

# Regulation of Motivation: Evaluating an Underemphasized Aspect of Self-Regulated Learning

Christopher A. Wolters

*Department of Educational Psychology  
University of Houston*

Self-regulated learning is often described as a function of students' motivation, cognitive strategy use, and metacognition. The purpose of this article is to emphasize regulation of motivation as another important aspect of self-regulated learning. To achieve this goal, a specific conceptual understanding of regulation of motivation is proposed and used to clarify theoretical distinctions between this process and motivation, metacognition, and volition. In addition, the diverse nature of this regulatory activity is established by reviewing evidence showing students' use of several specific strategies for the regulation of motivation. The importance of this process is highlighted by discussing links between these regulatory strategies and indicators of students' motivation, cognitive engagement, and achievement. Finally, a guide for additional research related to the theoretical definition, measurement, development and instruction of strategies for regulating motivation is identified.

Models of self-regulated learning emphasize that students are more effective when they take a purposeful role in their own learning (Pintrich, 2000; Schunk, 2001; Zimmerman, 2000). Research in this area has emphasized that self-regulated learners are autonomous, reflective, and efficient learners who have the cognitive and metacognitive abilities as well as the motivational beliefs and attitudes needed to understand, monitor, and direct their own learning (see Boekaerts, Pintrich, & Zeidner, 2000; Schunk & Zimmerman, 1994). The focus of this article is on the regulation of motivation, an essential but less investigated aspect of self-regulated learning.

## SELF-REGULATED LEARNING

The specific characteristics most often attributed to self-regulated learners concern their motivational beliefs or attitudes, their cognitive strategy use, and their metacognitive abilities. Regarding motivation, self-regulated learners are thought to hold a collection of adaptive beliefs and attitudes that drive their willingness to engage in and persist at academic tasks. Specifically, these students

tend to be highly self-efficacious individuals who are focused on increasing their level of mastery and who view the material they are learning in school as valuable, interesting, and useful to know (Pintrich, 2000; Schunk & Ertmer, 2000; Wigfield, 1994).

At the same time, self-regulated learners are viewed as having a large arsenal of cognitive strategies that they can readily and skillfully deploy to accomplish different academic tasks. For instance, these students are proficient with a variety of rehearsal, organizational, and elaboration strategies (Alexander, Graham, & Harris, 1998; Weinstein & Mayer, 1986). Self-regulated learners also are perceived as metacognitively skilled regarding their awareness and use of cognitive strategies (Butler & Winne, 1995; Zimmerman, 1989, 1994). These students have a large store of metacognitive knowledge about learning strategies specifically, and about the learning process more generally (Borkowski, Carr, Rellinger, & Pressley, 1990; Pintrich, Wolters, & Baxter, 2000; Zimmerman, 1986). They are capable of monitoring their learning and generating internal feedback about their cognitive processing (Butler & Winne, 1995). They also are adept at modifying their learning behaviors in response to shifting situational demands or conditions (Zimmerman, 1989). In short, self-regulated learners have high levels of knowledge about different cognitive learning strategies and have the ability to select, monitor, and regulate their use of those strategies when engaged in academic tasks.

## REGULATION OF MOTIVATION AS A COMPONENT OF SELF-REGULATED LEARNING

Many models of self-regulated learning also presume that students manage aspects of the learning process in addition to their actual cognitive processing. Students' ability to control aspects of their motivation, more specifically, is thought to have an impact on their learning and achievement. Research examining self-regulation from a volitional perspective, for example, has emphasized students' efforts to increase their persistence or time on task (Corno, 1993, 2001; Kuhl, 1985). Motivation has also been identified as one area of the learning process that students actively self-regulate within social cognitive models of self-regulated learning (Zimmerman, 1994). In line with this view, Pintrich (2000; Garcia & Pintrich, 1994) described resource management or effort control as an important component of students' self-regulated learning. Finally, Boekearts (1995, 1997) depicted the active management of affective and motivational processes as an important part of self-regulated learning. In sum, there is some agreement in the literature that students may act to monitor and regulate their motivation or the processes responsible for their motivation and that this form of self-regulation can ultimately have an impact on their learning and achievement.

The purpose of this article is to evaluate the theoretical and empirical research concerning regulation of motivation to emphasize its importance to students' self-regulated learning. To achieve this goal the remainder of the article is divided into four sections. In the first section, a working definition of regulation of motivation is provided. In the second section, the theoretical distinctions between regulation of motivation and motivation, volition, and metacognition are evaluated. In the third section, this conceptual understanding is used to identify and describe a number of strategies that students might use to regulate their motivation within academic contexts. As part of this discussion, the empirical evidence relating these strategies to students' choice, effort, cognitive engagement, or academic performance is reviewed. Finally, in the fourth section, several key issues related to regulation of motivation are identified as a guide for additional research.

## REGULATION OF MOTIVATION AND ITS RELATION TO OTHER ASPECTS OF SELF-REGULATED LEARNING

To define regulation of motivation, the meaning of achievement motivation itself needs to be clarified. Behaviorally, theories of motivation attempt to explain outcomes such as students' choice of activities, the intensity of their effort or level of cognitive engagement within those activities, and their persistence at those activities (Graham & Weiner, 1996; Pintrich & Schrauben, 1992; Winne & Marx, 1989). Historically, efforts to understand and explain these behavioral

outcomes have relied on factors that include instincts, internal drives or traits, behavioral associations, and psychoanalytic forces (Graham & Weiner, 1996; Pintrich & Schunk, 2002). In contrast, more contemporary models of motivation emphasize the importance of cognitive constructs such as students' causal attributions, perceptions of self-competence, value, interest, feelings of self-determination, and reasons for engaging in an activity (Graham & Weiner, 1996; Pintrich & Schunk, 2002).

From a cognitive perspective, motivation can be characterized as either a product or a process (Winne & Marx, 1989). When viewed as a product or state, motivation refers to a student's willingness to engage in and persist at a task. At any particular time, students have a level of motivation that they experience phenomenologically and that influences their choice, effort, and persistence regarding a particular activity. For example, students can experience the phenomenological state of being interested, feeling self-efficacious, or wanting to master an activity. Motivation also can be viewed as the process or processes that account for students' level of motivation or goal-directed behavior (Pintrich & Schunk, 2002). From this perspective, motivation refers not just to an end state but also to the means through which that state is determined, and more generally to the cognitive processes that govern students' choice, effort, and persistence (Winne & Marx, 1989). For instance, motivation would include the processes that account for a student being interested, feeling self-efficacious, or wanting to master a task and the impact of these states on students' behavior. Within this discussion, the term *motivation* is used broadly to refer to both students' level of motivation as well as the processes that account for that level of motivation.

Consistent with this inclusive view of motivation, regulation of motivation can be described as the activities through which individuals purposefully act to initiate, maintain, or supplement their willingness to start, to provide work toward, or to complete a particular activity or goal (i.e., their level of motivation). This form of regulation is achieved by deliberately intervening in, managing, or controlling one of the underlying processes that determine this willingness (i.e., the processes of motivation). Regarding behavior, the regulation of motivation (or motivational regulation) encompasses those thoughts, actions, or behaviors through which students act to influence their choice, effort, or persistence for academic tasks. Consistent with general descriptions of strategies (Alexander et al., 1998), a strategy for the regulation of motivation (or motivational regulation strategy) can be characterized as a procedure used by individuals in a purposeful and willful manner to influence their motivation. To the extent that such a strategy is instigated, monitored, and directed by a student, it also can be identified as a self-regulation strategy and one factor in determining whether that student is a self-regulated learner.

