proposed model. The boy in the above example may have been unwilling to bother finding and correcting words if skill in spelling did not figure in his future goals. The youngster's motivation to self-regulate spelling would be much greater if, for example, he hoped to become an editor of a local newspaper. Students' long-term goals and use of metacognitive control processes are dependent on their perceptions of *self-efficacy* as well as their self-regulatory knowledge. According to Bandura (1986), individuals "who have a high sense of self-efficacy set themselves more challenging goals to accomplish" (p. 348). In research on this issue, Bandura and Cervone (1986) found subjects' self-set goals were highly correlated with their estimates of self-efficacy.

According to my model, learners' *affective states* also influence self-regulated learning. For example, anxiety may impede the effectiveness of behavior-control efforts (Bandura, 1988b). In research on action control (which is similar to behavior-control processes), Kuhl (1982) found that subjects' ability to control their actions was negatively correlated with their reports of anxiety. Ruminative thoughts of prior failures detracted from control of their attention and responding. These data, along with research on self-efficacy as discussed earlier, indicate that students' anxiety and perceptions of low self-efficacy can affect metacognitive processes adversely and can inhibit setting long-term goals.

In my proposed model, student efforts to self-observe, self-judge, and self-react are treated as *behavioral influences* during self-regulated learning because these components are overt, trainable, and reciprocally interactive to a considerable degree. However, these components of enactment are assumed to be influenced by various covert (self) processes as well as by environmental determinants. For example, observation of personal-performance accomplishments also conveys vital information about how well one is progressing toward one's goals. *Self-observation* has been taught in two common behavioral forms: verbal or written reporting or quantitative recording of one's actions or reactions (e.g., Shapiro, 1984). There is extensive evidence that prompting students to keep records affects their learning, motivation, and self-efficacy (Schunk, 1983a).

Closely linked to self-observation is the act of *self-judgment.* Historically, noncognitive approaches to self-regulation have not separated judgmental processes from behavioral forms of self-recording (Zimmerman, 1989b). Judgmental processes have been shown to be highly dependent on such covert personal factors as self-efficacy, goal-setting, and knowledge of self-regulative standards (e.g., Schunk, 1983b). Although self-observation of one's previous performance accomplishments can affect the formation of personal standards of judgment, other criteria such as modeling, social norms, and mastery goals also play an influential role (Schunk, 1983a). A common self-evaluation procedure is to ask students to rate their answers relative to those of another person.

A third interdependent class of behavioral influences involves *self-reactions* or self-adjustments due to self-observations and self-judgments of one's own performance. Many self-reactions occur spontaneously during learning, such as perceptions of diminished efficacy, feelings of anxiety, and haphazard coping responses. However, self-regulated learners are characterized by systematic efforts to improve their functioning at both a behavioral level (e.g., increasing one's effort) and a covert personal level (e.g., improving one's learning strategy).

A fourth interdependent class of student self-regulatory behavior involves environmental structuring. Self-regulated students are not only aware of the potentially beneficial or adverse impact the immediate environment can have on their learning, they actively attempt to improve it. There is evidence that self-regulated students select, organize, and even create environments they believe will optimize their learning—such as arranging one's study room to eliminate distracting stimuli and to provide ready access to needed resources, such as lighting, writing materials, and books (Zimmerman and Martinez-Pons, 1986, 1988).

An effort to investigate the effects of training children to enact these four self-regulatory activities is underway currently in an asthma education program for minority youngsters at Columbia University College of Physicians and Surgeons (Evans *et al.*, 1989).

The third major determinant of students' self-regulated learning is *environmental.* Social events and the physical properties of one's performance context play a major role in self-regulation. Self-control, it will be recalled, emerges from socialization experiences in which self-regulatory actions are modeled and explained initially, then enacted with social support, and finally performed alone. Through this social-learning process, strategies to improve self-observation, self-judgments, and self-reactive responses can be acquired that will enable learners to achieve the ultimate degree of internalization. Participant or mastery modeling training has incorporated this internalization sequence. Research on components of this *social* training (e.g.,

Bandura *et al.*, 1975; Rosenthal and Downs, 1985; Schunk, 1986; Zimmerman and Kleefeld, 1977) has revealed that modeling, verbal persuasion, direct assistance, and symbolic supports (such as diagrams) can assist people to become self-regulated learners.

