

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/232534584>

A Social Cognitive View of Self-Regulated Academic Learning

Article in *Journal of Educational Psychology* · September 1989

DOI: 10.1037/0022-0663.81.3.329

CITATIONS

2,711

READS

36,577

1 author:



[Barry J. Zimmerman](#)

CUNY Graduate Center

170 PUBLICATIONS 51,878 CITATIONS

SEE PROFILE

A Social Cognitive View of Self-Regulated Academic Learning

Barry J. Zimmerman
Graduate School and University Center
City University of New York

Researchers interested in academic self-regulated learning have begun to study processes that students use to initiate and direct their efforts to acquire knowledge and skill. The social cognitive conception of self-regulated learning presented here involves a triadic analysis of component processes and an assumption of reciprocal causality among personal, behavioral, and environmental triadic influences. This theoretical account also posits a central role for the construct of academic self-efficacy beliefs and three self-regulatory processes: self-observation, self-judgment, and self-reactions. Research support for this social cognitive formulation is discussed, as is its usefulness for improving student learning and academic achievement.

For over two decades, social learning researchers have conducted research on such self-regulatory processes as self-reinforcement (e.g., Bandura, Grusec, & Menlove, 1967; Bandura & Kupers, 1964), standard setting (e.g., Mischel & Liebert, 1966), delay of gratification (e.g., Mischel, 1981; Mischel & Bandura, 1965), goal setting (e.g., Bandura & Schunk, 1981; Schunk, 1985), self-efficacy perceptions (e.g., Bandura, 1982a; Schunk, 1984; Zimmerman & Ringle, 1981), self-instructions (Schunk, 1986; Schunk & Rice, 1984), and self-evaluation (e.g., Bandura & Cervone, 1983, 1986). During this period of time, a number of researchers have tried to integrate this research into general models of self-regulation (e.g., Bandura, 1977a, 1986; Thoresen & Mahoney, 1974; Zimmerman, 1981, 1983). Bandura's seminal role in proposing and studying self-regulation component processes, their determinants, and their interrelationship is evident in many of these accounts. An initial formulation of self-regulated academic learning, offered as follows, incorporates many social learning constructs and assumptions.

A Definition of Self-Regulated Learning

In general, students can be described as self-regulated to the degree that they are metacognitively,¹ motivationally, and behaviorally active participants in their own learning process (Zimmerman, 1986, 1989). Such students personally initiate

and direct their own efforts to acquire knowledge and skill rather than relying on teachers, parents, or other agents of instruction. To qualify specifically as *self-regulated* in my account, students' learning must involve the use of specified strategies to achieve academic goals on the basis of self-efficacy perceptions. This definition assumes the importance of three elements: students' self-regulated learning strategies, self-efficacy perceptions of performance skill, and commitment to academic goals. *Self-regulated learning strategies* are actions and processes directed at acquiring information or skill that involve agency, purpose, and instrumentality perceptions by learners. They include such methods as organizing and transforming information, self-consequating, seeking information, and rehearsing or using memory aids (Zimmerman & Martinez-Pons, 1986). *Self-efficacy* refers to perceptions about one's capabilities to organize and implement actions necessary to attain designated performance of skill for specific tasks (Bandura, 1986). Academic goals such as grades, social esteem, or postgraduation employment opportunities can vary extensively in nature and in time of attainment.

My proposed definition follows Thoresen and Mahoney's (1974) lead in describing human self-regulation on the basis of a temporal gradient. Although they were primarily concerned with the impact of disparities between immediate and delayed environmental outcomes on behavioral functioning, my definition focuses on how learners represent contemporary actions and conditions in terms of strategies for reaching subsequent goals. It assumes a motivational orientation by learners that is sustained by continuing self-perceptions of efficacy when performing a specific task. Thus in order for students' strategic actions to be described as self-regulated, one must know their academic goals and perceptions of efficacy. For example, one cannot define students' going out for coffee after studying as a self-consequating strategy without knowing their purpose for using this strategy (i.e., to improve motivation) and their perceptions of efficacy when using it (e.g., of completing more homework).

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

I express my appreciation to David Evans and Robert B. Mellins of the Columbia University College of Physicians and Surgeons, Michael Pressley of the University of Maryland, Ted L. Rosenthal of the University of Tennessee Medical School, Dale H. Schunk of the University of North Carolina, and Charles P. Smith of the Graduate School of the City University of New York for their helpful comments on this article.

Correspondence concerning this article should be addressed to Barry J. Zimmerman, Graduate School and University Center, City University of New York, Educational Psychology, Box 445, 33 West 42nd Street, New York, New York 10036-8099.

¹ *Metacognitive* refers to decision-making processes that regulate the selection and the use of various forms of knowledge.

A View of Student Self-Regulated Academic Learning

Social Cognitive Assumptions

Triadic reciprocity. The proposed view of student self-regulated learning assumes reciprocal causation among three influence processes. In accordance with Bandura's (1977b, 1986) description, a distinction is made among personal, environmental, and behavioral determinants of self-regulated learning. According to social cognitive theorists (as social learning researchers now label themselves), self-regulated learning is not determined merely by personal processes; these processes are assumed to be influenced by environmental and behavioral events in reciprocal fashion. For example, a student's solution response to a subtraction problem such as " $8 - 4 = ?$ " is assumed to be determined not only by personal (self-) perceptions of efficacy but also by such environmental stimuli as encouragement from a teacher and by enactive outcomes (i.e., obtaining a correct answer to previous problems). This reciprocal formulation also allows that such self-regulative responses as self-recording can influence both the environment (e.g., a document is created) and various personal processes (e.g., self-efficacy perceptions). The essence of Bandura's (1986) triadic formulation is captured in the statement "Behavior is, therefore, a product of both self-generated and external sources of influence" (p. 454).

Bandura (1986) cautioned that reciprocity does not mean symmetry in strength or temporal patterning of bidirectional influence. Environmental influences may be stronger than behavioral or personal ones in some contexts or at certain points during behavioral interaction sequences. For example, in schools with a highly structured curriculum or a restrictive code for classroom conduct, many forms of self-regulated learning such as student planning or self-reward may be stifled. Conversely, in schools in which situational constraints are limited, such as alternative schools, personal or behavioral factors may be the dominant influence regulating functioning. Self-regulated learning occurs to the degree that a student can use personal (i.e., self-) processes to strategically regulate behavior and the immediate learning environment.

There are three general classes of strategies for increasing the regulatory influence of person (self-) processes (Thoresen & Mahoney, 1974): strategies designed to control behavior, the environment, or covert processes. Behavioral self-regulation is depicted in triadic terms in Figure 1. A student's proactive use of a self-evaluation strategy (e.g., checking math homework) will provide information about accuracy and whether checking must continue through enactive feedback. In this reciprocal depiction, causation is personally (self-) initiated, implemented through use of strategies, and enactively regulated through perceptions of efficacy. Thus self-efficacy serves as a sort of thermostat that regulates strategic efforts to acquire knowledge and skill through a cybernetic feedback loop (see Carver & Scheier, 1981).