As conceptualized here, motivational regulation is one process that operates within the larger system of self-regu-

lated learning. As such it is related to but conceptually distinct from other processes considered critical to self-regulated learning including motivation, volition, and metacognition.

### Distinguishing Between Motivation and Regulation of Motivation

Although deeply interrelated, the process of motivational regulation can be conceptually distinguished from the processes that account for motivation itself. Most notably these two processes can be differentiated based on the awareness and purposefulness of students' thoughts and actions. Self-regulated learners are considered to be consciously and intentionally engaging various regulatory strategies to accomplish specific learning goals, especially in the initial stages of using a strategy (Pintrich, 2000; Schunk, 2001; Zimmerman, 2000). Consistent with this view, regulation of motivation concerns only the thoughts and actions through which students deliberately try to influence their motivation regarding a particular activity.

Cognitive models of motivation, in contrast, do not typically propose that students necessarily are aware of the underlying processes that determine their motivation or that they purposefully intervene in these processes. For example, attribution theory proposes a process in which the causal attributions that students identify as responsible for their success or failure at a task sparks an emotional response and influences students' later expectations for success (Weiner, 1986). Together these emotions and expectations influence students' willingness to engage in similar tasks encountered in the future. Students' understanding and active control over the attributional process is not necessary for these effects to be realized. In contrast, students must exhibit a conscious level of understanding and more active control to self-regulate this motivational process. Boekaerts (1992) described this distinction as the difference between subjective control, meaning actions influenced through beliefs and perceptions, and active control, meaning conscious intent to manipulate. Kuhl highlights this difference by referring to the factors influencing the metalevel of decision making regarding one's actions as executional preferences, while using the labels "motivational" or "emotional" preferences for those factors influencing the more traditional process of motivation (Kuhl & Kazen-Saad, 1988; Kuhl & Kraska, 1989). Theories of motivation emphasize the subjective control that various beliefs and attitudes have on students' choice, effort, and persistence, whereas the regulation of motivation concerns students' active control of the processes that influence these outcomes.

This theoretical distinction between the process of motivation and the regulation of motivation mirrors the division that can be drawn between students' cognitive processing and their regulation of cognition (Pintrich et al., 2000). As with this latter distinction, the difference between the process of motivation and the regulation of motivation can become

somewhat fuzzy. For example, self-efficacy has been labeled a "self-regulatory process" and its role in students' motivation has been described as the self-regulation of motivation (Schunk, 1991; Zimmerman, Bandura, & Martinez-Pons, 1992). Self-efficacy does reflect a belief about the self and it does have a significant influence on motivation and ultimately on students' self-regulated learning. In line with the aforementioned distinction, however, this influence does not necessarily include any deliberate thoughts or actions by the individual. As an example, students may avoid activities because they do not feel efficacious about completing them (Bandura, 1997). This influence on choice, though, may not and may never have been consciously understood or controlled by the learner. Following the current understanding, therefore, the traditional influence of self-efficacy on students' choice, effort, or persistence would be considered motivational, whereas only some awareness and intentional management of this process by the student would be considered the regulation of motivation.

Despite this theoretical distinction, motivation and the regulation of motivation are likely to have a complex and interdependent relation. The need to use a motivational regulation strategy may only be triggered when students experience problems with their ongoing level of motivation, learning, or performance. It is possible that students will sometimes begin and complete a task with a consistently high level of motivation and thus may not experience any obstacles that interrupt their initiation, engagement, and persistence at the task. During such times students are unlikely to engage any regulation strategies intended to influence their motivation. This reasoning suggests that students who express highly adaptive motivational beliefs and attitudes may sometimes use motivational regulation strategies less frequently than students with less adaptive beliefs and attitudes may.

In contrast to this rather ideal situation, students often have some positive level of motivation yet experience potential motivational obstacles as they are preparing for and completing their academic work. For example, students may face boredom, difficulty in making progress, or distractions in the environment. Theoretically, the ability to regulate their motivation under these conditions should allow some students to overcome these problems and maintain a more productive level of engagement in the task. Hence, students who productively regulate their motivation should experience fewer situations in which they choose not to begin a task, provide inadequate effort, or disengage before a task is complete. Under these conditions, students' use of motivational regulation strategies should be positively associated with their motivation, their effort, and their performance.

Adding to the complexity of the relation between motivation and the regulation of motivation is the fact that some effort and thus some initial level of motivation are necessary to engage any regulatory strategy. Although it ultimately should result in an increased level of motivation, the regulation of motivation is also an effortful process that itself must be initi-

ated by some minimal willingness to complete a task. It seems doubtful that students who completely lack any expectation of success, who do not value successful completion of a task in the least, and who are not committed to finishing the task for any reason, will activate a strategy designed to ensure that the task is accomplished. From this perspective students must possess some minimum willingness to engage and complete a task or else when they encounter motivational problems they will fail to regulate their motivation and quit the task altogether. This assumption is supported by empirical evidence showing that students with more adaptive motivational beliefs tend to report using some motivational regulation strategies more frequently (Wolters & Rosenthal, 2000).

Overall, this line of reasoning suggests a theoretical relation between students' motivation and motivational regulation that is reciprocal and perhaps curvilinear. This relation is reciprocal in that students' motivation affects their use of motivational regulation strategies, while at the same time the use of motivational regulation strategies influences students' ongoing motivation. It may be curvilinear because this relation is likely to be strongest among students with a moderate level of motivation, while weaker for students with very high or very low levels of initial motivation. Research that tests these assumptions empirically is needed to clarify and better establish the nature of these hypothetical relations, and to explore how the regulation of motivation fits with specific models used to explain motivation.

### Distinguishing Between Regulation of Motivation and Metacognition

Like motivation, metacognition is often viewed as a core element necessary for self-regulated learning (Butler & Winne, 1995; Pintrich et al., 2000; Zimmerman, 1994). Historically, research on metacognition has roots that stretch into many areas of psychology including work focused on cognitive development, memory, executive processing, and learning strategies (Brown, Bransford, Ferrara, & Campione, 1983; Flavell, 1979; Kluwe, 1982; Pressley, Borkowski, & Schneider, 1987). Perhaps because of this heterogeneous background an exact and enduring definition of metacognition and its constituent processes has at times proven to be elusive (Baker, 1994; Paris & Winograd, 1990; Wellman, 1983). Nevertheless, metacognition is most frequently described as consisting of at least two theoretically distinguishable components including regulation of cognition and knowledge of cognition (Brown et al., 1983; Flavell, 1979; Pintrich et al., 2000; Schraw & Moshman, 1995).

Narrowly defined, regulation of cognition describes students' efforts to monitor, control, or adjust their cognitive processing in response to shifting task demands or conditions (Baker, 1994; Brown, 1987). Activities typically viewed as efforts to regulate cognition include planning how to complete a task, selecting the cognitive strategies one will use,

monitoring the effectiveness of the strategies one has chosen, and modifying or changing the cognitive strategies one is using when problems are encountered (Pintrich et al., 2000; Schraw & Moshman, 1995). Generally, the research on this facet of metacognition indicates that students who more effectively regulate their cognitive strategy use tend to show more adaptive performance or achievement outcomes (Baker, 1994; Butler & Winne, 1995; Pressley et al., 1987; Schraw & Moshman, 1995).

The regulation of motivation and the regulation of cognition are conceptually similar except that the purpose, object, or target of these two regulatory activities is different. Strategies for the regulation of cognition are meant to affect students' use of cognitive learning strategies or how students are processing, constructing, or understanding the material with which they are interacting. In contrast, strategies for regulating motivation ultimately are meant to affect students' willingness to process information, to construct meaning, or to continue working. Strategies for regulating motivation do not necessarily influence how students are completing activities, but why they are completing them, or for how long they are completing them. A student using a motivational regulation strategy, for instance, may be intentionally pushing herself to continue working on a task, but she is not necessarily modifying the cognitive activities she is using to complete it. She may be using memorization before as well as after engaging the motivational regulation strategy.

