Assessing Academic Self-regulated Learning

Christopher A. Wolters
University of Houston

Paul R. Pintrich
University of Michigan

Stuart A. Karabenick
Eastern Michigan University

Paper prepared for the Conference on

Indicators of Positive Development: Definitions, Measures, and Prospective Validity.

Sponsored by ChildTrends, National Institutes of Health

March 2003

(Revised April 2003)

Abstract

Self-regulated learning concerns the application of general models of regulation and self-regulation to issues of learning especially within academic contexts. Self-regulated learning is an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment. In this paper we describe a general framework or taxonomy for academic self-regulated learning and discuss our efforts to develop self-report measures of different components of academic self-regulated learning. Individual scales that assess cognitive and metacognitive learning strategies, regulation of motivation strategies, and strategies concerning the regulation of behavior are presented and discussed.

Self-regulated learning concerns the application of general models of regulation and self-regulation to issues of learning, in particular, academic learning that takes places in school or classroom contexts. There are a number of different models of self-regulated learning that propose different constructs and different conceptualizations (see Boekaerts, Pintrich, & Zeidner, 2000), but all of these models share some general assumptions and features. The purpose of this paper is to present a general framework or taxonomy for academic self-regulated learning and discuss our efforts to develop self-report measures of different components of academic self-regulated learning.

A General Framework for Self-Regulated Learning

Although there are many different models of self-regulated learning, there are four common assumptions shared by almost all models. One common assumption might be called the active, constructive assumption which follows from a general cognitive perspective. That is, all the models view learners as active constructive participants in the learning process. Learners are assumed to actively construct their own meanings, goals, and strategies from the information available in the "external" environment as well as information in their own minds (the "internal" environment). Learners are not just passive recipients of information from teachers, parents, or other adults, but rather active, constructive meaning-makers as they go about learning.

A second, but related, assumption is the potential for control assumption. All the models assume that learners can potentially monitor, control, and regulate certain aspects of their own cognition, motivation, and behavior as well as some features of their environments. This assumption does not mean that individuals will or can monitor and control their cognition, motivation, or behavior at all times or in all contexts, rather just that some monitoring, control, and regulation is possible. All of the models recognize that there are biological, developmental,

contextual, and individual difference constraints that can impede or interfere with individual efforts at regulation.

A third general assumption that is made in these models of self-regulated learning, as in all general models of regulation stretching back to Miller, Galanter, & Pribram (1960), is the goal, criterion, or standard assumption. All models of regulation assume that there is some type of criterion or standard (also called goals, reference value) against which comparisons are made in order to assess whether the process should continue as is or if some type of change is necessary. The common sense example is the thermostat operation for the heating and cooling of a house. Once a desired temperature is set (the goal, criterion, standard), the thermostat monitors the temperature of the house (monitoring process) and then turns on or off the heating or air conditioning units (control and regulation processes) in order to reach and maintain the standard. In a parallel manner, the general example for learning assumes that individuals can set standards or goals to strive for in their learning, monitor their progress towards these goals, and then adapt and regulate their cognition, motivation, and behavior in order to reach their goals.

A fourth general assumption of most of the models of self-regulated learning is that self-regulatory activities are mediators between personal and contextual characteristics and actual achievement or performance. That is, it is not just individuals' cultural, demographic, or personality characteristics that influence achievement and learning directly, nor just the contextual characteristics of the classroom environment that shape achievement, but the individuals' self-regulation of their cognition, motivation, and behavior that mediate the relations between the person, context, and eventual achievement. Most models of self-regulation assume that self-regulatory activities are directly linked to outcomes such as achievement and

performance, although much of the research examines self-regulatory activities as outcomes in their own right.

Given these assumptions, a general working definition of self-regulated learning is that it is an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment. These self-regulatory activities can mediate the relations between individuals and the context and their overall achievement. This definition is similar to other models of self-regulated learning (e.g., Butler & Winne, 1995; Zimmerman, 1989, 1998a, b; 2000). Although this definition is relatively simple, the remainder of this section outlines in more detail the various processes and areas of regulation and their application to learning and achievement in the academic domain which reveals the complexity and diversity of the processes of self-regulated learning.

Table 1 displays a framework for classifying the different phases and areas for regulation. The four phases that make up the rows of the table are processes that many models of regulation and self-regulation share (e.g., Zimmerman, 1998a, b; 2000) and reflect goal-setting, monitoring, control and regulation, as well as reflective processes. Of course, not all academic learning follows these phases as there are many occasions for students to learn academic material in more tacit or implicit or unintentional ways without self-regulating their learning in such an explicit manner as suggested in the model. These phases are suggested as a heuristic to organize our thinking and research on self-regulated learning. Phase 1 involves planning and goal-setting as well as activation of perceptions and knowledge of the task and context and the self in relation to the task. Phase 2 concerns various monitoring processes that represent metacognitive awareness of different aspects of the self and task or context. Phase 3 involves efforts to control and

regulate different aspects of the self or task and context. Finally, Phase 4 represents various kinds of reactions and reflections on the self and the task or context.

The four phases do represent a general time-ordered sequence that individuals would go through as they perform a task, but there is no strong assumption that the phases are hierarchically or linearly structured such that earlier phases must always occur before later phases. In most models of self-regulated learning, monitoring, control, and reaction can be on-going simultaneously and dynamically as the individual progresses through the task, with the goals and plans being changed or updated based on the feedback from the monitoring, control, and reaction processes. In fact, Pintrich, Wolters, & Baxter (2000) suggest that much of the empirical work on monitoring (phase 2) and control/regulation (phase 3) does not find much separation of these processes in terms of people's experiences as revealed by data from self-report questionnaires or think-aloud protocols.

The four rightmost columns in Table 1 represent different areas for regulation that an individual learner (the personal self) can attempt to monitor, control, and regulate. The first three columns of cognition, motivation/affect, and behavior reflect the traditional tripartite division of different areas of psychological functioning (Snow, Corno, & Jackson, 1996). As Snow et al (1996) note, the boundaries between these areas may be fuzzy, but there is utility in discussing them separately, particularly since much of traditional psychological research has focused on the different areas in isolation from the others. These first three areas in Table 1 represent aspects of the individual's own cognition, motivation/affect, and behavior that he or she can attempt to control and regulate. These attempts to control or regulate are "self-regulated" in that the individual (the personal self) is focused on trying to control or regulate his or her own cognition, motivation, and behavior. Of course, other individuals in the environment such as

teachers, peers, or parents can try to "other" regulate an individual's cognition, motivation, or behavior as well, by directing or scaffolding the individual in terms of what, how, and when to do a task. More generally, other task and contextual features (e.g., task characteristics, feedback systems, evaluation structures) can facilitate or constrain an individual's attempts to self-regulate his or her learning.

The cognition column in Table 1 concerns the different cognitive strategies individuals may use to learn and perform a task as well as the metacognitive strategies individuals may use to control and regulate their cognition. In addition, both content knowledge and strategic knowledge are included in the cognitive column. The motivation and affect column concerns the various motivational beliefs that individuals may have about themselves in relation to the task such as self-efficacy beliefs and values for the task. In addition, interest or liking of the task would be included in this column as well as positive and negative affective reactions to the self or task. Finally, any strategies that individuals may use to control and regulate their motivation and affect would be included in this column. The behavior column reflects the general effort the individual may exert on the task as well as persistence, help-seeking, and choice behaviors.