Environmental self-regulation is illustrated in triadic terms in Figure 1 as well. A student's proactive use of an environmental manipulation strategy (e.g., arranging a quiet study area for completing school work at home) would involve an intervening behavioral sequence of room-altering responses

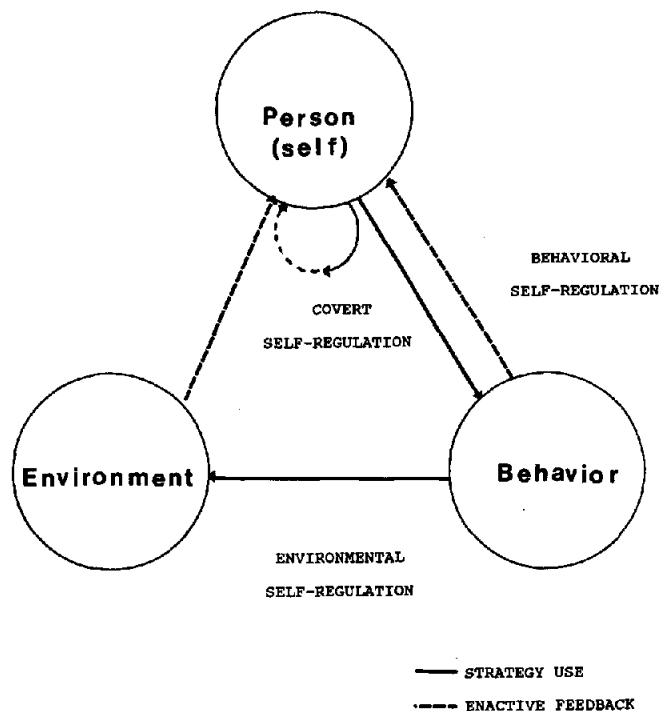


Figure 1. A triadic analysis of self-regulated functioning.

such as eliminating noise, arranging adequate lighting, and arranging a place to write. The continued use of this structured setting for learning would depend on perceptions of its effectiveness in assisting learning. This would be conveyed reciprocally through an environmental feedback loop. Although learning strategies can be initiated from the environment (e.g., through instruction) according to this formulation, they would not be labeled *self-regulated* unless they came under the influence of key personal processes (i.e., goal-setting and self-efficacy perceptions).

Covert self-regulation is presented schematically in Figure 1 also. The representation indicates that a person's covert processes also reciprocally affect each other. Social cognitive theorists are particularly interested in the effects of metacognitive processes on other personal processes such as bases of knowledge or affective states. For example, an elaboration strategy for associating the Spanish word *pan* with its English counterpart *bread* (e.g., "Bread is cooked in a pan") will enable students to augment their knowledge base in Spanish (see Pressley, 1982). It is assumed that use of such strategies is reciprocally regulated through a covert feedback loop (as illustrated in Figure 1). Bandura (1986) theorized that processes interact reciprocally with others within a particular triadic domain, as well as with processes in other domains. Further illustrations of reciprocal influences within the three domains will be presented later.

Last, Bandura (1986) assumed that the relative strength and the temporal patterning of mutual causation among personal, environmental, and behavioral influences can be altered through (a) personal efforts to self-regulate, (b) outcomes of behavioral performance, and (c) changes in environmental context. Consider the example of an adolescent boy

who is struggling to memorize the names of various bones for a course in human anatomy. His recall could improve either if he decides to self-record the names of forgotten bones (Influences a and b) or if another student arrives seeking to jointly memorize the list (Influence c). In addition, a student's personal capacity to self-regulate is assumed to depend on learning and development. Older and more experienced students are believed to be better able to self-regulate during learning (Bandura, 1986). This triadic view of functioning implies that researchers seeking to understand students' self-regulated learning must be sensitive to the impact of variations in context and personal experience.

Self-efficacy. Social cognitive theorists assume that self-efficacy is a key variable affecting self-regulated learning (Bandura, 1986; Rosenthal & Bandura, 1978; Schunk, 1986; Zimmerman, 1986). In support of this assumption, students' self-efficacy perceptions have been found to be related to two key aspects of the proposed reciprocal feedback loop: students' use of learning strategies and self-monitoring. Students with high self-efficacy have displayed better quality learning strategies (Kurtz & Borkowski, 1984) and more self-monitoring of their learning outcomes (Diener & Dweck, 1978; Kuhl, 1985; Pearl, Bryan, & Herzog, 1983) than have students with low self-efficacy. In addition, researchers have found that students' perceptions of self-efficacy are positively related to such learning outcomes as task persistence (Zimmerman & Ringle, 1981), task choice (Bandura & Schunk, 1981; Zimmerman, 1985), effective study activities (Thomas, Iventosch, & Rohwer, 1987), skill acquisition (Schunk, 1984), and academic achievement (Thomas et al., 1987). Students' behavioral performance is assumed to influence their perceptions of self-efficacy, as well as the reverse.

In support of this hypothesis, Zimmerman and Ringle (1981) found that the failure of young elementary school children to solve a puzzle influenced their estimates of self-efficacy during subsequent testing. The task used in this study involved separating two interlocking wires; however, the wires were bent closed enough to prevent the puzzle from being solved. This feature made the puzzle a demanding test of the children's motivation to achieve a solution. The children were pretested with a rating scale on which faces depicted varying degrees of self-efficacy. After attempting to separate the wires for up to 15 min, the youngsters were posttested for efficacy. Pupils in a control group (who were not exposed to any form of modeling treatment before trying to solve the puzzle themselves) displayed lower self-efficacy during posttesting than during pretesting. Other pupils were exposed to an adult model who expressed either optimism or pessimism about eventually solving the puzzle despite failing during an initial attempt. The model's verbal pessimism about solving the puzzle decreased young elementary school children's perceptions of self-efficacy about solving a similar wire puzzle significantly from pretest levels; however, the model's verbal optimism sustained their efficacy. Similar verbal optimism effects were evident during transfer on an embedded word puzzle.

The latter finding is noteworthy because Bandura (1977a, 1986) theorized that social influences such as an adult model's performance and verbal persuasion can also change an indi-

vidual's self-efficacy estimates. In another study of the importance of modeling, Schunk (1981) found that demonstrations of mathematical problem-solving methods by an adult model affected fourth-grade students' perceptions of efficacy and division skill. Youngsters with a background of low arithmetic achievement received modeling of division operations. Students exposed to a model's strategies for correct solutions during training displayed significantly higher self-efficacy and more division accuracy during posttesting than did youngsters in a control group.

Conversely, it is assumed that students' self-efficacy beliefs can affect their manipulation and choice of learning environments. Zimmerman (1985) reported evidence that experimental efforts to change elementary school pupils' perceptions of efficacy also affected their choice of learning tasks. In this investigation, tangible or verbal rewards were given to indicate efficacy (i.e., for performing better than most pupils in their class) or nonefficacy (i.e., for merely working) on a block design task of the Wechsler Intelligence Scale for Children (WISC). From a social cognitive perspective, efficacy rewards were hypothesized to improve pupils' perceptions of efficacy, which in turn were assumed to increase pupils' free choice and value ratings of the task (two measures of intrinsic motivation). Zimmerman found that rewards for efficacy increased pupils' self-efficacy perceptions and their free choice and value ratings of this intellectual task more than did rewards for nonefficacy. For pupils given rewards for efficacy, the increases from pretesting to immediate posttesting were approximately 48% for self-efficacy, 146% for task choice, and 29% for task interest. The corresponding changes for youngsters given nonefficacy rewards were a 16% increase in self-efficacy, a 39% decrease in task choice, and a 12% increase in task interest. The tangible versus verbal nature of rewards was unimportant in comparison with the self-efficacy implications.