Theoretically, strategies for regulating motivation and strategies for regulating cognition are closely related and may be used in conjunction with one another (Boekaerts, 1997). For example, the aforementioned student, recognizing that memorization is not working, may decide to outline and answer adjunct questions. This type of change in cognitive strategies would be the result of a metacognitive process. At the same time the student may activate a strategy to regulate her motivation to sustain the effort needed to engage in this more effortful cognitive processing. Alternatively, a student recognizing that she is bored and frustrated with a reading may engage a strategy to increase her persistence while also changing to a form of cognitive processing that requires less effort. In short, though they can be distinguished conceptually, the regulation of motivation and the regulation of cognition are expressions of the same underlying self-regulatory system and likely work in tandem under many circumstances. Thus, it may be difficult to differentiate empirically between regulation that is motivational and regulation that is metacognitive in particular cases.

Knowledge of cognition, the second component of metacognition, includes students' understanding or stored information regarding the thinking and learning process. This aspect of metacognition has been differentiated based on whether the knowledge pertains to the person, to tasks, or to strategies, and into declarative, procedural, and conditional forms of knowledge (Baker, 1994; Flavell, 1979; Schraw & Moshman, 1995). Students' knowledge of the thinking and

learning process is viewed as an important prerequisite for the regulatory aspects of metacognition and thus for students' self-regulated learning (Pintrich et al., 2000).

In a similar fashion, students' regulation of motivation is likely to be dependent on their metalevel knowledge regarding motivation. This knowledge might include information regarding their current level of motivation, the processes that impact their motivation, and the factors that affect motivation more generally. In other words, the influence of students' metamotivational knowledge on their use of motivational regulation strategies would mirror the impact of students' metacognitive knowledge on their use of strategies for regulating cognition. In theory, students would need to have declarative, procedural, and conditional knowledge pertaining to strategies for regulating motivation to use them effectively. Metalevel knowledge about motivation would also be important when making decisions about which motivational regulation strategy would be most effective within a particular context, or when making decisions about how to modify a strategy to fit a specific situation. Students who lack the requisite knowledge of motivation may fail to use a particular strategy for regulating motivation, or they may fail to use it effectively.

Previous research provides some insight into the importance of students' metalevel knowledge regarding motivation. For example, developmental changes in students' knowledge or beliefs about effort and its relation to ability can influence their level of motivation and perhaps their self-regulated learning more generally (Wigfield, Eccles, & Rodriquez, 1998). Still, motivational research has tended to focus on beliefs and attitudes that influence motivation through subjective control rather than on knowledge that is important for the active control of motivation (Boekaerts, 1992). For instance, much research has examined developmental changes in how competent students feel about completing academic work and how these changes relate to students' motivation and achievement (Wigfield et al., 1998). In contrast, studies that focus on whether students are aware of these changes—or are aware of how their feelings of competence impact their choice, effort, and persistence at academic tasks—are less readily available. Generally, additional research is needed that directly investigates the thoughts or beliefs that can be categorized as knowledge of motivation, when this knowledge develops, and how this knowledge influences students' cognition and motivation.

### Distinguishing Between Regulation of Motivation and Volition

The notion of will or volition appeared early in the history of psychology (e.g., Ach, 1905; James, 1890) although its prominence has waxed and waned especially regarding explaining behavior within academic settings (see Corno, 2001; Kuhl & Beckmann, 1985, for reviews). More recently, volition has

been emphasized by Kuhl (1985) and Corno (2001) as a way of understanding students' self-regulated learning. In fact, the regulation of motivation discussed up to this point appears similar and indeed has much in common with volitional accounts of self-regulation. Regulation of motivation and volition both convey the importance of understanding how students manage disruptions in goal-directed behaviors. For instance, each construct can be used to explain how students manage distractions or other problems that might interfere with the timely completion of their academic work. In addition, regulation of motivation and volition both recognize as significant the distinction between motivational processes and students' ability to regulate or purposefully control those processes. Finally, explanations of the regulation of motivation and volition are similar in that they both highlight the fact that the management of goal-directed behavior is accomplished through the use of various strategies that, at least initially, are consciously controlled by the learner.

Despite these commonalities, students' management of their motivation is conceptualized and presented in this review from a more general social cognitive perspective of self-regulated learning. One reason for adopting this view of self-regulated learning is that it assumes a more fluid, ongoing interaction between students' motivational, cognitive, and regulatory processing (Bandura, 1986; Schunk, 2001; Zimmerman, 2000). Volitional perspectives on self-regulation emphasize the distinction between motivational processes or those that account for the selection of which goals to pursue, and volitional processes that are important for protecting the intention to pursue that goal (Corno, 2001; Kuhl, 1985). For example, the transition from processing that is motivational to processing that is volitional has been depicted as crossing the Rubicon, a change that is difficult to undo (Corno, 1993). Social cognitive views also acknowledge that the self-regulation process can be described as including forethought, performance, and self-reflection phases (Zimmerman, 2000). From a social cognitive perspective, however, the distinction among these phases is viewed as less absolute, and the interaction among the processes within each phase more dynamic. For example, self-efficacy as a motivational process is thought to be important within each of these phases (Schunk, 2001). This more dynamic view is advantageous for understanding the regulation of motivation because many of the strategies described in the following section appear to operate across the forethought, performance, and self-reflection phases of task completion.

A second reason for using a social cognitive framework to understand the regulation of motivation is that this framework makes it easier to tie this process to contemporary views of motivation. Cognitive views of motivation are not limited to explaining students' selection of particular goals, or to their choice of activities or behaviors. Rather, cognitive views of motivation extend into the activities associated with completing a task to understand, explain, and predict students' quality or intensity of engagement and on-

going persistence at a task (Graham & Weiner, 1996; Pintrich & Schrauben, 1992). Theoretical accounts of self-efficacy, interest, and goal orientations, for example, propose to explain students' level of cognitive engagement and ongoing effort at academic tasks and not just their selection of particular goals (Pintrich & Schunk, 2002). Hence, a strict volitional account of the motivational process as involving only the selection of goals appears somewhat incongruent with many contemporary cognitive views of motivation. Adopting a social cognitive perspective allows for a clearer understanding of how the regulation of motivation and specific motivational constructs may be related throughout the process of self-regulated learning.

The distinction between the regulation of motivation, as presented here, and volition is also evident when evaluating each in relation to the regulation of cognition and to self-regulation itself. As described earlier, the regulation of motivation is portrayed as a somewhat parallel process to the regulation of cognition that focuses on explaining how individuals' control their motivational rather than their cognitive processing. At the same time, the regulation of motivation is viewed as a component or as one of several processes that contribute to students' self-regulated learning. Theoretical descriptions of volition, in contrast, portray it as encompassing both the regulation of cognition and the regulation of motivation, thus making it more analogous to the process of self-regulation more broadly. For example, Corno (2001) and Kuhl (1985) both described students' control of cognition and control of motivation as types of volitional strategies. In addition, the terms *volition* and *self-regulation* are often used interchangeably or as synonyms for one another within the volitional research. In comparison to volition, therefore, the regulation of motivation can be viewed as a more limited process that is perhaps more consistent with students' use of motivational control strategies than with volition more broadly.