The last column in Table 1, context, represents various aspects of the task environment or general classroom or cultural context where the learning is taking place. Given that this column concerns the "external" environment, attempts to control or regulate it would not be considered "self-regulating" in some models because the context is not assumed to be part of the individual. In these models, self-regulation usually only refers to aspects of the self that are being controlled or regulated. On the other hand, individuals do try to monitor and control their environment to some extent, and in fact, in some models of intelligence (e.g., Sternberg, 1985) attempts to selectively control and change the context are seen as very adaptable. In the same manner, in

this model, it is assumed that individual attempts to monitor and control the environment is an important aspect of self-regulated learning as the "self" or person tries to actively monitor and regulate the context. It is the self or person who is acting on the context and attempting to change it as well as adapt to it that makes attempts to regulate the context a part of self-regulated learning. In this case, it is not the area that is being regulated that determines the label self-regulating, but the fact that the personal self is involved and the strategies the individual person is using to monitor, control, and regulate the context that makes it an important aspect of self-regulated learning.

This general description of the rows and columns of Table 1 provides an overview of how the different phases of regulation relate to different areas for regulation. Pintrich (2000b) provides more detail about the columns, rows, and cells in Table 1. For the purposes of this paper, we concentrate on the control/regulation phase and discuss our instrument development efforts in the three domains of cognition, motivation/affect, and behavior. The relevant scale names are listed at the bottom of Table 1.

Strategies for the Regulation of Academic Cognition

Cognitive control and regulation includes the types of cognitive and metacognitive activities that individuals engage in to adapt and change their cognition . In most models of metacognition and self-regulated learning, control and regulation activities are assumed to be dependent on, or at least strongly related to, metacognitive monitoring activities, although metacognitive control and monitoring are conceived as separate processes (Butler & Winne, 1995; Nelson & Narens, 1990; Pintrich et al, 2000; Zimmerman, 1989, 2000). As in any model of regulation, it is assumed that attempts to control, regulate, and change cognition should be related to cognitive monitoring activities that provide information about the relative discrepancy

between a goal and current progress towards that goal. For example, if a student is reading a textbook with the goal of understanding (not just finishing the reading assignment), then as the student monitors his or her comprehension, this monitoring process can provide the student with information about the need to change reading strategies.

One of the central aspects of the control and regulation of cognition is the actual selection and use of various cognitive strategies for memory, learning, reasoning, problem solving, and thinking. Numerous studies have shown that the selection of appropriate cognitive strategies can have a positive influence on learning and performance. These cognitive strategies range from the simple memory strategies very young children through adults use to help them remember (Schneider & Pressley, 1997) to sophisticated strategies that individuals have for reading (Pressley & Afflerbach, 1995), mathematics (Schoenfeld, 1992), writing (Bereiter & Scardamalia, 1987), problem solving, and reasoning (see Baron, 1994; Nisbett, 1993). Although the use of various strategies is probably deemed more "cognitive" than metacognitive, the decision to use them is an aspect of metacognitive control and regulation as is the decision to stop using them or to switch from one strategy type to another.

In research on self-regulated learning, the various cognitive and learning strategies that individuals use to help them understand and learn the material would be placed in this cell. For example, many researchers have investigated the various rehearsal, elaboration, and organizational strategies that learners can use to control their cognition and learning (cf., Pintrich & De Groot, 1990; Pintrich, Smith, Garcia, & McKeachie, 1993; Pressley & Afflerbach, 1995; Schneider & Pressley, 1997; Weinstein & Mayer, 1986; Zimmerman & Martinez-Pons, 1986). These strategies include the use of imagery to help encoding of information on a memory task as well as imagery to help one visualize correct implementation of a strategy (e.g., visualization in

sports activities as well as academic ones, cf., Zimmerman, 1998a). The use of mnemonics would also be included in this cell as well as various strategies like paraphrasing, summarizing, outlining, networking, constructing tree diagrams, and notetaking (see Weinstein & Mayer, 1986).

In our work, we have focused on three general types of cognitive strategies, rehearsal, elaboration, and organization (Weinstein & Mayer, 1986) and general metacognitive self-regulation. Rehearsal strategies include attempts to memorize material by repeating it over and over or other types of more "shallow" processing. In contrast, elaboration strategies reflect a "deeper" approach to learning, by attempting to summarize the material, put the material into your own words, etc. Finally, organizational strategies also involve some deeper processing through the use of various tactics such as note-taking, drawing diagrams, or developing concept maps to organize the material in some manner. Metacognitive self-regulation includes various planning, monitoring, and regulation strategies for learning such as setting goals for reading, monitoring comprehension as one reads, and making changes or adjustments in learning as one progresses through a task. Sample items for each of these four scales are provided in Appendix A.

Our empirical work on these four general types of strategies has been based in the development of the Motivated Strategies for Learning Questionnaire or MSLQ (e.g., Pintrich, Smith, Garcia, & McKeachie, 1991; 1993; Pintrich & De Groot, 1990). The MSLQ is a self-report instrument that asks students about their cognitive and metacognitive strategies for learning. The MSLQ uses a seven-point Likert scale ranging from 1 (labeled "not at all true of me") to 7 (labeled "very true of me") with no specific labels for the other response categories. The MSLQ does not have norms associated with it as it is assumed that students' responses to the

items will vary by subject area (reading-English, mathematics, science , social studies, etc.) or by classroom context. In addition, the items include phrases like "in this class", or "in this subject", to increase the likelihood that students will focus their responses to what they do in specific courses or classes. In other words, the MSLQ assumes, at a theoretical level, domain or context specificity in student strategy use and operationalizes it empirically at the course or classroom level. This may make the MSLQ items less usable for studies that want to assess general strategy use in school, or that collapses across or ignores subject matter, domain, or classroom level specificity.

The MSLQ has been in existence since the late 1980s and was finalized in the early 1990s. In our own research, the MSLQ has been used with two general types of samples, students in colleges and universities and students in middle schools or junior high schools. Our samples have been mainly white, middle class or working class samples, from schools in southeastern Michigan. Although the percentage of minority students (about 5%) in the samples reflects the ethnic diversity in the schools we have worked in, we have not pursued analyses by different ethnic groups because of the relatively low sample size and concerns about the reliability of the findings. There is a clear need to examine how our measures work with more diverse populations.

In addition, the MSLQ has been used by a large number of other researchers in the United States with other age populations, although we do not recommend the use of it for children at or below third grade, due to developmental considerations. The MSLQ also has been used by a large number of researchers from other countries. Although we do not have access to all of these other studies or data on the validity or reliability from these studies, we do know that the MSLQ has been translated into a number of different languages including French, German,

Spanish, Italian, Finnish, Swedish, Norwegian, Dutch, Hungarian, Greek, Japanese, Chinese, Hindi, and Arabic. In this paper, we only discuss the results from our own research programs and do not attempt to summarize the research by other American or international researchers on the instrument.