Subprocesses in self-regulation. Social cognitive theorists assume that self-regulation involves three classes of subprocesses: self-observation, self-judgment, and self-reaction (Bandura, 1986). These performance-related subprocesses are assumed to interact with each other in reciprocal fashion. For example, listening to an audiotape of one's speech (self-observation) is assumed to affect self-judgments of progress in acquiring rhetorical skill. These self-judgments, in turn, are expected to determine one's subsequent willingness to continue this self-instructive practice (a self-reaction).

There is growing evidence of the importance of these three classes of self-regulatory processes on students' academic performance. For example, Mace and Kratochwill (1985) studied the effects of one form of self-observation and two forms of self-judgment on the speech fluency of college students. The self-observation procedure involved self-recording verbal nonfluencies (e.g., "um," "ah," "er," "uh," and so forth), using a mechanical counter while talking on a current topic for 9 min. The self-judgment procedures involved (a) setting a goal for reducing nonfluencies and/or (b) comparing the mechanical counter outcomes with the goal and stating aloud when successful, "I did a really good job of showing self-control." Students in a control group were not taught any self-observation or self-judgment procedures; they merely talked on the

topic for 9 min. The results were that all self-observation groups showed a decrease in verbal nonfluencies (a self-reaction); the largest decrease occurred in the group that made judgmental statements as well. It appears that self-observational and self-judgmental processes combined to facilitate students' self-regulation of their speech.

Determinants of Self-Regulated Learning

On the basis of these social learning assumptions and constructs, it is possible to offer an initial view of students' self-regulated learning. Among the three major types of influence, self-efficacy is considered a key personal (i.e., self-) influence. Self-observation, self-judgment, and self-reaction are depicted as major categories of performance-related influence. Two major classes of environmental influence are extrapolated from social cognitive research and theory: the physical context and social experience. In accordance with social cognitive theory, the major types of personal, behavioral, and environmental influence are assumed to be interdependent.

Before offering a more detailed description of each of the various types of influence, an additional assumption about this formulation should be mentioned. It is assumed that self-regulated learning is never an absolute state of functioning but rather varies in degree, depending on the social and physical context (Thoresen & Mahoney, 1974). This approach to learning also depends on a variety of personal influences that can change with teaching or development, such as one's level of knowledge and metacognitive skill (see the following discussion). A learner's degree of self-regulation is assumed to be determined situationally by his or her use of strategies that fully incorporate triadic influences in obtaining academic goals. When a learner can exert strategic control over each of the three types of influence, he or she can be described as self-regulated and the *self-* prefix can be legitimately applied to that type of strategy (e.g., *self-consequences*). Conversely, in the absence of a learner's use of effective self-regulatory strategies, other personal (e.g., affect), environmental, or behavioral influences are assumed to dominate.

Personal influences. Student's self-efficacy perceptions depend in part on each of four other types of personal influence: students' knowledge, metacognitive processes, goals, and affect. A distinction is drawn between declarative and self-regulative knowledge of students. *Declarative* or propositional knowledge is organized according to its own inherent verbal, sequential, or hierarchical structure. According to Siegler (1982), declarative knowledge is (a) organized in terms of subjects and predicates, (b) unambiguously related to events in the external world (i.e., to only a single referent), (c) separate from control structures (metacognitive processes), and (d) unaffected by context conditions. An example of such knowledge is the lexical definition of the word *truth* (e.g., what conforms to fact or reality). This type of personal knowledge is assumed to be distinct from procedural knowledge.

According to Anderson (1976), procedural knowledge is organized around conditions and actions. It is highly sensitive to context and to outcomes of such action-related variables

as a person's current goals, level of motivation, contents of short-term memory, and stimulation from the external environment. One of most common ways of depicting procedural knowledge is in the form of strategies, which have been defined as "processes (or sequences of processes) that, when matched to the requirements of the task, facilitate performance" (Pressley, Goodchild, Fleet, Zajchowski, & Evans, 1987, p. 5). Pressley, Borkowski, and Schneider (1987) drew a distinction between specific strategies, which are dependent on distinctive task contexts, and general strategies, which can be used more universally. Other theorists such as Paris and Byrnes (1989) have distinguished between procedural and conditional knowledge: the former refers to knowledge of *how* to use strategies, and the latter refers to knowledge of *when* and *why* strategies are effective.

In my account, students' *self-regulative knowledge* (e.g., learning strategies or standards) is assumed to have both procedural and conditional qualities; however, because of the conditional dependence of students' strategy use on a feedback loop (as discussed earlier), it is treated theoretically as a single, integrated construct. For example, a goal-setting strategy such as dividing weekly mathematics assignments into daily tasks to accomplish has both procedural dimensions (i.e., decomposing a task in terms of proximal subgoals) and conditional dimensions (i.e., continuing to use this strategy as long as it facilitates task completion). It is assumed that declarative and self-regulative knowledge are interactive. For example, students' general knowledge of mathematics will contribute to their ability to divide the week's assignment into manageable daily tasks.

Historically, social cognitive theorists (Bandura, 1977b; Rosenthal & Zimmerman, 1978; Zimmerman & Martinez-Pons, 1988) have distinguished knowledge acquisition from behavioral performance. Students' use of self-regulated learning strategies depends not only on their knowledge of strategies but also on metacognitive decision-making processes and performance outcomes. At a general level of self-regulation, task analysis or *planning* has been proposed to describe decisional processes for selecting or altering general self-regulatory strategies (e.g., Bandura, 1982b; Mischel, 1968; Zimmerman, 1983). Planning is assumed to occur on the basis of task and environment features, one's declarative and self-regulatory knowledge (about strategies), goals, perceptions of efficacy, affective states, and outcomes of behavior control. At a 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, 1985; for a similar distinction). With self-regulated learners, strategic planning guides efforts to control learning and is affected reciprocally by enactive feedback from these efforts.

These two metacognitive distinctions can be illustrated in a self-instruction strategy (e.g., Meichenbaum & Goodman, 1979). A ninth-grade boy in the school band plays discordant sounds on his trumpet periodically, and these mistakes have subjected him to derision by other band members. To correct his misreading certain musical notes, he *plans* to covertly spell a key mnemonic word to remind him of the meaning of the musical staff. To carry out (i.e., *control*) this self-instruction

strategy, he will position himself to read the notes better and will rehearse the key word between musical numbers to facilitate recall. His use of this covert verbalization strategy will be continued if monitoring reveals that it is successful in reducing the number of sour notes during rehearsal. According to this analysis, students' effectiveness in planning and controlling their use of personal, behavioral, and environmental strategies to learn is one of the most visible signs of their degree of self-regulation (Zimmerman & Martinez-Pons, 1986).

Metacognitive decision making depends also on learners' long-term goals, according to the proposed definition of self-regulated learning. The boy in the illustration may have dropped out of the school band after being ridiculed rather than adopting a self-instruction strategy if he lacked long-term musical goals for himself (e.g., becoming a professional musician). A particularly effective strategy for reaching long-term goals involves setting intermediate goals that are based on their specificity, difficulty level, and proximity in time (Bandura, 1982a). With regard to specificity, research has shown that students given general goals such as "Do your best" do not improve in motivation or learning (Locke, Shaw, Saari, & Latham, 1981). In addition, self-regulated learners can strategically set goals at a plausible difficulty level. Extensive research on children's achievement motivation (e.g., McClelland, 1985; Smith, 1969) has indicated that youngsters with low achievement motivation have tended to set goals for themselves that were either too high or too low to be of much assistance.