### STRATEGIES FOR THE REGULATION OF MOTIVATION

As one critical dimension of self-regulating learning, students may know about and use many different strategies to regulate their motivation. In this next section, research relevant to students' use of strategies for regulating motivation is reviewed. This review is not intended to be exhaustive in that it does not cover every possible way in which students' may regulate their motivation, nor does it present all the research about any particular strategy. Rather, the goal of this review is to substantiate the significance of this process by identifying and describing several key activities that can be considered strategies for regulating motivation and by evaluating the evidence linking these strategies to students' motivation, cognitive engagement, and achievement.

### Self-Consequating

A prototypical way in which students regulate their motivation is through the use of self-administered or self-provided consequences for their own behavior. This strategy includes students' identification and administration of extrinsic reinforcements or punishments for reaching particular goals associated with completing a task. An example of this strategy would be a student who, when reading a textbook chapter at the library, states to herself, "If I finish reading this chapter I can buy myself an ice cream cone on the way home." Typically, individual's use of rewards has been emphasized and in some research this process has been labeled "self-reinforcement." However, students may rely on punishments as well as reinforcements for influencing their motivation and shaping their own behavior. For instance, a student might say to himself, "If I don't finish reading this chapter I can't go to the gym to work out as I had planned."

Evidence indicating that students can use concrete consequences to affect their own behavior is readily available. For example, Jackson and Malloy (1983, 1985) found that students who provided themselves with rewards completed more arithmetic problems than students who provided themselves with punishments or students who did not self-consequence. In earlier studies such as these, however, self-consequating was viewed from a more behavioral perspective as a method of self-conditioning in which the association between certain stimuli (e.g., being in library) and certain responses (e.g., studying) were strengthened.

Research derived from volitional and social cognitive perspectives has highlighted this strategy as a form of self-regulation (Corno & Kanfer, 1993; Kuhl, 1985; Zimmerman & Martinez-Pons, 1986, 1990). In this research, providing oneself with a consequence for continued effort on a task is one method that students may use to purposefully maintain the pursuit of their established intentions. For example, Zimmerman and Martinez-Pons (1986, 1990) read elementary and high school students several short scenarios in which they were asked to report how they would overcome a typical academic problem and reach some identified goal. Students reported using self-consequating strategies, especially when asked about trying to finish homework when other more enjoyable activities were possible. Using a similar questionnaire and coding scheme, Purdie and Hattie (1996) found that Australian and Japanese high school students also reported using this type of strategy.

In addition to using concrete rewards or behavioral activities as a means of influencing their motivation, students may also make verbal statements to themselves while they are engaged in a task as a more immediate and perhaps more subtle method of self-consequating their behavior. Students might say to themselves while working, "You finished another problem, good job, you are making good progress." Using this type of strategy for shaping one's motivation and behavior has been demonstrated within the self-instruction literature (Graham &

Harris, 1994; Graham, Harris, & Troia, 1998; Meichenbaum & Biemiller, 1992). For example, students have been taught to make self-praising or self-reinforcing statements to bolster their use of effective writing strategies (Graham et al., 1998). Hence, the statements, and the strategy of making the statements, are used by students to increase their effort or quality of effort in completing specific school tasks.

Evidence from several theoretical perspectives indicates that students may work to influence their effort and persistence through the process of self-consequating. Past findings, for instance, demonstrate that high achieving or gifted students use this type of strategy more frequently than other students (Purdie & Hattie, 1996; Zimmerman & Martinez-Pons, 1986, 1990). Further, students who report using a self-consequating strategy also tend to report more adaptive motivational beliefs and the use of some cognitive and metacognitive learning strategies (Wolters, 1999; Wolters & Rosenthal, 2000). Finally, the use of self-reinforcing statements or thoughts has also been linked to more affective and emotional outcomes such as depression and anxiety (Heiby, 1981, 1983). In sum, research indicates that self-consequating has been positively associated with increases in students' effort, performance, and general well-being.

### Goal-Oriented Self-Talk

Another regulation of motivation strategy rests on students' desire to reach various goals associated with completing academic tasks. Like the self-reinforcing verbal statements described earlier, goal-oriented self-talk involves students' use of thoughts or subvocal statements while they are engaged in an academic activity. The content of these thoughts, however, is different from simple statements that reinforce or punish particular behaviors. Instead, students using goal-oriented self-talk think about or make salient various reasons they have for persisting or completing a task. Mirroring recent distinctions in goal theory, Wolters (1998, 1999; Wolters & Rosenthal, 2000) has argued that the goals students highlight can be categorized based on whether they are associated with performance or mastery goals. For example, when faced with an urge to quit studying a student may purposefully think about getting high grades, doing better than others, or showing one's innate ability or other performance-approach goals as a way of convincing themselves to continue working. Alternatively, students may subvocalize or think about various mastery-related reasons for wanting to complete an activity such as satisfying their curiosity, becoming more competent or knowledgeable about a topic, or increasing their feelings of autonomy.

Research documenting students' use of this type of motivational regulation strategy is limited. Results from Wolters (1998), however, suggested that students' use of goal-oriented self-talk may be quite widespread among college students. In this study, undergraduate psychology students were

asked to report what they would do if they were faced with several different motivational problems but wanted to continue to work at the task described. In their written responses, students provided many different ideas about how to overcome the hypothetical motivational problems. The most frequently reported strategy, however, was self-talk related to highlighting or emphasizing different performance-approach goals (Wolters, 1998). Although reported much less frequently, results from this study also indicated that at times students would highlight mastery related goals for wanting to complete the task.

The evidence linking goal-oriented self-talk to behavioral indicators of students' motivation is also limited. Wolters (1998) did not examine the relation between specific strategies and any engagement or performance outcomes. Performance-oriented self-talk was, however, a component of a larger category of strategies labeled "extrinsic regulation" that was positively related to students' performance but not to their use of cognitive strategies. In contrast, a larger category of strategies labeled "intrinsic regulation" that included mastery-oriented self-talk was positively associated with several higher order cognitive strategies including critical thinking. Wolters (1999) found similar results in a group of 9th- and 10th-grade students. On the one hand, mastery self-talk was associated with greater use of planning and monitoring strategies, and with a self-report measure of students' effort. Performance self-talk, on the other hand, was positively associated with rehearsal and regulation strategies, and with students' classroom performance. Hence, there is some evidence that students engage in goal-oriented self-talk, and that using this type of strategy may increase their effort and ultimately their achievement within academic tasks.

### Interest Enhancement

Although students may use self-talk to increase their focus on mastery-oriented goals, they may also work to increase aspects of their intrinsic motivation in more concrete ways. In particular, students may use strategies designed to increase their immediate enjoyment or the situational interest they experience while completing an activity. Sansone and her colleagues (Sansone, Weir, Harpster, & Morgan, 1992; Sansone, Wiebe, & Morgan, 1999) highlighted this type of strategy when they studied how college students cope with boring or repetitive tasks. In these studies, students were required to copy an array of letters over and over by hand. Overall, these researchers found that some students who were required to complete this task would modify what they were doing to make the process less repetitive or boring. For instance, these students would copy the letter array, but while doing so would creatively alter the script used to copy the letters. This modification made the task somewhat more difficult, but it served to increase the students' motivation by making the task more situational enjoyable, interesting, or challenging to complete.

Regarding more authentic academic tasks, the college students in Wolters (1998) reported that they would “Make (studying) into a game,” or, simply, “Try to make (studying) more interesting” when faced with boring or uninteresting lectures or textbook readings. Hence, there is some evidence that indicates students may work to purposefully affect their situational interest for academic tasks. Additional research that documents the various ways students affect their situational interest and examines whether they regulate their motivation using other forms of interest would be helpful.