First, in terms of the general structure of the instrument, both exploratory and confirmatory factor analyses on different college samples (n=over 2,000) demonstrate that the four cognitive strategy factors (see Appendix A) of rehearsal, elaboration, organization, and metacognitive self-regulation is supported (e.g., Pintrich, 1989; Pintrich & Garcia, 1991; Pintrich et al, 1991, 1993; Pintrich, Zusho, Schiefele, & Pekrun, 2001; VanderStoep, Pintrich & Fagerlin, 1996). Estimates of internal consistency, computed using Cronbach's alpha, also are reasonable with ranges across the different studies and samples, rehearsal (.50 to .69), elaboration (.75 to .85), organization (.64 to .81) and metacognitive self-regulation (.71 to .81).

In contrast, studies with younger students in junior high or middle school classrooms (n=over 1,000) do not support the four factor structure (e.g., Pintrich & DeGroot, 1990; Pintrich, Roeser, & DeGroot, 1994; Wolters & Pintrich, 1998; Wolters, Yu, & Pintrich, 1996). In these studies, these younger students do not seem to make reliable distinctions among the three cognitive strategy factors of rehearsal, elaboration, and organization. Factor analyses with these younger students support the creation of one general cognitive strategy scale and one metacognitive strategy scale. Developmentally, it appears that for these younger students, being cognitively engaged in learning the material includes using a combination of rehearsal, elaboration, and organizational strategies and that they do not make fine distinctions between these strategies as do college students. Accordingly, for high school and younger students, it is recommended that a general cognitive strategy scale that includes all of the cognitive strategy

items be used, rather than three separate scales for rehearsal, elaboration, and organization. The alphas for the general cognitive strategy scale are acceptable (alpha=.83 to .88) and also for the metacognitive self-regulation scale (alpha=.63 to .74) across different studies (Pintrich & De Groot, 1990; Pintrich et al, 1994; Wolters & Pintrich, 1998; Wolters et al, 1996).

Besides the internal consistency of the scales, we also have found evidence of the construct validity of the scales in terms of their relations with other motivational and achievement measures. First, in terms of motivation, in general, we have found that, as theoretically expected, positive motivational beliefs such as self-efficacy, interest, task value, and mastery goals, are positively related to cognitive strategy use and metacognitive self-regulation (for summary of these findings, see Pintrich, 1999). As Pintrich (1999) points out, we have consistently found that students who believe they are capable (high self-efficacy) are more likely to report using cognitive strategies and being metacognitively self-regulating with regressions coefficients ranging from .10 to .67 across both middle school and high school studies (regressions control for other motivational constructs). In the same manner, students who value and are interested in their school work, also report the use of more cognitive and metacognitive strategies, with coefficients ranging from .03 to .73 across different studies. Finally, we also have found that students who are focused on mastery goals, and are attempting to learn and understand the material also report higher levels of strategy use and metacognitive self-regulation (coefficients range from .06 to .73). This type of evidence supports the theoretical predictions that students who are more motivated also are more cognitively regulating and demonstrates the construct validity of the cognitive scales.

Finally, we also have found consistent relations between the cognitive strategy and metacognitive scales with various indices of achievement in classrooms. In the college studies,

we have found that students who report using more cognitive and metacognitive strategies do score higher on tests in the course, grades on papers, lab performance, as well as receive higher grades (Pintrich, 1989; Pintrich et al, 1991; 1993; VanderStoep et al, 1996). In most cases, the relations are moderate with significant correlations ranging from .15 to .30, and some of the scales not showing strong relations across the studies. The same pattern emerges in the middle school studies with correlations ranging from .11 to .36 (Pintrich & De Groot, 1990; Wolters & Pintrich, 1998; Wolters et al, 1996). At the same time, these studies do show that even with rather global measures of achievement such as grades or scores on tests, there are consistent, and theoretically predicted, relations between cognitive strategy use, metacognitive self-regulation and achievement.

One important point to note is, that in many of the studies, the use of rehearsal strategies is positively correlated with achievement measures. This was not our original prediction, given that rehearsal strategies are assumed to reflect a shallower processing or approach to learning. However, it has become clear to us over many different studies at both the middle school and college level, that for many of the tasks and tests in these courses, even college courses, that students can be successful in terms of obtaining high grades by simply trying to memorize and rehearse the course material. This reflects the importance of the nature of the tasks and tests in shaping student strategy use and that students are adaptive in using strategies that will help them succeed even if they may not result in deeper levels of learning and understanding.

In summary, the four scales of cognitive (rehearsal, elaboration, and organization) and metacognitive strategy use seem to provide reliable and valid indicators of students academic regulation. At the college level it is appropriate to use all four scales, while at the middle school level it is more appropriate to just use two scales, a general cognitive scale and a metacognitive

self-regulation scale. Although more research needs to be done with diverse populations and with younger students, the items and scales seem to provide reasonable measures of cognitive self-regulations, albeit they may not be able to make very fine distinctions between different types and levels of self-regulation (Pintrich et al, 2000).

Strategies for the Regulation of Achievement Motivation

Motivation is consistently viewed as a critical determinant of students' learning and achievement within academic settings (Graham &Wiener, 1996; Pintrich & Schunk, 2002). 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 do so without the structure or social pressures to continue working that are present in the classroom. In light of these obstacles, students' ability to actively influence their motivation is viewed as an important aspects of their self-regulated learning.

In the same manner that learners can regulate their cognition, they can regulate their motivation and affect. Wolters (in press) describes the regulation of motivation as those activities through which individuals purposefully act to initiate, maintain or supplement their willingness to start, to provide work towards, 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). At a general level, 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.

Although closely related, the regulation of motivation is conceptually distinct from motivation itself. Most notably, these processes differ with regard to the awareness and purposefulness of students' thoughts and actions. Regulation of motivation concerns only the thoughts and actions through which students consciously and intentionally attempt to influence their motivation regarding a particular activity (Boekaerts, 1992; Kuhl & Kraska, 1989; Wolters, in press). 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. As with the distinction drawn between students' cognitive processing and their regulation of cognition the difference between the process of motivation and the regulation of motivation may not always be clear.

Aspects of motivational regulation have been investigated by researchers interested in volition (Corno, 1989; 1993; Garcia, McCann, Turner, & Roska, 1998; Kuhl, 1984; 1985), personality (Heiby, 1981; Sansone, Wiebe, & Morgan, 1999), language development (Biemiller, Shany, Inglis, & Meichenbaum, 1998), and behavioral conditioning (Jackson & Molloy, 1983) as well as those more specifically focused on self-regulated learning (Boekaerts, 1995; Garcia & Pintrich, 1994; Wolters, 1998; Zimmerman & Martinez-Pons, 1986). Based on these diverse perspectives researchers have identified a variety of strategies that students might use to manage the processes that have an influence on their motivation. These strategies include attempts to

regulate various motivational beliefs that have been discussed in the achievement motivation literature (see Pintrich & Schunk, 2002; Wolters, 1998) such as goal orientation, self-efficacy as well as task value beliefs and personal interest in the task. When initiated in order to control motivational outcomes such as effort and persistence, students' management of their affect, environment, and behavior have also been considered forms of motivational regulation (Boekaerts, 1995; Corno, 1989, 1993; Kuhl, 1984, 1985; Wolters, 1998; in press).

Drawing from all of these traditions, the focus in this paper is on a set of scales developed by Wolters (1998; 1999b; Wolters & Rosenthal, 2000) that can be used to assess seven regulation of motivation strategies. These scales include strategies based on self-consequating, environmental structuring, mastery self-talk, performance or extrinsic self-talk, relative ability self-talk, situational interest enhancement, and interest enhancement based on relevance or personal interest. Although this collection does not include all possible regulation of motivation strategies, it does represent a cross-section of the ways in which students attempt to manage their motivation or motivational processing (Wolters, in press).