Goals can be set on the basis of their proximity in time. Proximal goal setting is important, according to Bandura (1986), because "most anticipated outcomes are too far off, or too general, to shepherd specific actions in immediate situations that present many uncertainties and complexities. People have to create for themselves proximal guides and self-motivators for courses of action that lead to distal attainments" (p. 336). Bandura and Schunk (1981) reported evidence that elementary school pupils with gross deficits and low motivation in arithmetic were aided by setting proximal goals for themselves. Youngsters who set page completion goals daily for their mathematics seatwork displayed significantly better intrinsic interest, perceptions of self-efficacy, and acquisition of arithmetic skills than did youngsters who relied on longer term goals. The effects of proximal goal setting were impressive in comparison with those of distal goal-setting: The numerical advantages of proximal goals during posttesting were approximately 60% higher self-efficacy, 95% higher arithmetic skill, and 2500% higher intrinsic interest.²

Students' long-term goals and use of metacognitive control processes are theorized to be dependent on perceptions of *self-efficacy* and *affect*, as well on self-regulatory knowledge. Bandura (1986) suggested that "those who have a high sense of self-efficacy set themselves more challenging goals to accomplish" (p. 348). In support of this hypothesis, Bandura and Cervone (1986) reported evidence that subjects' self-set goals were correlated significantly with their estimates of self-efficacy ($r = .54$) under feedback conditions in which their performance appeared grossly substandard. Affective states can also influence self-regulated functioning. For example,

there is evidence that anxiety can impede various metacognitive processes, particularly action control processes (which are similar to behavior control processes). Kuhl (1982) developed a scale to measure action control—that is, one's ability to carry out intended actions. This self-rating measure is designed to assess learners' disposition to use volitional processes effectively to protect intended actions from competing internal states (such as ruminating thoughts of prior failures) or external conditions (such as high task difficulty or distractions). Kuhl found that learners' action control scores were negatively correlated with a measure of anxiety. Thus anxiety and low self-efficacy perceptions can undermine students' use of metacognitive control processes and can inhibit setting long-term goals.

Behavioral influences. Three classes of student responding are of particular relevance to analyses of self-regulated learning: self-observation, self-judgment, and self-reaction. Although it is assumed that each of these classes of responding is influenced by various covert personal (self-) processes, as well as by environmental processes, each class subsumes actions that are observable, trainable, and interactive. For these reasons, self-observation, self-judgment, and self-reaction are treated in my model as behavioral influences on self-regulated learning.

Self-observation refers to students' responses that involve systematically monitoring their own performance. Observing oneself can provide information about how well one is progressing toward one's goals. Self-observation is influenced by such personal processes as self-efficacy, goal-setting, and metacognitive planning, as well as by behavioral influences. Two common behavioral methods of self-observation are (a) verbal or written *reporting* and (b) quantitative *recording* of one's actions and reactions. There is extensive evidence that prompting students to keep records affects their learning, motivation, and self-efficacy. For example, Schunk (1983c), using several recording procedures, trained groups of elementary school children with poor achievement records to subtract. One group of youngsters was taught to self-record the number of pages of the workbook that they completed at the end of each class period. In a second group, an adult recorded the number of workbook pages that the children completed. In comparison with a no-recording control group, children in both the self-recording and the external-recording groups displayed significantly greater self-efficacy, skill, and task persistence. Self-recording proved to be as effective as external recording on all three measures. Children who self-recorded had 116% higher self-efficacy, 129% more skill, and 65% more task persistence during posttesting than did youngsters in the no-recording control group. This study indicated how systematic observation of one's own learning progress can produce positive self-reactive effects during student learning.

A second class of student self-regulated response involves self-judgment. *Self-judgment* refers to students' responses that involve systematically comparing their performance with a

² I calculated these and subsequent comparative percentages by dividing the difference between the two means in question by the smaller mean.

standard or goal. This definition assumes that self-evaluation depends on such personal processes as self-efficacy, goal setting, and knowledge or standards, as well as self-observed responses. Knowledge of standards or goals can be derived from a variety of sources including social norms, temporal criteria such as earlier performance levels, or absolute criteria such as mastery tests or goals (Bandura, 1986). Two common ways in which students self-evaluate behaviorally are by *checking* procedures, such as re-examining their answers to mathematics problems, and by *rating* their answers in relation to those of another person or an answer sheet (see Evans et al., in press).

The role of two forms of students' self-judgments in their academic achievement has been studied recently. In an investigation of students' self-regulation during mathematical learning, Schunk (1983a) examined the effects of self-judgments based on goals and social comparative criteria with fourth- and fifth-grade children. The children kept a record of their success in completing division problems for 2 days. Pupils in the comparative information group were told at the start of the first session that half of the children like them were able to finish 25 problems; at the start of the second session, they were told that half of the children like them were able to finish 16 problems. Pupils in the goals group were given the suggestion at the start of the first session that they might want to decide to try at least 25 problems; at the start of the second session, the suggestion to try 16 problems was given. The pupils in the combined comparative information and goal group were given both sets of instructions, and youngsters in the control group received neither set. Schunk found that pupils profited significantly from both efforts to instigate self-judgments, and youngsters in the combined goals and comparative information group showed the highest level of division skill after training. These effects were substantial: Pupils given both self-judgment treatments displayed 21% higher self-efficacy and 53% more division skill on the posttest than did youngsters in a control group.

Several studies have also established that self-judgment is related to other dimensions of self-regulated learning. Recently, Zimmerman and Martinez-Pons (1988) assessed high school students' use of self-regulation strategies by using a structured interview concerning a series of common learning contexts. Teachers of these students were asked to rate the students' display of self-regulation during classroom learning, during testing, or in their homework. Zimmerman and Martinez-Pons found that students' use of self-regulated learning strategies was related to teachers' ratings of their awareness of how well they did on a test before it was graded.

There is also evidence that students' use of self-judgment responses is related to personal self-regulated learning processes such as their perceptions of efficacy. Collins (1982) studied children who had high or low self-efficacy for mathematics. According to their performances on difficult mathematical problems, highly efficacious students were quicker to discard faulty strategies, solved more problems, and reworked more previously failed problems than their less efficacious counterparts. The outcomes obtained even when adjustments were made for differences in students' ability levels. These data indicated that highly self-efficacious students displayed

better self-judgment when solving difficult problems than did students with low self-efficacy.

A third class of students' self-regulated response involves *self-reactions* to one's performance. As was the case with self-observation and self-evaluation, learners' self-reactions involve such personal processes as goal setting, self-efficacy perceptions, and metacognitive planning, as well as behavioral outcomes. The relations between these processes are assumed to be reciprocal. For example, initial levels of self-efficacy will affect a learner's choice of strategy, and the enactive feedback from actual usage will alter subsequent estimates of efficacy. Not all forms of self-reaction will necessarily increase self-regulated learning: Unfavorable self-evaluations of learning progress may lead to withdrawal or learned helplessness when learners no longer try because they expect their responses to be futile (Seligman, 1975).