Although not studied extensively, there is also evidence linking this type of strategy to greater effort and persistence. For instance, Sansone et al. (1999) found that students who engaged an interest-enhancing strategy persisted longer at the repetitive letter-copying task than students who did not use this type of strategy. Similarly, Wolters (1999) found positive correlations between high school students’ reported use of interest enhancement strategies and their self-reported effort, and use of metacognitive monitoring and regulation strategies. Wolters and Rosenthal (2000) also found that eighth-grade students who reported using interest enhancement strategies more often tended to report greater value for academic tasks and a stronger focus on learning goals. There was no clear relation between interest enhancement and students’ academic achievement in any of these studies.

### Environmental Structuring

Another type of strategy that students may use to regulate their effort and persistence for academic tasks has been labeled “environmental control” within the volitional literature (Corno, 1993). In other research this type of strategy has been expressed as resource management (Pintrich, 2000) or environmental structuring (Zimmerman & Martinez-Pons, 1986, 1990). Typically, this strategy is conceptualized as decreasing the possibility of off-task behavior by reducing the probability of encountering a distraction or by reducing the intensity of distractions that do occur. For example, students in a bustling classroom might move to a relatively quiet corner to read, or a college student might select a secluded spot in the library to study. Alternatively, students may try to control their current environment more directly through such actions as asking fellow classmates to be quiet or by turning off a loud television or radio.

Results from Wolters (1998) indicated that college students use a variety of environmental structuring strategies to help ensure their completion of the academic tasks they are required to complete. The students in this study not only reported changing their location to a more suitable study environment, but also reported such things as eating or drinking food that they believed would increase their level of attention, taking naps or short breaks to increase their readiness for study, and listening to music to become more attentive and ready to study. Thus, students worked to alter the environ-

ment to avoid distractions and to maintain their focus on the task, but they also managed their own physical and mental readiness for the task. Purdie and Hattie (1996) used a similar split in the type of environmental structuring reported by groups of high school students from Australia and Japan. Longer term strategies such as keeping a calendar with important deadlines noted or setting aside specific times for studying have also been described as forms of environmental structuring (Pintrich, 2000).

Environmental structuring has not typically been assessed and evaluated independent of other regulatory strategies. Consequently, there is little evidence that specifically links this form of motivational regulation to students’ effort, persistence, or performance on academic tasks. In one study that did evaluate environmental structuring separately, Zimmerman and Martinez-Pons (1990) failed to find differences in the use of this strategy between gifted and nongifted or between older and younger students. More typically, this strategy is incorporated into a general measure of volition or self-regulation that itself is associated with greater effort, persistence, or performance. However, it is impossible to conclude anything about the influence of students’ environmental structuring independently. Additional research that assesses the impact of students’ use of environmental structuring strategies apart from other forms of self-regulation is needed to better evaluate the importance of this type of regulatory strategy.

### Self-Handicapping

Students using an environmental structuring strategy actively work to remove distractions or other obstacles that hamper motivation or impede their progress in completing a task. A related but quite different type of strategy for regulating motivation involves the manufacture of obstructions before or during a task that make performing that task more difficult. This somewhat counter-intuitive regulation of motivation activity has been labeled “self-handicapping” (Riggs, 1992; Urdan & Midgley, 2001). Putting off doing work until the last minute, avoiding studying, and staying up late the night before an important exam have all been used as examples of how students self-handicap within academic settings. Evidence that a significant number of individuals engage in these sorts of behaviors regarding academic tasks most often has been found among college students (Eronen, Nurmi, & Salmela-Aro, 1998; Martin, Marsh, & Debus, 2001; Rhodewalt, 1994) although students as young as the seventh grade have also been found to self-handicap (Urden & Midgley, 2001). One issue still debated within this research is whether students are consciously aware of and purposefully engage in self-handicapping behaviors, or whether they do so without forethought (Urden & Midgley, 2001).

The motivational benefits of using this strategy are somewhat equivocal. In academic contexts, one possible reason

that students self-handicap is that it allows them to attribute poor performance to factors other than low ability, thus helping to maintain their self-esteem or sense of self-worth (Martin et al., 2001; Urdan & Midgley, 2001). For instance, students can blame their low score on a test to staying up late drinking with friends rather than on a lack of ability. Self-handicapping may be motivationally adaptive to the extent that it achieves this goal and helps students to avoid a complete withdrawal from a task, course, or subject area. Clear empirical evidence documenting the links between self-handicapping and these long-term benefits is still needed (Urdan & Midgley, 2001).

A second possible and more immediate motivational advantage of this strategy may be that it allows students to shift from focusing on performance aspects of a task to concentrating more on the task itself. Because self-handicappers establish a clear excuse for not performing even before beginning a task, they may be able to relax and focus on doing the task as best they can without worrying about appearing inadequate in comparison to others or to some presumed criteria (Berglas & Jones, 1978). Deppe and Harackiewicz (1996) found support for this hypothesis in a study of college students in which self-handicapping was associated with the maintenance of intrinsic interest or enjoyment of a pinball-playing task. Self-handicapping behaviors, these authors reasoned, may serve to protect a person from the worries of performance evaluation and allow them to experience greater intrinsic motivation for a task. These findings are also in line with the characterization of self-handicapping as a self-presentation strategy. In this role, handicapping is not intended to sustain self-esteem as much as it is meant to provide an avenue for maintaining the public perception that an individual has high ability (Riggs, 1992; Urdan & Midgley, 2001).

Regardless of these possible benefits, self-handicapping is typically characterized as a maladaptive activity because, by definition, it serves to impede students' optimal ability to complete a task. This effect has been born out empirically by research showing links between self-handicapping and a cycle of low effort and low task performance that may become more pronounced over time (Martin et al., 2001; Urdan & Midgley, 2001; Zuckerman, Kieffer, & Knee, 1998). For example, Midgley and Urdan (1995, 2001) found that self-handicapping is associated with lower achievement in middle school students. Even when linked with decreased anxiety and increased enjoyment of an activity, self-handicapping was tied to less time spent practicing the activity (Deppe & Harackiewicz, 1996). Hence, there is evidence suggesting that self-handicapping may be counterproductive as a regulation of motivation strategy. Additional research that examines the motivational impact of using this strategy, including both the immediate and long-term consequences, is needed to better evaluate whether this activity should be considered an adaptive way to regulate motivation.

## Attribution Control

Self-handicapping entails students' a priori manipulation of the causal attributions they will be able to make for an academic task. The causal attributions students make also can be manipulated during or after a task and in a way that more positively impacts their motivation. When using this strategy, individuals purposefully select causal attributions to maintain or increase their motivation for a task or for future tasks that are similar. Students may, for example, intentionally avoid blaming their academic setbacks on internal, stable, and uncontrollable causes because this type of attribution tends to lead to a helpless orientation (Weiner, 1986). Students may instead purposefully use attributions that reflect internal and controllable factors because they lead to more adaptive motivational outcomes.

The evidence that students actually use this type of strategy in a purposeful manner is more circumstantial than direct. One form of indirect evidence supporting attributional control as a motivational strategy comes from studies showing that students' attributions can be intentionally manipulated. Using carefully designed interventions students ranging from elementary school to college have been taught in a variety of ways to make attributions for their failures and successes to more internal and controllable causes such as effort or the use of a particular learning strategy (Foersterling, 1985; Graham, 1991; Robertson, 2000).

It is difficult, however, to consider the attributional control documented in this research as a form of self-regulation because learners do not manipulate their own attributions. Instead, modeling, feedback, or reinforcement provided by a teacher, experimenter, or trainer is used to get students to make more adaptive attributions. Further, the interventions rarely provide students the knowledge and practice they would need to understand and to purposefully control their own attributional processes (cf. Borkowski, Weyhing, & Carr, 1988). Evaluating attributional control as a form of motivational regulation and distinguishing it from changes in students' attributions that result from training has not been pursued actively in this area of research.