When using a self-consequating strategy, students establish and provide themselves with an extrinsic consequence for their engagement in learning activities (Corno & Kanfer, 1993; Kuhl, 1985, Purdie & Hattie, 1996; Zimmerman & Martinez-Pons, 1986; 1990). Students can use concrete rewards and punishments as well as verbal statements as consequences (Graham & Harris, 1994; Graham, Harris, & Troia, 1998; Meichenbaum & Biemiller, 1992). The five items used to assess this strategy include "I promise myself some kind of a reward if I get my readings or studying done." (see Appendix A).

Environmental structuring describes students' efforts to concentrate attention, to reduce distractions in their environment, or more generally, to arrange their surroundings to make

completing a task easier or more likely to occur without interruption (Corno, 1993). For example, students in a bustling classroom might move to a relatively quiet corner to read, or a student may ask a fellow classmates to quiet down. This type of strategy can also include students' efforts to manage their own physical and mental readiness for completing a task by taking breaks or by eating or drinking particular foods (Purdie & Hattie, 1996; Wolters, 1998). This strategy is assessed with five items including "I change my surroundings so that it is easy to concentrate on the work." (see Appendix A).

Students also regulate their motivation by emphasizing or articulating particular reasons for wanting to complete an activity in which they are engaged. That is, students use thoughts or sub-vocal statements to purposefully prompt themselves to recall or make salient some underlying reason they have for wanting to continue working on the activity. Consistent with distinctions within achievement goal theory, students may rely on different types of goals to increase their motivation. Students may sub-vocalize or think about mastery-related goals such as satisfying their curiosity, becoming more competent or knowledgeable about a topic, or increasing their feelings of autonomy. To assess this type of mastery self-talk, students are asked to respond to six items including "I tell myself that I should keep working just to learn as much as I can" (see Appendix A). Alternatively, when faced with an urge to quit studying a student may think about getting high grades, or doing well in a class as a way of convincing themselves to continue working. This type of strategy, labeled performance or extrinsic self-talk, includes items such as "I convince myself to keep working by thinking about getting good grades." Finally, students may think about more specific performance-approach goals such as doing better than others or showing one's innate ability in order to keep themselves working

hard. Four items are used to assess this type of relative ability self-talk including "I keep telling myself that I want to do better than others in my class." (see Appendix A).

Interest enhancement strategies describe activities in which students work to increase their intrinsic motivation for a task through either situational or personal interest. In some studies these interest enhancement strategies have been treated as a single type of more general strategy (Wolters, 1999b) but they can also be differentiated. On the one hand, students can work to improve their situational interest or the immediate enjoyment they experience while completing a task (Sansone, Weir, Harpster, & Morgan, 1992; Sansone et al., 1999). For example, college students asked to perform a repetitive and relatively boring task altered the task slightly to make it more challenging and entertaining to complete (Sansone, et al., 1992). The scale used to assess this aspect of interest enhancement is labeled situational interest enhancement and includes the item "I make studying more enjoyable by turning it into a game." (see Appendix A). On the other hand, interest enhancement also includes students' efforts to increase the relevance or meaningfulness of a task by linking it to their own life or their own personal interests. For example, students can make an effort to link the material they are learning to their own experiences or to a topic in which they have a personal interest. One of the six items that has been used to assess this strategy is "I try to connect the material with something I like doing or find interesting." (see Appendix A).

Two forms of support for the construct validity of the scales used to assess these regulation of motivation strategies are discussed below. First, evidence indicating that these motivational strategies accurately represent discrete ways in which students' attempt to manage their motivation is presented. Second, evidence is presented regarding the relations of these

motivational regulation strategies to students' motivational beliefs, engagement, use of learning strategies, and finally to their classroom performance.

The statements used to assess these regulation of motivation strategies were developed from responses provided by undergraduate students to an open-ended questionnaire (Wolters, 1998). In this research (n = 115), students were presented with a short scenario describing one of four common tasks faced by college students (e.g., reading a textbook chapter, studying for an exam) followed by three common motivational problems (e.g., the material was boring or uninteresting) they might experience with respect to that task. For each of these 12 situations, students reported what they would do if they wanted to get themselves to overcome the problem and continue working on the task. A 14 category coding scheme was developed from motivational and volitional research and used by two independent coders to classify students' written responses (Wolters, 1998). Later, some of the specific behaviors, thoughts or procedures students' reported were used to create a set of Likert-scaled items that tapped into the regulation of motivation strategies represented by these categories (see Appendix A). Hence, the items used to assess regulation of motivation derive from both important theoretical distinctions within the motivational literature and actual activities reported by college students.

Additional evidence regarding the validity of these items comes from a follow-up study with a subset of the students from Wolters (1998). Forty-eight of these students returned approximately one month after taking the open-ended questionnaire described above for a second experimental session. Students spent approximately the first 20 minutes of this second session studying for their introductory psychology course then completed a questionnaire that asked them to report on aspects of their motivation and cognition during the short study session they had just finished. The results of this study indicate that students did use a number of

regulation of motivation strategies during the study session, and that using these strategies to some extent facilitated their engagement in the specific study task in which they were used (Wolters, 1999a).

The Likert scaled items developed from these studies were refined and used in several additional studies examining regulation of motivation within junior high school (Wolters & Rosenthal, 2000), high school (Wolters, 1999b), and college students (Wolters, 2001). The seven point response scale used ranges from 1 ("not very true of me') to 7 ("very true of me") with no labels for the intervening response categories. A set of instructions that precede and contextualize the items were also developed (see Appendix B). Although limited in size (see Table 2), the samples of students used in these studies were, as a whole, diverse with respect to gender, ethnicity, and ability level. Data from this series of studies substantiates the view that these items tap into discrete regulation of motivation strategies in an internally consistent and reliable manner.

Further evidence that these items reflect discrete regulation of motivation strategies was provided in Wolters (1999b). Data gathered from 88 High School students in this study were subjected to a principal components exploratory factor analyses. Results from these analyses indicated that the 28 motivational regulation items included in this study could best be represented by five factors that corresponding to five of the regulation of motivation strategies described above. Analyses using data collected from junior high school and college students (Wolters & Rosenthal, 2000; Wolters, 2001) indicate similar findings. With a few exceptions, the motivational regulation scales in these studies exhibited moderately strong correlations (see Table 3) indicating that these scales reflect similar, but not overlapping underlying theoretical constructs.

The internal consistency of these regulation of motivation scales also has been supported in each of these studies. Within the recent college samples, coefficient alphas for these scales ranged from .72 to .94, with most alphas greater than .80 (see Table 2). Likewise, these scales have exhibited strong internal consistency among junior and senior high school students with alphas ranging from .73 to .88 (see Table 2). In short, there is ample evidence indicating that the regulation of motivation items tap into discrete underlying strategies within samples of students from early to late adolescence.