Three self-regulatory classes of self-reaction strategies should be distinguished according to social cognitive theory: (a) *behavioral* self-reactions by which students seek to optimize their specific learning responses; (b) *personal* self-reactions by which they seek to enhance their personal processes during learning; and (c) *environmental* self-reactions by which they seek to improve the learning environment. These forms of self-reaction correspond closely to the three major classes of self-regulation strategies. In triadic terms, all three strategic reactions are self-initiated (a personal influence) and sustained through positive self-evaluations (a response influence). Each of the three classes of self-reaction strategies is designed to increase one or more triadic influences during subsequent responding. Examples of behavioral self-reactions involve use of such strategies as self-administered praise or criticism; examples of personal self-reactions are such strategies as proximal goal resetting or rehearsing and memorizing. Two common environmental self-reactions involve structuring one's environment and asking for assistance from other people (see Zimmerman & Martinez-Pons, 1986).

Bandura (1986) theorized that all three classes of behavioral influence are highly interdependent. For example, he hypothesized that making students more self-observant can reciprocally influence their self-judgments of their work in two ways: "It provides the information necessary for setting realistic performance standards and for evaluating ongoing changes in behavior" (p. 337). There is a rather extensive body of evidence that training students to self-record can produce a variety of positive *reactivity* effects (Shapiro, 1984) during student learning and performance.

Schunk (1983b) investigated the important intermediary role that self-judgment responses play in students' reactions to self-recording. Elementary school children who were deficient in mathematical division skill were given initial instruction in solution strategies and then were asked to record the number of problems that they completed during two learning sessions. Two dimensions of the students' self-judgments were examined through goal-setting instructions: their difficulty level (high or low number of problems) and their justification (socially comparable students can achieve the goal or they personally should be able to achieve the goal). Schunk found that students given high goals and a personal justification attained the highest level of mathematical achievement and

displayed the highest level of self-efficacy. Regardless of the justification, students given high goals completed the greatest number of division problems. Providing a social comparative justification for a goal had the least effect on the students' perceived self-efficacy. This study indicated that variations in students' self-judgment responses can influence not only behavioral self-reactions to record keeping such as problem completion but also such personal self-reactions as knowledge acquisition and perceptions of self-efficacy.

Environmental influences. Social cognitive theorists have devoted particular attention to the impact of social and enactive experience on human functioning. This emphasis is extended to self-regulated learning in my formulation. Bandura (1986) assumed that learning from observing one's own behavior and from *enactive outcomes* is the most influential method for changing a learner's perceptions of efficacy and improving retention of knowledge. According to this view, a student's decision to use an academic learning strategy, such as outlining text material to prepare for a test, ultimately rests on the question "Does this strategy work for me on this topic?" An outlining strategy may help other students, or it could be even helpful personally with other courses or teachers, but if it clearly does not improve one's own learning of the task at hand, it will not be continued. Bandura emphasized the importance of enactive experience because it conveys feedback about personal efficacy, as well as declarative and self-regulative knowledge, to the learner. This sense of self-efficacy for learning a task is assumed to motivate further strategy selections and enactments.

There is a sizable body of evidence that enactive mastery experiences improve self-efficacy perceptions in a wide variety of school tasks (Schunk, 1984). For example, Schunk (1983d) gave elementary school children instructional experiences involving written packets of step-by-step written directions and practice problems in arithmetic division problems. Students who were given rewards for performance accomplishments (i.e., mastery) displayed significantly greater self-efficacy, faster learning, and greater division skill than did students who were given rewards for simply participating or given no rewards. The advantages of earning rewards for performance accomplishments in comparison with rewards for mere participation were large during posttesting: The students' self-efficacy was 140% higher, their learning was 22% faster, and their division skill was 160% higher. These results indicate that mere enactment is not sufficient to increase perceptions of mastery and to motivate self-regulated learning. Experiencing environmental outcomes of such enactments as rewards for surpassing preestablished criteria of excellence is also important.

The impact of *modeling* on self-regulation is given particular emphasis in social cognitive formulations. The modeling of effective self-regulated strategies can improve the self-efficacy for even deficient learners. In Bandura's (1986) view, the modeling of "effective coping strategies can boost the self-efficacy of individuals who have undergone many experiences confirming their inefficacy," as well as "the self-assured" (p. 400). Such modeling is theorized to be especially effective if the model is perceived as similar to the observer. Schunk, Hanson, and Cox (1987) exposed elementary school children

who were performing below grade level in mathematics to either a coping model or a model who displayed errorless mastery. In addition to eliminating errors gradually, the coping model showed high concentration, persistence, and increased effort. Not only did these deficient children view the coping model as more similar in competence to themselves than the errorless model, but they also learned arithmetic fractions more readily and gained a greater sense of efficacy from the coping model. The differential impact of a coping model on children's self-efficacy was substantial: A coping model raised children's self-efficacy perceptions 86% from pretesting to posttesting, whereas a mastery model raised these perceptions only 32%.

According to social cognitive theory, another important form of social experience is *verbal persuasion*. This type of experience is often a less effective method for conveying self-regulation strategies because it depends on a learner's level of verbal comprehension. However, when combined with social modeling, verbal description has been found to be a powerful medium through which children can learn a wide variety of cognitive, affective, and academic skills (Rosenthal & Zimmerman, 1978; Zimmerman & Rosenthal, 1974).

For example, Zimmerman and Rocha (1984, 1987) compared the effectiveness of an adult female model's toy manipulations and verbal elaborations on kindergarten children's associative learning in two studies. The task involved matching toys that were paired together during an initial learning phase. In the first study (Zimmerman & Rocha, 1984), youngsters who observed the model motorically enact and verbally describe a toy manipulation sequence (e.g., pinching a scarecrow with pliers) recalled more toy pairs than did children who saw the model enact it silently. Children in a silent, enactive modeling condition in turn performed better than youngsters in a silent, nonenactive modeling (control) condition in which toy pairs were presented statically together. Children who heard the model use highly elaborated adult descriptions of the enactive sequence recalled more toy pairs than did youngsters who heard less elaborated peer descriptions of the sequence. These data indicate that a model's verbal elaboration increased the effectiveness of her motoric performance.

In a second study involving the same type of task and procedures, Zimmerman and Rocha (1987) explored the secondary effects of a female model's motoric and verbal elaborations on kindergarten children's acquisition and use of these two strategies on a transfer task (as well as their primary effects on associative learning). Exposure to the model's verbal descriptions and motoric manipulations significantly increased not only children's associative learning but also their use of verbal and motoric elaboration strategies during transfer. In comparison with pupils who observed a nonelaborative model, youngsters who were exposed to verbal and motoric modeling displayed 197% more associative learning and 88% more transfer. In terms of their strategy use, pupils who viewed an elaborative model displayed 150% more verbal elaboration and 67% more motoric elaboration than youngsters who observed a nonelaborative model. These results indicated that modeling could convey learning strategies to even very young children.

In addition to modeling and verbal persuasion, Zimmerman and Martinez-Pons (1986) identified two other sources of social support widely used by self-directed learners: (a) direct *assistance* from teachers, other students, or adults and (b) literary and other *symbolic* forms of information such as diagrams, pictures, and formulas. These researchers found that self-initiated efforts to obtain either form of social support was predictive of the students' achievement track in school. This investigation will be described in detail later.