A second form of indirect evidence for this motivational strategy comes from research indicating that some students understand the attributional process enough to manipulate it to their own advantage. For instance, students have been found to manipulate the public attributions they make so that teachers, parents, or peers will view them in a positive light (Juvonen, 2000). Analogous to this intentional control of public attributions, it may be possible for individual's to regulate the attributions they make internally to affect their motivation. Research that specifically documents this form of attributional control and its subsequent effect on students' effort and persistence is needed.

Another indication that students might be able to actively regulate the attributional process comes from research examining differences between process and product

goals (Zimmerman & Kitsantas, 1997, 1999). For example, Zimmerman and Kitsantas (1999) found that students who set learning process goals were subsequently more likely to make strategy attributions to explain their performance than students who focused on learning outcome goals. Strategy attributions, moreover, were found to be more motivationally adaptive in that they were correlated positively with self-efficacy and intrinsic interest. Hence, this research indicates that students may be able to purposefully impact their attributional processing by consciously selecting learning process goals over outcome goals when engaged in academic tasks. Whether students choose to pursue process goals with this end in mind has not been investigated specifically.

A final form of evidence indicating that students can become more conscious, reflective, and purposeful about the types of attributions they use for their own academic performances is anecdotal. After covering attribution theory in my own courses, many students have conveyed to me that they have caught themselves making maladaptive attributions for their low performance (e.g., blaming a lack of innate ability) and that when this happens they work to identify another attribution (e.g., effort, strategy use) that would result in a more adaptive motivational outcome. These personal accounts suggest that some students may gain an understanding of the attributional process that allows them to monitor and adaptively regulate the type of attributions they use to explain their academic outcomes. Empirical support for this awareness and control, however, is not readily available.

The attributions that students make can impact their subsequent motivation for academic tasks (Wiener, 1986). Further, interventions that teach students to make more appropriate attributions have been found to improve outcomes such as choice, effort, and performance (Foersterling, 1985; Graham, 1991; Robertson, 2000). Overall, there is much research showing that attributions can be manipulated through external means and that the attributions students make can impact their motivation and performance. More research is needed to determine whether students engage in this type of regulatory activity without direct interventions, or in a way that is more directed at influencing their current motivation. Further, evidence specifically examining whether attributional control positively influences students' effort and persistence is needed.

### Efficacy Management

Students' self-efficacy or beliefs about whether they will be successful on a given task are a powerful predictor of their choice, effort, and persistence for academic as well as nonacademic activities (Bandura, 1997; Pajares, 1996). Students' ability to monitor, evaluate, and purposefully control their own expectations, perceptions of competence, or self-efficacy for tasks represents a significant form of motivational

regulation. Because of the various influences on students' expectations there are many ways in which students might influence their self-efficacy for a task. Based on prior work, three strategies students may use to manage their perceived competence for academic tasks are considered here: proximal goal setting, defensive pessimism, and efficacy self-talk.

*Proximal goal setting.* Proximal goal setting consists of breaking complex or larger tasks into simpler more easily and quickly completed segments. For example, a student who has 30 pages of textbook reading to complete may identify reading 10 pages as a short-term goal. This process may be viewed as a strategy for regulating motivation when students purposefully and consciously engage in proximal goal setting to affect their motivation for an academic task. As support for this type of strategy, Wolters (1998) found that when faced with difficult tasks college students indicated they would break down the activity and make it more manageable to sustain their efforts at completing the task. Although similar to the process of self-consequating, students using this strategy set and pursue proximal goals without necessarily linking them to any particular consequence.

There are concerns, however, with considering proximal goal setting a regulation of motivation strategy. One problem is that setting proximal goals may not be a conscious or active process on the part of the student. Instead, teachers or experimenters often drive the goal-setting process (e.g., Bandura & Schunk, 1981). Another concern is that proximal goal setting may not be utilized to address motivational objectives. Instead students may set short-term goals to guide their cognitive processing during the task. Research that examines whether students purposefully use this strategy to influence their motivation for academic tasks would help to clarify these concerns.

Whether considered a type of regulation of motivation or not, previous research has found that providing students with short-term goals can raise their self-efficacy and subsequent motivation for particular tasks (Bandura, 1997; Bandura & Schunk, 1981; Locke & Latham, 1990). The goal properties of proximity and specificity have especially been tied to increases in self-efficacy and subsequent motivation. In a study of elementary school children with a history of poor performance in math, for instance, Bandura and Schunk (1981) found that setting proximal goals for a math task was associated with greater self-efficacy, interest, and effort when compared to setting more distal goals or not setting goals at all. Studies such as this one indicate that short-term specific goals can raise motivation. Further, self-set goals are viewed as more advantageous in affecting behavior than other-set goals. Hence, students should be able to positively influence their motivation by purposefully setting and monitoring their own proximal goals. The evidence available does not clearly establish whether students engage in proximal goal setting with this purpose in mind.

*Defensive pessimism.* A second motivational strategy tied to students' perceived competence to complete a task has been labeled "defensive pessimism." In this strategy, students highlight their level of unpreparedness, lack of ability, or other factors to convince themselves that they are unlikely to complete a particular task successfully (Garcia & Pintrich, 1994; Norem & Cantor, 1986). The anxiety associated with these lowered performance expectations is used strategically to increase students' willingness to prepare and thus avoid the outcomes associated with the anticipated failure. For example, college students identified as defensive pessimists described their behavior the night before an exam with statements such as "I think about how unprepared I am in order to get myself to work harder" (Norem & Cantor, 1986). This strategy is distinct from dispositional and realistic forms of pessimism in that it facilitates students' performance and because the students who use it have generally performed quite well on academic tasks (Cantor & Norem, 1989). Like self-handicapping, one concern with labeling this behavior as a self-regulation strategy is that students may not be purposefully using this process to affect their motivation.

The few studies examining the academic benefits of defensive pessimism are inconclusive. In one study, students categorized as defensive pessimists and exposed to experimental conditions intended to facilitate this strategy performed better and reported lower levels of anxiety than similar students in conditions that disrupted their use of this strategy (Norem & Illingworth, 1993). In contrast, Martin et al. (2001) found reason to believe that defensive pessimism has both facilitative and negative effects on students' learning and achievement. In this study, one aspect of defensive pessimism (i.e., reflectivity) predicted higher levels of persistence and self-regulation, whereas a second part (i.e., defensive expectations) was related negatively to both of these outcomes. Defensive pessimism also may have long-term negative influences on motivation and achievement. Cantor and Norem (1989) found that college students identified as defensive pessimists during their 1st year of college earned lower grades and reported more frequent instances of worry 2 years later. In light of these findings, defensive pessimism may best be considered a preventative strategy that facilitates students' motivation and performance in the short run but may serve to hinder these outcomes in the long term. Additional studies that link defensive pessimism more directly to increased effort, persistence, and academic performance would help to clarify the short- and long-term outcomes associated with using this strategy.

*Efficacy self-talk.* A third motivational strategy related to students' self-efficacy can be identified as efficacy self-talk. Students using this strategy engage in thoughts or subvocal statements aimed at influencing their efficacy for an ongoing academic task. Students might say to themselves such things as "You can do it, just keep working." or "You are

doing a good job; you are going to be successful if you just keep at it." There is some evidence indicating that college students use this type of strategy. For example, a small percent of the students in Wolters (1998) reported this type of strategy. College students also moderately endorsed items that tapped into this type of self-talk when they were included on a broader measure of volition (McCann & Garcia, 1999).