In addition, the *features* (e.g., difficulty) of academic tasks and environmental *outcomes of enactments* have been found to be of critical importance in research on self-regulated learning (e.g., Bandura and Schunk, 1981; Zimmerman and Martinez-Pons, 1989) as they have in more general research on the contextual specificity of human functioning (e.g., Mischel and Peake, 1982; Zimmerman, 1983).

Finally, it should be noted that the three classes of self-regulatory determinants identified in Table I are reciprocally interdependent. Self-regulated learning is determined not only by personal (self) processes but also by environmental and behavioral events. Self-regulation is not an absolute state of functioning but rather varies in degree, depending on the social and physical context, personal efforts to self-regulate, and outcomes of behavioral performance. Bandura (1986b) has cautioned that reciprocal determinism does not imply symmetry in strength or patterning of bidirectional influence. Environmental influences may be stronger than behavioral or personal ones in certain settings or at certain points during behavioral interaction episodes. For example, highly regimented schools with restrictive codes of conduct may preclude many forms of self-regulated learning, such as student planning or self-rewards.

Students' degree of self-regulation is determined situationally by their use of strategies that fully incorporate triadic influences to achieve academic goals. Self-regulated learning occurs to the degree that a student can use personal (i.e., self) processes to strategically regulate his or her behavior and immediate learning environment through feedback loops depicted in Fig. 2. The most sophisticated self-regulated learning strategies rely on behavioral and environmental processes to control covert personal processes in reciprocal fashion. For example, students' feelings of test anxiety might be reduced by using muscle-relaxation techniques. In the absence of a learner's use of effective self-regulatory strategies, other personal (e.g., affect), environmental, or behavioral influences dominate.

CONCLUSION

Two particularly attractive features of a cognitive social-learning view of self-regulation to educators are its suitability (a) for identifying the sources of intrinsic motivation and regulative skill needed for learners to self-initiate and self-direct their learning, and (b) for describing the specific socializa-

tion processes through which this level of functioning is attained. With regard to the former, research has indicated the key role of students' perceptions of efficacy in motivating them to learn by themselves and the role of students' strategies in regulating their acquisition of knowledge and skill. A strategic control loop is proposed to describe how students personally (self) regulate their behavior, environment, and covert processes in a cyclic manner. A triadic approach to self-regulated learning seeks to coordinate all three influences rather than relying on just one or two, as do autonomous and noncognitive behavioral approaches.

In their studies of how self-regulation is internalized during children's socialization, social-cognitive researchers have demonstrated the importance of modeling, rule induction, and enactive performance on the learning and transfer by young children. Available evidence suggests when learners are taught to be self-observant, appropriately self-judgmental, and effectively self-reactive, they can achieve the ultimate level of internalization—adaptive functioning to changing environmental conditions, behavioral capabilities, and covert personal processes. However, formal programs to develop self-regulated learning skills among students who are at academic risk, such as underachievers or dropouts, are just beginning. There is reason to expect students who can attain self-regulation in their academic learning will complete their formal schooling self-confidently, and be well prepared to meet the challenges of the age of information.

ACKNOWLEDGMENT

Preparation of this article was supported in part by grant number 2-RO1 HL 28907 from the Lung Division, National Heart, Lung and Blood Institute, and a gift from the Spunk Fund.

I would like to express my appreciation to Albert Bandura and Carl E. Thoresen of Stanford University, David Evans and Robert B. Mellins of the Columbia University College of Physicians and Surgeons, John C. Glover of Ball State University, and Ted L. Rosenthal of the University of Tennessee Medical School for their helpful comments on this manuscript.

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