The construct validity of these scales is supported by evidence linking them to students' motivational beliefs, motivational engagement, and to their cognitive and metacognitive strategy use. Across several studies, findings indicate positive relations between five of the seven motivational strategies and both task value and a mastery goal orientation (see Table 4). Hence, there is strong evidence that students who express adaptive motivational beliefs are more likely to report using several regulation of motivation strategies. The regulation of motivation scales were less consistently tied to students' self-efficacy. Although the significant correlations that have been found all indicate a positive relation between feeling more confident in one's abilities and use of the regulation strategies. The regulation of motivation strategies also showed a less consistent pattern of relations with students' reported focus on wanting good grades or other extrinsic goals. Further, this motivational belief was related negatively to students' reported use of motivational strategies in several instances.

Regulation of motivation strategies should help students to provide effort and persist at academic tasks and to avoid maladaptive academic behaviors such as procrastination. There is some evidence that the regulation of motivation scales described here are associated with these behaviors in the expected fashion (see Table 4). For instance, strong positive correlations were

found between several of the motivational regulation strategies and a scale reflecting students' self-reported effort and persistence (see Table 4). In contrast, three of these strategies have consistently exhibited negative relations with a measure of students' procrastination (see Table 4). This pattern of findings provides further evidence for the discriminate validity of these strategies.

Overall, prior studies with both younger and older students have provided evidence that students' regulation of motivation is related positively to the more cognitive and metacognitive aspects of students' self-regulated learning. For instance, across five different studies students' reported use of metacognitive strategies was related significantly to each of the regulation of motivation strategies described here. The strength of these correlations was generally high with most exceeding .40 (see Table 4). The pattern of relations between these regulation of motivation strategies and students' reported use of cognitive strategies was similar. Again, the strength of most of these relations exceeded .40. These findings indicate that students' who report using cognitive and metacognitive strategies also tend to report using regulation of motivation strategies.

Students ability to regulate their motivation is one factor that may ultimately play a role in students' achievement or performance within academic settings. Thus far, however, the evidence linking students' regulation of motivation to their achievement is weak. As noted in Table 4, studies have generally failed to find a positive relation between any of the motivational regulation strategies presented here and students' instructor-assigned grades, regardless of the age level of the students. One explanation for this lack of relation is that any influence regulation of motivation has on achievement is mediated by such factors as effort, persistence, and cognitive engagement. Previous research has not explored this possibility directly.

In summary, the scales discussed here seem to provide reliable and valid indicators for seven strategies that students use to regulate their motivation. These scales, furthermore, appear to be appropriate for assessing motivational regulation within younger as well as older adolescent populations. Additional research is needed to determine whether they would be useful for younger populations of students. Research clarifying how to assess other regulation of motivation strategies would also be useful.

Strategies for the Regulation of Behavior

Regulation of behavior is an aspect of self-regulation that involves individuals' attempts to control their own overt behavior. Some models of regulation would not include this as an aspect of "self" regulation since it does not explicitly involve attempts to control and regulate the personal self and would just label it behavioral control. In contrast, the framework in Table 1 follows the triadic model of social cognition (Bandura, 1986; Zimmerman, 1989) where behavior is an aspect of the person, albeit not the internal "self" that is represented by cognition, motivation, and affect. Nevertheless, individuals can observe their own behavior, monitor it, and attempt to control and regulate it and as such these activities can be considered self-regulatory for the individual.

Strategies for actual behavioral control and regulation are many as attested to by the chapters in Boekaerts et al. (2000) that address issues of behavioral control of physical health, mental health, work behaviors, and social relations with others, as well as behavioral control of activities for academic learning. Students may regulate the time and effort they expend studying two textbook chapters based on their monitoring of their behavior and the difficulty of the task. If the task is harder than they originally thought, they may increase their effort, depending on their goals, or they may decrease effort if the task is perceived as too difficult. Students may

also try to manage their time and study context (also an aspect of contextual control, but discussed here for ease of presentation). They may manage their time by setting up study schedules and making plans for when to study.

In our empirical work with the MSLQ, we have developed two scales that reflect behavioral control, one we call effort regulation and the other regulating time and study environment (see Appendix A). Students respond to these items using the same response scale as the other items on the MSLQ (see above). These items have only been used in the college samples and studies with the MSLQ. College students do have much more autonomy and freedom in terms of their time use and where they study in comparison to middle and high school students. Younger students are often much more regulated externally by teachers, parents, or just the structure of the school day in K-12 settings in contrast to college settings. Accordingly, we only have data on these scales with college students.

Our analyses of these scales do show they separate in factor analyses (Pintrich et al, 1991; 1993) from the cognitive and metacognitive scales. In addition, they do show reasonable internal consistency. Alphas for effort regulation have ranged from .69 to .82 and for time and study regulation from .65 to .76. Although we have not investigated these scales as often in our research, they do show the theoretically predicted relations with adaptive motivational beliefs such as self-efficacy, task value, and goals. Students who have adaptive profiles of motivation such as higher self-efficacy, higher task value, and mastery goals are more likely to regulate their effort and time/study environment (correlations range from .12 to .57. In addition, these two scales have shown moderate correlations with achievement measures (correlations range from .10 to .32). In summary, these measures, although not as strongly related to achievement as some of the cognitive and metacognitive strategy scales, do show reasonable construct validity.

These measures can be used, at least with college students, to obtain measures of behavioral regulation that can complement the information gained from the cognitive and motivational regulation measures.

Another behavioral strategy that can be very helpful for learning is help-seeking. It appears that good students and good self-regulators know when, why, and from whom to seek help (Karabenick & Sharma, 1994; Nelson Le-Gall, 1981; 1985; Newman, 1991, 1994, 1998a, b; Ryan & Pintrich, 1997). Help-seeking is listed here as a behavioral strategy because it involves the person's own behavior, but it also involves contextual control because it necessarily involves the procurement of help from others in the environment and as such is also a social interaction (Ryan & Pintrich, 1997).

When learners cannot solve problems, understand text material, or complete assignments, their options include seeking assistance from friends, family, classmates, and teachers as well as persistence or abandoning tasks (Feather, 1961; 1963). Until recently, help seeking was stigmatized as an act of dependency, especially in Western cultures that highly value independence and individual success. This negative view has changed dramatically, however, with the recognition that it can also be adaptive and strategically beneficial (Butler, 1998; Dillon, 1998; Karabenick, 1998; Nelson-Le Gall 1981, 1985; Newman, 2000; van der Meij, 1998). Whether help seeking contributes in this positive fashion depends on learners' goals. Asking other students for answers to problems would be an example of executive (also called expedient) help seeking that is designed to minimize effort. This may have short-term benefits but not decrease a learner's dependence on others when subsequently faced with similar problems. By contrast, instrumental (also called autonomous) help seeking is that undertaken to increase mastery and competence by obtaining the assistance necessary to further understanding, for

example, by asking teachers for explanations rather than solutions. Butler (1998) has also proposed adding performance-related goals as a separate category of reasons why learners seek help. Performance-related goals would be focused on seeking help to ensure success or avoid failure.