Evidence specifically linking efficacy self-talk to effort, persistence, or performance is almost nonexistent. A larger grouping of motivational strategies that included efficacy self-talk was positively related to students' use of some higher level cognitive strategies but not to course grade (Wolters, 1998). Bembenuity (1999) also found that, as part of a larger scale, efficacy self-talk was positively related to college students' reported ability to persist at studying when more appealing alternatives were possible. Hence, the evidence linking efficacy self-talk to motivation and performance is unclear because efficacy self-talk has not been evaluated separate from other regulation strategies. Research examining the relation of efficacy self-talk to students' motivation and performance is necessary to clarify the effectiveness of this strategy.

## Emotion Regulation

Emotions and emotional reactions permeate the processes of self-regulation and of learning more broadly (Aspinwall, 1998; Carver & Scheier, 1990). Even for very young children, the ability to regulate this aspect of one's functioning is considered an important skill. From a developmental perspective, emotion regulation incorporates children's ability to monitor, evaluate, and change the occurrence, intensity, or duration of a particular emotional experience (Eisenberg et al., 2001; Thompson, 1994; Walden & Smith, 1997). It may also include children's ability to mask physical manifestations of an emotion they are feeling or to present physical signs of an emotion they are not feeling. The specific strategies that young children use to manage their emotions include such behaviors as attention shifting (looking at something else), attention focusing (thinking of something else), tactile self-soothing (thumb sucking), and avoidance (leaving or avoiding particular situations; Rothbart, Ziaie, & O'Boyle, 1992; Thompson, 1994).

As a regulation of motivation strategy within educational settings, emotion control describes students' ability to regulate their emotional experience to ensure that they provide effort and complete academic tasks (Corno, 1993; Schutz & Davis, 2000). In this context, emotional control is frequently viewed as necessary for reducing negative affective response and deleterious effects associated with performance evaluations (Spielberger & Vagg, 1995; Zeidner, 1998). Although mentioned less frequently, strategies designed to control positive emotions might also be important regarding academic functioning. For instance, students may purposefully control

their excitement about seeing and wanting to talk to a friend to maintain their efforts at studying.

There are many specific strategies that students may use to influence or cope with their emotional reactions such as slowly counting to 10, purposefully controlling their breathing so it is slow and deep, and wishful thinking (Knapp, Kukjian, Spirito, & Stark, 1991; Schutz & Davis, 2000). Individuals might also use inner speech to control their affective reaction, making statements such as "Don't worry about the others; you are doing fine." or "It's not going to help to get frustrated; just keep trying." Self-affirmation, a process by which students conduct a cognitive search for positive evaluations of the self, also has been described as a strategy used to avoid negative emotional experiences (Garcia & Pintrich, 1994). As a whole, there is ample evidence indicating that school-age children understand and use many specific strategies for regulating their emotional responses (Thompson, 1994).

The evidence linking this growing emotional sophistication to important academic outcomes, however, is less certain. Emotional control strategies have most often been tied to students' academic effort and performance within the test anxiety literature (Spielberger & Vagg, 1995; Zeidner, 1998). Studies within this area indicate that test anxiety can have a debilitating influence on students' academic performance and that interventions can be effective in reducing the anxiety that students experience (Zeidner, 1998). However, studies that specifically examine the relation between students' use of coping or emotion regulation strategies and their academic performance have produced mixed results (Zeidner, 1998). Some studies have found a positive relation between using strategies to cope with test anxiety or stress and subsequent performance; whereas others have found no relation, or even a negative relation between them. More research examining the relation between emotional control as a regulation of motivation strategy and students' choice, effort, and persistence is needed, especially in situations beyond those associated with tests or other performance evaluations.

## Summary

Drawing together evidence from many areas, this brief review indicates that students may use many types of strategies to regulate their motivation for academic tasks. The range of strategies reviewed here demonstrates that there are forms of motivational regulation that are consistent with many of the most prevalent cognitive views of motivation. For instance, strategies linked to students' motivation as outlined by attribution theory, self-efficacy, value, interest, and goal theory all were identified. These varied links indicate that the regulation of motivation is not tied to any one perspective on motivation, but can be viewed as a more ubiquitous self-regulatory process that is consistent with many models of achievement motivation.

Although limited in scope, the research reviewed here also provides insight into the variety of academic outcomes that have been or might be linked to students' use of strategies for the regulation of motivation. As might be expected, there is evidence that students' use of motivational regulation strategies is associated positively with both conceptual and behavioral indicators of their level of motivation. For example, strategies for the regulation of motivation have been tied to motivational constructs such as interest and value, and to motivational outcomes such as persistence and effort (Sansone et al., 1999). In addition, the regulation of motivation has been positively associated with the more cognitive and metacognitive aspects of self-regulated learning (Wolters, 1999). Consistent with these positive relations, the regulation of motivation has been tied to adaptive performance outcomes. For instance, research reviewed earlier indicates that students who use motivational regulation strategies are more likely to get better grades than students who do not regulate their motivation (Wolters, 1998, 1999).

Overall, the research reviewed here provides support for the importance of further integrating the regulation of motivation process into models of self-regulated learning. At the same time, it is clear that much more research documenting the nature and effectiveness of this process and of individual strategies is needed to provide a clear understanding of this important regulatory activity.

## ISSUES FOR FUTURE RESEARCH

As part of the discussion up to this point, research needed to investigate particular theoretical relations or particular strategies has been highlighted. In this final section, a broader set of issues related to the definition, development, measurement, and instruction of motivational regulation strategies are described as a further guide to the research needed in this area.

### Definition

To be consistent with the definition presented earlier, a strategy for the regulation of motivation must meet at least two criteria. One, students must be acting in a deliberate or purposeful attempt to influence their level of motivation or the processes that determine their motivation. Two, the strategy should actually facilitate or improve students' motivation and subsequent performance on academic tasks. For many of the strategies described earlier, there is not enough information to clearly establish that both of these criteria are in fact satisfied.

Regarding the first criteria, it is unclear whether students use several of the strategies presented in the current review in an active or deliberate effort to influence their motivation. Under some conditions these strategies can be used without any conscious intent on the part of the student to affect their own motivation. Proximal goal setting and attributional con-

trol, for example, often have been used by students because of instructional interventions (Bandura & Schunk, 1981; Foersterling, 1985). Hence, instructors are driving the regulatory process and not the student. Whether students continue to use these strategies in a more conscious, deliberate, and active process has not yet been demonstrated directly. In a similar fashion, some strategies that act to regulate motivation may not be engaged purposefully by the student. Self-handicapping and defensive pessimism, for instance, apparently may be used without a conscious decision by the student (Martin et al., 2001). Additional research is needed to support more clearly the view that students can knowingly use these strategies purposefully to sustain or increase their level of motivation.

Based on the second criteria, additional research evaluating the relations between students' use of particular types of strategies and their motivation and performance on academic tasks is needed. By definition, one immediate goal of students' regulation of motivation is to increase their effort, persistence, or choice of activities. This adaptive change in motivation ultimately should positively affect outcomes that more directly reflect students' learning and achievement. Empirical evidence supporting these relations, however, can be considered incomplete at best for many of the strategies reviewed here. One reason for this problem is that prior work has tended to group strategies together into more general measures of volition or self-regulation before examining how they are related to learning and achievement (e.g., McCann & Garcia, 1999; Wolters, 1998). This research provides valuable evidence that self-regulation more generally is related to performance. Now, research that investigates the regulation of motivation or particular motivational regulation strategies would provide needed insight into this facet of self-regulated learning. As an example, research is needed to link goal-oriented self-talk to students' level of engagement, persistence, and performance on academic tasks.