There is research indicating that physical assistance can enable young elementary school children to acquire a complicated conditional rule. Rosenthal and Zimmerman (1973) taught these pupils to select the correct number and color of spools on the basis of clocklike stimuli through modeling and/or physical guidance of their hands. Each procedure proved to be effective separately and when combined with the other instructional procedure in facilitating rule learning and transfer. In a recent review, Rosenthal and Downs (1985) provided an analysis of a wide variety of symbolic, social, and physical aids that can be used to self-regulate learning. They reported extensive evidence of the effectiveness of such aids as structured manuals, guides for processing, prompts and textual supports, reviews, and reductive codes when used alone or in combination.

The final type of environmental influence on student self-regulated learning that will be considered is the *structure* of the learning context, particularly such elements as the academic task and setting. According to social cognitive theory (Mischel & Peake, 1982; Zimmerman, 1983), human learning remains highly dependent on the social environmental context from which it sprang. This assumption is extended in my formulation to self-regulated learning. Changing an academic task to increase the difficulty level or changing the academic setting from a noisy to a quiet place to study is expected to affect self-regulated learning. A growing body of evidence indicates that student judgments of self-efficacy are directly influenced by the difficulty of the tasks (Bandura, 1986).

In a recent observational study of self-regulation during writing, Marcus (1988) found that students who displayed superior ability on a standardized test of writing regulated their immediate physical environment more effectively than did students with poor writing ability. Students were brought to an experimental room to write a paper on jogging. The setting contained a variety of stimuli that could facilitate or impede writing. Marcus found that 11th-grade students with superior writing ability were more likely to adjust the sound of a television set and to use a clock to monitor their performance while they wrote their themes than were students of lower ability. These results indicate that high-ability writers displayed greater awareness of the need to self-regulate environmental stimuli such as televisions and clocks than did less able writers.

Each of the environmental influences just described is assumed to be reciprocally interactive with personal and behavioral influences. When learners become self-directed, personal influences are mobilized to strategically regulate behavior and the immediate learning environment. Self-directed learners are assumed to understand the impact of the environment on them during acquisition and to know how

to improve that environment through the use of various strategies. Zimmerman and Martinez-Pons (1986, 1988) found that self-regulated learners use such strategies as environmental structuring (e.g., creating a study area), seeking social assistance from teachers (e.g., regarding an assignment), and seeking or reviewing information (e.g., from literary sources). Because, in the proposed triadic formulation, environmental, personal, and behavioral influences affect one another, external mechanisms for increasing personal self-regulation should be of interest to educators. It is assumed that students can be taught or prompted to become more self-regulated learners by acquiring effective strategies and by enhancing perceptions of self-efficacy. Students' use of self-regulated learning strategies enables them to increase their personal control over their own behavior and immediate environment.

Self-Regulated Learning Strategies

Bandura (1986) ascribed much importance to a learner's use of self-regulation strategies. In his view, strategy applications provide a learner with valuable self-efficacy knowledge. This knowledge, in turn, is assumed to determine subsequent strategy selections and enactments; "such representation knowledge is put to heavy use in forming judgments and in constructing and selecting courses of actions" (Bandura, 1986, p. 454).

Significant inroads have been made in the investigation of common self-regulated learning strategies that students use to improve their academic achievement. In contrast to the laboratory training studies that have constituted much research on self-regulated learning to date, Zimmerman and Martinez-Pons (1986) relied on interviews with high school students about self-reported strategies used in a variety of common learning contexts. They found evidence of students' use of 14 types of self-regulated learning strategies that were very similar to strategies that had been studied in laboratory research (see Table 1). Students' use of these strategies was found to be highly correlated with their achievement indices and with teachers' ratings of their degree of self-regulation in class. For example, students' reports of using these self-regulated learning strategies accounted for 93% of the variance ($R = .96$) of their achievement track placement in school, and 13 of the 14 strategies discriminated significantly between students from the upper achievement track and students from lower tracks.

In more recent research, Zimmerman and Martinez-Pons (1988) found that students' reports of using self-regulated strategies were highly correlated ($R = .70$) with a factor derived from teachers' judgments of students' self-regulation during class and the students' achievement test scores. The teachers were asked to rate such responses as students' (a) timely completion of assignments, (b) solicitation of additional information or help, (c) awareness of test performance before grading, and (d) preparation for and interest in class. These data indicated that strategies that had been derived from social cognitive theory and self-regulation laboratory training research were highly predictive of students' performance in class.

Table 1
Self-Regulated Learning Strategies

Categories/Strategies	Definitions
1. Self-evaluating	Statements indicating student-initiated evaluations of the quality or progress of their work; e.g., "I check over my work to make sure I did it right."
2. Organizing and transforming	Statements indicating student-initiated overt or covert rearrangement of instructional materials to improve learning; e.g., "I make an outline before I write my paper."
3. Goal-setting and planning	Statements indicating students' setting of educational goals or subgoals and planning for sequencing, timing, and completing activities related to those goals; e.g., "First, I start studying two weeks before exams, and I pace myself."
4. Seeking information	Statements indicating student-initiated efforts to secure further task information from nonsocial sources when undertaking an assignment; e.g., "Before beginning to write the paper, I go to the library to get as much information as possible concerning the topic."
5. Keeping records and monitoring	Statements indicating student-initiated efforts to record events or results; e.g., "I took notes of the class discussions"; "I kept a list of the words I got wrong."
6. Environmental structuring	Statements indicating student-initiated efforts to select or arrange the physical setting to make learning easier; e.g., "I isolate myself from anything that distracts me"; "I turned off the radio so I can concentrate on what I am doing."
7. Self-consequating	Statements indicating student arrangement or imagination of rewards or punishment for success or failure; e.g., "If I do well on a test, I treat myself to a movie."
8. Rehearsing and memorizing	Statements indicating student-initiated efforts to memorize material by overt or covert practice; e.g., "In preparing for a math test, I keep writing the formula down until I remember it."
9-11. Seeking social assistance	Statements indicating student-initiated efforts to solicit help from <i>peers</i> (9), <i>teachers</i> (10), and <i>adults</i> (11); e.g., "If I have problems with math assignments, I ask a friend to help."
12-14. Reviewing records	Statements indicating student-initiated efforts to reread <i>notes</i> (12), <i>tests</i> (13), or <i>textbooks</i> (14) to prepare for class or further testing; e.g., "When preparing for a test, I review my notes."
15. Other	Statements indicating learning behavior that is initiated by other persons such as teachers or parents, and all unclear verbal responses; e.g., "I just do what the teacher says."

The effectiveness of each of the 14 self-regulated learning strategies described in Table 1 can be explained on the basis of the proposed triadic model. The purpose of each strategy is to improve students' self-regulation of their (a) personal functioning, (b) academic behavioral performance, and (c) learning environment. For example, the strategies of organizing and transforming, rehearsing and memorizing, and goal setting and planning focused on optimizing personal regulation. Strategies such as self-evaluation and self-consequences were designed to enhance behavioral functioning. The strategies of environmental structuring, seeking information, reviewing, and seeking assistance were intended to optimize the students' immediate learning environment.