Several approaches have advanced this positive perspective of help seeking. Ames (1983) conceptualized help seeking as a strategic achievement behavior. In action control theory (Heckhausen & Kuhl, 1985; Kuhl, 1985) help seeking is considered a way to exert volitional control over the environment, and Rohrkemper and Corno (1988) regard seeking assistance from others an adaptation to difficulty or unfamiliarity. Newman (1991, 1994, 2000) has identified "adaptive help seeking" as a strategy of self-regulated learners (Boekaerts, Pintrich & Zeidner, 2000) who efficiently seek necessary assistance in response to a perceived lack of comprehension. Adaptive help seeking is based on actions that would be normative (i.e., ideal) at each phase of the help-seeking process (Gross & McMullen, 1983; Nelson-Le Gall, 1981): well calibrated comprehension monitoring, assessing costs and benefits of seeking and not seeking help, instrumental help-seeking goals, identifying and securing appropriate sources of help, and effectively processing help received.

Given its potential benefits, research has focused on the person and situation determinants of whether, for what reasons, and from whom help is sought (e.g., Butler, 1998; Butler & Neuman, 1995; Karabenick, 1998, 2001; Karabenick & Knapp, 1991; Karabenick & Sharma, 1994; Newman, 1990, 1991, 1994, 1998, 2000; Newman & Goldin, 1990; Newman & Schwager, 1993; Ryan, Gheen & Midgley, 1998; Ryan, Hicks & Midgley, 1997). There is now considerable evidence that more motivated, active, engaged, and self-regulated learners are more likely to seek assistance when necessary (Karabenick, 1998). Children who prefer challenge and

independent mastery are more likely to seek such help (Arbreton, 1998; Arbreton & Wood, 1992; Nelson-Le Gall & Jones, 1990; Newman, 1990), and high school students who use other self-regulated strategies also seek help from peers, teachers, and adults. In response to poor performance, college students with achievement-oriented "help-relevant" beliefs (Ames, 1983) and those who use a variety of cognitive, metacognitive, and self-regulating learning strategies (Karabenick & Knapp, 1991) will also seek help more frequently. It is important to emphasize the conditional nature of these relationships. More motivated, self-regulated, and therefore successful students are actually less likely to need and to seek help (Karabenick & Knapp, 1988). They are only more likely to seek help given equivalent levels of need (Karabenick & Knapp, 1991), which as discussed subsequently has implications for the assessment of help seeking.

Several studies with elementary, middle school, and adolescent learners (freshman and sophomore college students) have examined effects of achievement goals (Midgley, 2002; Pintrich & Schunk, 2002; Pintrich, 2000a, 2000b). Typically, students' personal mastery goal orientations have been associated with instrumental/autonomous help seeking, whereas help-seeking threat, avoidance, and executive (expedient) help seeking relates to performance avoid goals (e.g., Arbreton, 1993; Butler, 1998; Karabenick, 2003; Newman, 1998a; Ryan & Pintrich, 1997; Ryan, et al., 1998).

In general, help seeking is subject to the same person and situation influences as are other strategies (Karabenick, 2003; Karabenick & Knapp, 1991), with one important difference: successful help seeking involves other- as well as self-regulation (Newman, 2000). For this reason, the help-seeking process is especially sensitive to learners' social-interactive context, such as whether teachers are perceived willing to provide help (Karabenick & Sharma, 1994). The focus on socio-cultural context in motivation and learning is thus particularly relevant for

understanding the conditions that determine whether and how help seeking is expressed (e.g., Maehr & Pintrich, 1995; McInerney & Van Etten, 2001; Salili, Chiu & Hong, 2001; Urdan, 1999; Volet & Järvelä, 2001).

Recent work has also examined whether students could be characterized not only according to their intentions to seek or avoid seeking help (e.g., Ryan, 1998; Ryan, et al., 1998), or by their help-seeking goals (instrumental vs. expedient), but rather according to more elaborated orientations (Karabenick, 2001; 2002). Somewhat analogous to achievement goals, which incorporate both the purposes of task engagement and standards against which success is measured, orientation as used here is intended to capture affect, cognition, and behavior that, in combination, reflect students' help-seeking experiences. Building on previous research that has examined associations between components of the help-seeking process (e.g., Gross & McMullen, 1983; Newman, 1990), general orientations provide a parsimonious way to summarize different components, or indicators, of the help-seeking process. Consistent with recent analyses of approach and avoidance dimensions in motivation (Elliot & Covington, 2001; Elliot & Thrash, 2002)., two rather than one dimension were required to describe students' help-seeking orientations (Karabenick, 2001; 2002).

As indicated by our review, help seeking involves more than intentions to seek or avoid help. Rather, it incorporates several components that can be assessed independently, and combined to provide more inclusive orientations. Assessment is simplified when the indicators are conceptually independent. For example, just as it is necessary to control for the need for assistance when measuring students' intentions to seek help (Karabenick & Knapp, 1991; Newman, 1990), indications of helper preference can be made contingent on students' intentions to seek help. That is, students' intentions to seek and to avoid seeking help are measured

independent of the type of help (goals and sources) that students would seek if they were to do so. Instrumental and expedient help-seeking goals, as well as preferred source (formal or informal) can also be assessed in a way that maintains their conceptual independence, that is, by asking students to rate why they would seek help (if they did) and from whom. In addition, we present a scale to assess students' perceptions of their teachers' support of questioning (Karabenick & Sharma, 1994).

A recent study that included measures of help seeking involved 852 college students enrolled in one of 13 sections of Introductory Psychology at a large Midwestern university. The majority (60%) were females and most (77%) were first-term freshmen and Caucasian (74%) or African-American (20%). Their average standardized composite test scores were 1057 (SAT) and 21 (ACT). Measures of help seeking, motivation, achievement goals, and learning strategies were part of a 107-item instrument, which included a modified version of the Motivated Strategies for Learning Questionnaire that was discussed previously (Pintrich et al., 1993), with a 5-point (1 to 5) response scale that was anchored with the statements "not at all true" and "completely true." Multiple achievement goal orientation scales were included in the motivation portion of the survey: mastery approach, mastery avoid, performance approach and performance avoid (Elliot & McGregor, 2001; Pintrich, 2000a, 2000b).

Measures of help seeking are shown in Appendix A, and descriptive statistics shown in Table 5. Help-seeking orientations were obtained by computing the means of the component scales (Karabenick, 2001, 2002, submitted). Approach orientation combined students' intentions to seek help, perceived benefits of seeking help, instrumental help-seeking goal, and preferences for obtaining help from teachers. Avoidance orientation combined help-seeking threat, intentions to avoid help, and to seek expedient help. Based on exploratory factor analysis,

seeking help from other students was not included in either orientation. All of the help-seeking scales have acceptable levels of internal consistency (Cronbach □). Table 5 also presents stability estimates for each scale and the orientations over a period that began 2-months prior to the final assessment. The correlations indicate that students were relatively consistent over that time period but also evidenced variability.

As shown in Table 6, approach and avoidance help-seeking orientations related in very different ways to students' motivation, achievement goals, and use of learning strategies. Students with higher approach orientations were more motivated (efficacy, value, interested), had higher levels of mastery approach personal goal orientation, and indicated they used other self-regulated learning strategies. Conversely, students higher in help-seeking avoidance were less motivated, more test anxious, had lower mastery approach and higher mastery avoid and performance achievement goals, and tended to use lower-level rehearsal rather than higher level learning strategies. In sum, help-seeking approach orientation was typical of students who were more engaged in learning, whereas avoidance-oriented students were less engaged, with more negative affect, and greater concerns about their level of performance in the course. These results are consistent with studies of younger learners and suggest the way approach-oriented help seeking is integral to positive approaches to learning: an adaptive self-regulated strategy.