Also related to the second criteria is the need to explore the contextual or situational effectiveness of strategies for regulating motivation. A particular motivational regulation strategy is not presumed to be appropriate under all situations, nor in response to all motivational problems. For instance, an interest-enhancement strategy may not be effective if deployed in response to problems associated with frustration or perceived task difficulty. Theoretically, regulating motivation is most effective when the strategy selected is tied to the motivational problem experienced (or expected to be experienced) by the student. The effectiveness of strategies for regulating motivation also may be influenced by situational factors such as the stage of task completion or the social setting (e.g., Zimmerman & Kitsantas, 1997). Additional research that documents these situational influences would help to clarify the conditions under which strategies to regulate motivation most facilitate students' performance.

Another definitional issue that needs further work concerns the relation of the regulation of motivation to other processes

important for self-regulated learning. As argued earlier, the regulation of motivation is best viewed as one process, along with others like motivation and metacognition that together determine whether students self-regulate their academic learning. Additional research is needed to clarify how these different processes influence one another. For instance, it was maintained earlier that motivation and the regulation of motivation have a complex relation in which they reciprocally influence one another. However, more empirical research is needed to explicate how best to model this relation at a general level and regarding specific motivational constructs. At the same time, research that investigates the relative influence of these different processes on students' cognitive engagement and achievement would also be informative.

## Development

Another important area of research concerns the development of students' ability to regulate their motivation. Prior research has documented students' regulation of motivation across a wide developmental period. For instance, there is evidence that children use strategies to avoid distractions and persist at tasks well before they reach school age (Metcalf & Mischel, 1999). Research also has documented forms of motivational regulation within elementary, secondary, and postsecondary student populations (Sasone et al., 1999; Thompson, 1994; Wolters, 1999). The developmental progress of the regulation of motivation, however, has not been mapped out to any great extent. Hence there are several unaddressed yet important questions concerning the development of students' regulation of motivation. For instance, what is the connection between earlier and later regulation of motivation activities? How and when do students develop the range of strategies described here? Charting the strategies that are used at different age levels, and examining the relations between students' use of these strategies at early ages and older age levels, would serve to clarify these developmental questions.

## Measurement

More work is also needed to address issues related to the measurement of motivational regulation strategies. Aspects of students' regulation of motivation have been examined experimentally (Kuhl, 1985; Sansone et al., 1992), with oral interviews (Zimmerman & Martinez-Pons, 1986), with open ended questionnaires (Wolters, 1998), with Likert scaled items (McCann & Garcia, 1999; Pintrich, Smith, Garcia, & McKeachie, 1993; Wolters & Rosenthal, 2000), and through observation (Kuhl, 1985). Hence, there is evidence that aspects of this regulatory process can be assessed successfully using an array of methodologies. These various methods must now be refined and improved to increase their validity and reliability across different contexts and groups of students.

One particular measurement issue that needs to be addressed is the ability to measure regulation of motivation apart from other aspects of self-regulation. Attempts to assess students' use of strategies for the regulation of motivation have frequently been grouped with other regulatory strategies into more global measures of self-regulation. For example, the questionnaire developed by Zimmerman and Martinez-Pons (1986, 1988) to assess self-regulated learning taps into 14 self-regulatory activities found in students at the elementary and secondary level. Whereas most of these activities can be described as cognitive or metacognitive strategies, a few tap into students' regulation of motivation. In a similar way, a survey popularly used to assess self-regulation includes items that reflect students' use of resource management or effort control strategies along with more cognitive and metacognitive learning strategies (Pintrich et al., 1993). Research using these instruments, furthermore, tends not to investigate the importance of motivational regulation independently or to distinguish these different regulatory processes (e.g., Pintrich & DeGroot, 1990). Reliable and valid measures of the regulation of motivation discrete from other self-regulatory processes are needed to evaluate better the relations between these processes, and to investigate their unique and joint effects on students' learning and achievement. This goal might be achieved by augmenting those parts of the existing measures that already tap into students' regulation of motivation or by developing new instruments more specifically designed for this purpose.

Another measurement goal that should be pursued is to develop measures that assess a broader spectrum of strategies for the regulation of motivation. Many of the efforts to assess this regulatory process have focused on a single or a small number of strategies (e.g., Pintrich et al., 1993; Sansone et al., 1992; Zimmerman & Martinez-Pons, 1986). This is problematic because the construct validity of an assessment is threatened when it fails to adequately reflect all aspects of the underlying theoretical construct in question (Pintrich et al., 2000). Hence, measures that purport to assess students' regulation of motivation must sufficiently reflect all the important aspects (e.g., strategies) underlying this construct and not just a small set of them. This issue is also a concern when global measures of self-regulation overemphasize regulation of cognition strategies and fail to include regulation of motivation strategies to a degree that reflects their importance to the process of self-regulated learning. The extent to which strategies for the regulation of motivation should be incorporated into these measures must also be pursued in future research.

### Instruction

Instruction, or how the regulation of motivation might be fostered in students, represents a fourth area in need of further study. Students' understanding and use of strategies for the regulation motivation should be amenable to instruction.

There is in fact evidence that students' use of some of these strategies can be increased through well-designed instructional interventions (e.g., Foersterling, 1985; Graham et al., 1998; Zeidner, 1998). Building on this previous research, work is needed to investigate whether other types of strategies might also be fostered through instructional interventions. In addition, work is needed to refine the procedures and conditions with which these strategies are best taught to students. For example, at what age will students most benefit from instruction in which type of strategy? Are there particular groups of students who would most benefit from instruction in these types of strategies? By addressing questions such as these, the usefulness of strategies for the regulation motivation to the classroom teacher can be increased.

### CONCLUSION

Motivation is consistently viewed as a critical determinant of students' learning and achievement within academic settings (Graham & Wiener, 1996; Pintrich & Schunk, 2002). More specifically, motivation is viewed as an important component of self-regulated learning (Pintrich, 2000; Winne, 2001; Zimmerman, 2000). At the same time, a lack of motivation is a frequent problem experienced by students at all age levels. Learning is an effortful process and academic tasks are fraught with obstacles that are likely to interfere with students maintaining an adaptive level of achievement motivation. Typical classrooms, for example, are often characterized by multiple tasks occurring at one time, a high level of noise and distractions, and many opportunities for off-task behavior (Schuell, 1996). Within this context, students are expected to focus on material or tasks that for many are viewed as boring, repetitious, difficult, or unimportant. The challenge to complete academic work outside the classroom can be even more difficult. When completing homework, students are asked to learn material or complete tasks that also may suffer from these same problems, and to do so without the structure or social pressures to finish that are present in the classroom. In light of these obstacles, students' ability to actively influence their motivation to increase their choice, effort, and persistence at academic tasks is likely to be an important determinant of their self-regulated learning and achievement.

Despite its importance, students' ability to regulate their motivation has not received the same level of attention as their ability to manage their cognitive processing. In this article, the need to better understand the regulation of motivation has been emphasized in three ways. First, it was argued that the regulation of motivation can be viewed as interdependent but conceptually distinct from other processes related to self-regulated learning including motivation, metacognition, and volition. Two, prior research bearing on the regulation of motivation was used to show a variety of distinct strategies that students' can use to regulate their motivation within academic contexts. Further, this review

indicated that there is some empirical evidence linking students' use of some of these strategies to important motivational, cognitive, and achievement outcomes, although more evidence of these relations clearly is needed. Finally, several issues related to the conceptual understanding, measurement, development, and instruction of strategies for the regulation of motivation were identified to provide direction for additional research in this area.

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