Conclusion

The zeitgeist for explaining students' self-regulated academic learning has grown rapidly in recent years. It has spawned a number of theoretical efforts to explain such phenomena as strategy use (e.g., Pressley, Borkowski, & Schneider, 1987; Weinstein & Underwood, 1985), intrinsic motivation (e.g., Ryan, Connell, & Deci, 1984), the self-system (e.g., McCombs, 1986), academic studying (e.g., Thomas & Rohwer, 1986), classroom interaction (e.g., Rohrkemper, 1989; Wang & Peverly, 1986), use of instructional media (Henderson, 1986), metacognitive engagement (e.g., Corno & Mandinach, 1983), and self-monitoring learning or comprehension (e.g., Ghatala, 1986; Paris, Cross, & Lipson, 1984). These, as well as other related theoretical views, represent a wide spectrum of fundamental assumptions about students and the importance of various self-regulatory processes, ranging from behavioral to cognitive and phenomenological (see Zimmerman, 1989). In comparison with purely behavioral views, the proposed social cognitive account is less parsimonious because it includes numerous person (self-) processes. In comparison with purely cognitive approaches, a social cognitive view is more restrictive insofar as it does not focus on mental phenomena unless they are manifested overtly in some form during social and behavioral functioning.

Among the advantages of a social cognitive approach to self-regulated academic learning, three are particularly important to educational psychologists: (a) It distinguishes the effects of personal (self-) regulatory influences from overt behavioral ones and can explain the relative advantage of each; (b) it links students' self-regulatory processes to specific social learning or behaviorally enactive experiences and can explain their reciprocal impact; and (c) it identifies two key processes through which self-regulated learning is achieved, self-efficacy perceptions and strategy use, and can explain their relation to student motivation and achievement in school. To the degree that a social cognitive approach renders students' self-regulated learning processes observable and trainable through specific experience, it should prove helpful in guiding academic analyses and interventions.

References

- Anderson, J. R. (1976). *Language, memory, and thought*. Hillsdale, NJ: Erlbaum.

- Bandura, A. (1977a). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191-215.
- Bandura, A. (1977b). *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. (1982a). Self-efficacy mechanism in human agency. *American Psychologist*, 37, 122-147.
- Bandura, A. (1982b). The self and mechanisms of agency. In J. Suls (Ed.), *Psychological perspectives on the self* (Vol. 1, pp. 3-39). Hillsdale, NJ: Erlbaum.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A., & Cervone, D. (1983). Self-evaluative and self-efficacy mechanisms governing the motivational effects of goal systems. *Journal of Personality and Social Psychology*, 45, 1017-1028.
- Bandura, A., & Cervone, D. (1986). Differential engagement of self-reactive influences in cognitive motivation. *Organizational Behaviors and Human Decision Processes*, 38, 92-113.
- Bandura, A., Grusec, J. E., & Menlove, F. L. (1967). Some social determinants of self-monitoring reinforcement systems. *Journal of Personality and Social Psychology*, 5, 449-455.
- Bandura, A., & Kupers, C. J. (1964). The transmission of patterns of self-reinforcement through modeling. *Journal of Abnormal and Social Psychology*, 69, 1-9.
- Bandura, A., & Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology*, 41, 586-598.
- Carver, C. S., & Scheier, M. F. (1981). *Attention and self-regulation: A control-theory approach to human behavior*. New York: Springer-Verlag.
- Collins, J. L. (1982, March). *Self-efficacy and ability in achievement behavior*. Paper presented at the annual meeting of the American Educational Research Association, New York.
- Corno, L. (1989). Self-regulated learning: A volitional analysis. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theory, research, and practice* (pp. 111-141). New York: Springer.
- Corno, L., & Mandinach, E. (1983). The role of cognitive engagement in classroom learning and motivation. *Educational Psychologist*, 18, 88-108.
- Diener, C. I., & Dweck, C. S. (1978). An analysis of learned helplessness: Continuous changes in performance strategy and achievement cognitions following failure. *Journal of Personality and Social Psychology*, 36, 451-462.
- Evans, D., Clark, N. M., Feldman, C. H., Wasilewski, Y., Levison, M. J., Zimmerman, B. J., Levin, B., & Mellins, R. M. (in press). School-based health education for children with asthma: Some issues for adherence research. In S. A. Schumaker & J. Ockene (Eds.), *The adoption and maintenance of behaviors for optimal health*. New York: Springer.
- Ghatala, E. S. (1986). Strategy monitoring training enables young learners to select effective strategies. *Educational Psychologist*, 21, 434-454.
- Henderson, R. W. (1986). Self-regulated learning: Implications for the design of instructional media. *Contemporary Educational Psychology*, 11, 405-427.
- Kuhl, J. (1982). Volitional aspects of achievement motivation and learned helplessness: Toward a comprehensive theory of action control. In B. Maher (Ed.), *Progress in experimental personality research* (Vol. 15, pp. 99-171). New York: Academic Press.
- Kuhl, J. (1985). Volitional mediators of cognitive-behavior consistency: Self-regulatory processes and action versus state orientation. In J. Kuhl & J. Beckman (Eds.), *Action control* (pp. 101-128). New York: Springer.
- Kurtz, B. E., & Borkowski, J. G. (1984). Children's metacognition: Exploring relations among knowledge, process, and motivational variables. *Journal of Experimental Child Psychology*, 37, 335-354.
- Locke, E. A., Shaw, K. N., Saari, L. M., & Latham, G. P. (1981). Goal setting and task performance: 1969-1980. *Psychological Bulletin*, 90, 125-152.
- Mace, F. C., & Kratochwill, T. R. (1985). Theories of reactivity in self-monitoring: A comparison of cognitive-behavioral and operant models. *Behavior Modification*, 9, 323-343.
- Marcus, M. (1988). *Self-regulation in expository writing*. Unpublished doctoral dissertation, Graduate School of the City University of New York, New York.
- McClelland, D. C. (1985). *Human motivation*. Glenview, IL: Scott Foresman.
- McCombs, B. (1986). The role of the self-system in self-regulated learning. *Contemporary Educational Psychology*, 11, 314-332.
- Meichenbaum, D., & Goodman, S. (1979). Clinical induction of private speech and critical questions about its study in natural settings. In G. Zivin (Ed.), *The development self-regulation through private speech* (pp. 325-360). New York: Wiley.
- Mischel, W. (1968). *Personality and assessment*. New York: Wiley.
- Mischel, W. (1981). Metacognition and the rules of delay. In J. H. Flavell & L. Ross (Eds.), *Social cognitive development: Frontiers and possible futures* (pp. 240-271). Cambridge, England: Cambridge University Press.
- Mischel, W., & Bandura, A. (1965). The influence of models in modifying delay of gratification patterns. *Journal of Personality and Social Psychology*, 2, 698-705.
- Mischel, W., & Liebert, R. M. (1966). Effects of discrepancies between observed and imposed reward criteria on their acquisition and transmission. *Journal of Personality and Social Psychology*, 3, 45-53.
- Mischel, W., & Peake, P. K. (1982). Beyond déjà vu in the search for cross-situational consistency. *Psychological Review*, 89, 730-755.
- Paris, S. G., & Byrnes, J. P. (1989). The constructivist approach to self-regulation and learning in the classroom. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theory, research, and practice* (pp. 169-200). New York: Springer.
- Paris, S. G., Cross, D. R., & Lipson, M. Y. (1984). Informed strategies for learning: A program to improve children's reading awareness and comprehension. *Journal of Educational Psychology*, 76, 1239-1252.
- Pearl, R., Bryan, T., & Herzog, A. (1983). Learning disabled children's strategy analyses under high and low success conditions. *Learning Disability Quarterly*, 6, 67-74.
- Pressley, M. (1982). Elaboration and memory development. *Child Development*, 53, 296-309.
- Pressley, M., Borkowski, J. G., & Schneider, W. (1987). Cognitive strategies: Good strategy users coordinate metacognition and knowledge. In R. Vasta & G. Whitehurst (Eds.), *Annals of child development* (Vol. 5, pp. 89-129). Greenwich, CT: JAI Press.
- Pressley, M., Goodchild, F., Fleet, J., Zajchowski, R., & Evans, E. D. (1987, April). *What is good strategy use and why is it hard to teach?: An optimistic appraisal of the challenges associated with strategy instruction*. Paper presented at the annual meeting of the American Educational Association, New Orleans, LA.
- Rohrkemper, M. (1989). Self-regulated learning and academic achievement: A Vygotskian view. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theory, research, and practice* (pp. 143-167). New York: Springer.
- Rosenthal, T. L., & Bandura, A. (1978). Psychological modeling: Theory and practice. In S. L. Garfield & A. E. Bergin (Eds.), *Handbook of psychotherapy and behavior change* (2nd ed., pp. 621-658). New York: Wiley.
- Rosenthal, T. L., & Downs, A. (1985). Cognitive aides in teaching and treating. *Advances in Behavior Research and Therapy*, 7, 1-53.
- Rosenthal, T. L., & Zimmerman, B. J. (1973). Organization, obser-