It is important to emphasize, however, that students with higher help-seeking approach orientations are not more likely to seek help, or those with avoidance orientation less help. That is, due to the nature of relationships between orientations and the need for help. In the study described here, for example, students with higher levels of need reported getting more help overall ($\underline{r}$ = .53). Students higher in help-seeking avoidance orientation reported needing help more ($\underline{r}$ =.26) and reported having obtained more help during the term (r = .20). Help-seeking

approach orientation was not related to the level of need (r = .06), yet was related to reported help obtained (r = .21). Thus, both orientations were related to the amount of help actually obtained during the term. Orientations are need-contingent, however. Controlling for the level of need, help-seeking avoidance motivation was not related to the total help seeking reported (r = .06), whereas help-seeking approach motivation was (r =.20). This is just what would be expected since higher help-seeking approach orientation translates into a greater likelihood of getting needed help, whereas higher levels of help-seeking avoidance orientation results in less help seeking despite greater need.

Table 7 presents descriptive statistics for the Perceived Teacher Support of Questioning (PTSQ) scale (Karabenick & Sharma, 1994), including correlations with help-seeking orientations and students' personal achievement goals. It is quite evident that students with different levels of help-seeking orientation perceived their teachers in distinct ways. Those more likely to seek instrumental help from their teachers, when needed, perceived them as more receptive to questioning, whereas those threatened, avoidant, and expedient perceived them as less receptive. The extent that teacher receptivity influenced help-seeking orientations (Karabenick, submitted), and students' help-seeking approach orientations affected how they perceive their teachers, is not possible to determine. Whatever the initial impetus, the relationships indicate the potential for self-fulfilling consequences of perceived teacher support in exacerbating both approach and avoidance tendencies. This would be especially problematic for those with higher avoidance orientations (Karabenick & Sharma, 1994). For this reason, assessing students' perceptions of teachers' receptivity to questioning (and by extension other types of assistance) would be important.

Included here are several scales that measure various aspects of help seeking. Used separately or in combination they can measure how learners feel about the costs and benefits of help seeking, their intentions to seek help, the kind of help they intend to seek, and whom they intend to approach. In addition, we present a measure of students' perceived support of questioning. The scales represent over two decades of research and theoretical development, based on the premise that seeking help is an important, and in many instances a critical strategy of self-regulated learners.

Conclusion

To conclude, we have presented and evaluated particular strategies that can be used to assess students' regulation of their cognition, motivation, and behavior within academic contexts. In this final section we touch on a few issues that apply to these strategies more generally. One issue concerns how these strategies might fit together. As described above, the regulation of cognition items were the first to be developed. Subsequently, the scales for assessing the regulation of motivation and the regulation of behavior were developed at about the same time, but through different research programs. Consequently and as described above, there is sufficient evidence linking the regulation of cognition scales to both the regulation of motivation and regulation of behavior scales. However, these latter two forms of regulation have not been linked empirically to any great extent, although there is some evidence that they would be positively related. For example, the students in Wolters (1998) did report that they would seek help from their peers and from course instructors when faced with some motivational problems.

A second issue concerns whether it is necessary to assess all three areas in order to assess students' self-regulated learning. First we should note that even when using all of the

scales discussed here, some aspects of self-regulated learning are not represented. For example, critical aspects of the forethought, monitoring and reflection phases are not represented in these scales (see Table 1). However, the scales discussed here do represent several keys aspects of students' regulatory processing and thus provide important coverage of this aspect of self-regulated learning. These scales do not, however, need to be used as a complete set. Individual scales, or sets of scales can be used as indicators of students' tendency to regulate these different aspects of their academic functioning. The particular scales that are selected should be a function of the specific research questions being investigated. The more scales that are used the more complete the picture of students' regulatory processing that will result.

Another concern that cuts across these three areas of regulation is the domain specificity of the items. Items from the MSLQ were originally intended to tap into students' regulatory behaviors with regard to a specific course. Similarly, the items reflecting students' regulation of motivation have been tailored to specific context, courses, or subject areas when presented to students. Self-regulated learning is presumed to be, to some extent, a context specific process. Students may self-regulate their learning within one context or situation but fail to do so in others. An advantage to the items/scales we describe above is that it is possible to more specifically tailor them to particular courses or subject areas. For instance, slight modifications in wording allow items to be tied to students' functioning within a mathematics, history, English, or science course without a substantial change in reliability (Wolters & Pintrich, 1998; Wolters et al., 1996). This flexibility could be useful for researchers interested in examining students' academic functioning within particular contexts, or in examining differences across contexts.

Having said this, it also is possible to assess this process by tapping into students' more general behaviors without regard to a particular subject areas, course, or task. That is, the items

can be modified to assess more general beliefs and behaviors. However, the predictive validity and reliability of the scales we describe may fall if they are presented in these more general terms.

Another general concern with the scales presented here is the relative lack of empirical data specifically examining their validity with regard to particular individual differences. In many cases, the sample populations involved in the development and testing of the scales presented here were diverse with regard to gender, age level, and socioeconomic status. In addition, some analyses indicate that the factor structure and reliability of these scales is consistent for both males and females. Furthermore, with slight modifications many of the scales presented here have been used across a developmental range spanning from middle school to college. As noted above, there are some differences in how the scales operate within groups of students at different age levels. Nonetheless, the overall message is that these scales can be used to assess students' regulatory functioning within academic contexts across a broad age range. In contrast, evidence regarding the reliability and validity of these scales with regard to specific ethnic or cultural groups is not readily available. Moreover, it may be reasonable to suspect that some of the regulatory activities assessed by these scales could vary across these groups (e.g., appropriateness of help-seeking). Additional research examining the psychometric properties of these scales within diverse populations is needed to provide additional evidence regarding this aspect of validity.

A final issue that cuts across all of the scales discussed here concerns the nature of self-report data on which they are based. Students can accurately self-report some aspects of their cognition, motivation, and behavior but not all. The scales presented here assess students' thoughts and actions at a particular level of analysis that has proven useful for understanding and

predicting certain academic outcomes. However, self-reports may not be appropriate for the more fine detailed analysis of students' functioning necessary to address some research questions. In short, it is important to consider the nature of the information that is made available through these scales when evaluating their appropriateness for any particular study.

As a whole, the strategies presented here provide a reasonably valid and reliable way of assessing many of the regulatory activities that contribute to students' self-regulation of their learning in academic contexts. The scales can be used flexibly to tap into those aspects of this complex process that are of most relevant to a particular study. Thus, they provide a useful set of tools that can be used to address a variety of important research questions focused on understanding students' functioning within academic contexts.

References

Ames, R. (1983). Help-seeking and achievement orientation: Perspectives from attribution theory. In B. M. DePaulo, A. Nadler, & J. D. Fisher (Eds.), New directions in helping: Vol. 2: Help seeking (pp. 165-186). New York: Academic Press.

Arbreton, A. (1993). When getting help is helpful: Developmental, cognitive, and motivational influences on students' academic help seeking. Unpublished doctoral dissertation, University of Michigan, Ann Arbor.

Arbreton, A. (1998). Student goal orientation and help-seeking strategy use. In S. A. Karabenick (Ed.), Strategic help seeking: Implications for learning and teaching (pp. 95-116). Mahwah, NJ: Erlbaum.