- vation, and guided practice in concept attainment and generalization. *Child Development*, 44, 606-613.
- Rosenthal, T. L., & Zimmerman, B. J. (1978). *Social learning and cognition*. New York: Academic Press.
- Ryan, R. M., Connell, J. P., & Deci, E. L. (1984). A motivational analysis of self-determination and self-regulation in education. In C. Ames & R. Ames (Eds.), *Research on motivation in education* (Vol. 2, pp. 13-52). New York: Academic Press.
- Schunk, D. H. (1981). Modeling and attributional effects on children's development: A self-efficacy analysis. *Journal of Educational Psychology*, 75, 93-105.
- Schunk, D. H. (1983a). Developing children's self-efficacy and skills: The roles of social comparative information and goal setting. *Contemporary Educational Psychology*, 8, 76-86.
- Schunk, D. H. (1983b). Goal difficulty and attainment information: Effects on children's achievement behaviors. *Human Learning*, 2, 107-117.
- Schunk, D. H. (1983c). Progress self-monitoring: Effects on children's self-efficacy and achievement. *Journal of Experimental Education*, 51, 89-93.
- Schunk, D. H. (1983d). Reward contingencies and the development of children's skills and self-efficacy. *Journal of Educational Psychology*, 75, 511-518.
- Schunk, D. H. (1984). The self-efficacy perspective on achievement behavior. *Educational Psychologist*, 19, 199-218.
- Schunk, D. H. (1985). Participation in goal-setting: Effects on self-efficacy and skills of learning disabled children. *Journal of Special Education*, 19, 347-369.
- Schunk, D. H. (1986). Verbalization and children's self-regulated learning. *Contemporary Educational Psychology*, 11, 347-369.
- Schunk, D. H., Hanson, A. R., & Cox, P. D. (1987). Strategy self-verbalization during remedial listening comprehension instruction. *Journal of Educational Psychology*, 53, 54-61.
- Schunk, D. H., & Rice, J. M. (1984). Strategy self-verbalization during remedial listening comprehension instruction. *Journal of Experimental Education*, 53, 49-54.
- Seligman, M. E. P. (1975). *Helplessness: On depression, development, and death*. San Francisco: Freeman.
- Shapiro, E. S. (1984). Self-monitoring procedures. In T. H. Ollendick & M. Hersen (Eds.), *Child behavior assessment: Principles and procedures* (pp. 148-165). New York: Pergamon.
- Siegler, R. S. (1982). Information processing approaches to development. In P. Mussen (Ed.), *Manual of child psychology* (Vol. 1, pp. 129-211). New York: Wiley.
- Smith, C. P. (Ed.). (1969). *Achievement-related motives in children*. New York: Russell Sage Foundation.
- Thomas, J. W., Ivontosch, L., & Rohwer, W. D., Jr. (1987). Relationships among student characteristics, study activities, and achievement as a function of course characteristics. *Contemporary Educational Psychology*, 12, 344-364.
- Thomas, J. W., & Rohwer, W. D., Jr. (1986). Academic studying: The role of learning strategies. *Educational Psychologist*, 21, 19-41.
- Thoresen, C. E., & Mahoney, M. J. (1974). *Behavioral self-control*. New York: Holt, Rinehart & Winston.
- Wang, M. C., & Peverly, S. T. (1986). The self-instructive process in classroom learning contexts. *Contemporary Educational Psychology*, 11, 370-404.
- Weinstein, C. E., & Underwood, V. L. (1985). Learning strategies: The how of learning. In J. W. Segal, S. F. Chipman, & R. Glaser (Eds.), *Thinking and learning skills* (Vol. 1, pp. 241-258). Hillsdale, NJ: Erlbaum.
- Zimmerman, B. J. (1981). Social learning theory and cognitive constructivism. In I. E. Sigel, D. M. Brodzinsky, & R. M. Golinkoff (Eds.), *New directions in Piagetian theory and practice* (pp. 39-49). Hillsdale, NJ: Erlbaum.
- Zimmerman, B. J. (1983). Social learning theory: A contextualist account of cognitive functioning. In C. J. Brainerd (Ed.), *Recent advances in cognitive developmental theory* (pp. 1-49). New York: Springer.
- Zimmerman, B. (1985). The development of "intrinsic" motivation: A social learning analysis. *Annals of Child Development*, 2, 117-160.
- Zimmerman, B. J. (1986). Development of self-regulated learning: Which are the key subprocesses? *Contemporary Educational Psychology*, 16, 307-313.
- Zimmerman, B. J. (1989). Models of self-regulated learning and academic achievement. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theory, research, and practice* (pp. 1-25). New York: Springer.
- Zimmerman, B. J., & Martinez-Pons, M. (1986). Development of a structured interview for assessing student use of self-regulated learning strategies. *American Educational Research Journal*, 23, 614-628.
- Zimmerman, B. J., & Martinez-Pons, M. (1988). Construct validation of a strategy model of student self-regulated learning. *Journal of Educational Psychology*, 80, 284-290.
- Zimmerman, B. J., & Ringle, J. (1981). Effects of model persistence and statements of confidence on children's efficacy and problem solving. *Journal of Educational Psychology*, 73, 485-493.
- Zimmerman, B. J., & Rocha, J. (1984). Influence of a model's verbal description of toy interactions on kindergarten children's associative learning. *Journal of Applied Developmental Psychology*, 5, 281-291.
- Zimmerman, B. J., & Rocha, J. (1987). Mode and type of toy elaboration strategy training on kindergartners' retention and transfer. *Journal of Applied Developmental Psychology*, 8, 67-78.
- Zimmerman, B. J., & Rosenthal, T. L. (1974). Observational learning of rule governed behavior by children. *Psychological Bulletin*, 81, 29-42.

Received May 2, 1988

Revision received February 13, 1989

Accepted March 22, 1989 ■