Arbreton, A., & Wood (1992). Help-seeking behaviors and children's learning preferences in the middle school years. Paper presented at the Biennial Meeting of the Society for Research on Adolescence. Washington, DC.

Bandura, A. (1986). Social foundations of thought and action. Englewood Cliffs, NJ: Prentice-Hall.

Baron, J. (1994). Thinking and deciding. New York: Cambridge University Press.

Bereiter, C., & Scardamalia, M. (1987). The psychology of written composition. Hillsdale, NJ: Lawrence Erlbaum Associates.

Biemiller, A., Shany, M., Inglis, A., & Meichenbaum, D. (1998). Factors influencing children's acquisition and demonstration of self-regulation on academic tasks. In D. Schunk and B. Zimmerman (Eds.), Self-regulated learning: From teaching to self-reflective practice (pp. 203-223). New York: The Guilford Press.

Boekaerts, M. (1992). The adaptable learning process: Initiating and maintaining behavioral change. Applied Psychology: An International Review, 41, 377-397.

Boekaerts, M. (1993). Being concerned with well-being and with learning. Educational Psychologist, 28, 148-167.

Boekaerts, M. (1995). Self-regulated learning: Bridging the gap between metacognitive and metamotivational theories. Educational Psychologist, 30, 195-200.

Boekaerts, M. Pintrich, P.R., & Zeidner, M. (2000). Handbook of Self-regulation: Theory, research, and applications. San Diego, CA: Academic Press.

Butler, D.L., & Winne, P.H. (1995). Feedback and self-regulated learning: A theoretical synthesis. Review of Educational Research, 65, 245-281.

Butler, R. (1998). Determinants of help seeking: Relations between perceived reasons for classroom help-avoidance and help-seeking behaviors in an experimental context. Journal of Educational Psychology, 90, 630-643.

Butler, R., & Neuman, O. (1995) Effects of task and ego achievement goals on help-seeking behaviors and attitudes. Journal of Educational Psychology, 87, 261-271.

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-Verlag.

Corno, L. (1993). The best-laid plans: Modern conceptions of volition and educational research. Educational Researcher, 22, 14-22.

Corno, L., & Kanfer, R. (1993). The role of volition in learning and performance. In L. Darling-Hammond (Ed.), Review of Research in Education (Vol. 19, pp. 301-341). Washington, DC: AERA.

Dillon, J. T. (1998). Theory and practice of student questioning. In S. A. Karabenick (Ed.), Strategic help seeking: Implications for learning and teaching (pp. 171-193). Mahwah, NJ: Erlbaum.

Elliot, A J., & Covington, M. V. (2001). Approach and avoidance motivation. Educational Psychology Review, 13(2), 73-92.

Elliot, A. J. & McGregor, H. A. (2001). A 2 * 2 achievement goal framework. Journal of Personality & Social Psychology: Special Issue, 80(3), 501-519.

Elliot, A. J., & Thrash, T. M. (2002). Approach-avoidance motivation in personality: Approach and avoidance temperaments and goals. Journal of Personality & Social Psychology, 82, 804-818.

Feather, N. T. (1961). The relationship of persistence at a task to expectations for success and achievement-oriented motives. Journal of Abnormal and Social Psychology, 63, 552-561.

Feather, N. T. (1963). Persistence at a difficult task with an alternative task of intermediate difficulty. Journal of Abnormal and Social Psychology, 66, 604-609.

Garcia, T., & Pintrich, P.R. (1994). Regulating motivation and cognition in the classroom: The role of self-schemas and self-regulatory strategies. In D.H. Schunk & B. J. Zimmerman (Eds.), Self-regulation of learning and performance: Issues and educational applications (pp. 127-153). Hillsdale, NJ: Lawrence Erlbaum Associates.

Garcia, T., McCann, E., Turner, J., & Roska, L. (1998). Modeling the mediating role of volition in the learning process. Contemporary Educational Psychology, 23, 392-418.

Graham, S., & Harris, K. (1994). The role and development of self-regulation in the writing process. In D. Schunk & B. Zimmerman (Eds.), Self-regulation of learning and

performance: Issues and educational applications (pp. 203-228). Hillsdale, NJ: Lawrence Erlbaum Associates.

Graham, S., & Weiner, B. (1996). Theories and principles of motivation. In D. Berliner and R. Calfee (Eds.), Handbook of Educational Psychology (pp. 63 - 84). New York: Simon and Schuster Macmillan.

Graham, S., Harris, K., & Troia, G. (1998). Writing and self-regulation: Cases from the self-regulated strategy development model. In D. Schunk & B. Zimmerman (Eds.), Self-regulated learning: From teaching to self-reflective practice (pp. 20-41). New York: The Guilford Press.

Gross, A. A., & McMullen, P. A. (1983). Models of the help seeking process. In B. M. DePaulo, A. Nadler, & J. D. Fisher (Eds.), New directions in helping: Vol. 2. Help seeking (pp. 45-70). San Diego, CA: Academic Press.

Heckhausen, H., & Kuhl, J. (1985). From wishes to action: The dead ends and short-cuts on the long way to action. In M. Frese & J. Sabini (Eds.), Goal directed behavior: Psychological theory and research on action (pp. 134 – 159). Hillsdale, NJ: Erlbaum Associates.

Heiby, E. (1981). Depression and frequency of self-reinforcement. Behavior Therapy, 12, 549-555.

Jackson, H., & Molloy, G. (1983). Tangible self-consequation and arithmetical problem-solving: An exploratory comparison of four strategies. Perceptual and Motor Skills, 57, 471-477.

Karabenick, S. A. (2001, April). Help seeking in large college classes: Who, why, and from whom. Presented at the annual meeting of the American Educational Research Association, Seattle, WA.

Karabenick, S. A. (2002, July). Effects of subjective classroom context on college student help seeking.. Presented at the International Congress of Applied Psychology, Singapore.

Karabenick, S. A. (2003). Help seeking in large college classes: A person-centered approach. Contemporary Educational Psychology, 28, 37–58

Karabenick, S. A. (Ed.). (1998). Strategic help seeking: Implications for Learning and Teaching. Mahwah, NJ: Erlbaum.

Karabenick, S. A. (submitted). Perceived Achievement Goal Structure and College Students' Help-Seeking Orientations.

Karabenick, S. A., & Knapp, J. R. (1988). Help-Seeking and the need for academic assistance. Journal of Educational Psychology, 80, 406-408.

Karabenick, S. A., & Knapp, J. R. (1991). Relationship of academic help seeking to the use of learning strategies and other instrumental achievement behavior in college students. Journal of Educational Psychology. 83, 221-230.

Karabenick, S. A., & Sharma, R. (1994). Seeking academic assistance as a strategic learning resource. In P. Pintrich, D. Brown, & C. E. Weinstein (Eds.), Student motivation, cognition, and learning: Essays in honor of Wilbert J. McKeachie (pp. 189-211). Hillsdale, NJ: Erlbaum.

Knapp, J. R., & Karabenick, S. A. (1988). Incidence of formal and informal help-seeking in higher education. Journal of College Student Development, 29, 223-227.

Kuhl, J. (1984). Volitional aspects of achievement motivation and learned helplessness: Toward a comprehensive theory of action control. In B. Maher & W. Maher (Eds.), Progress in experimental personality research. (Vol. 13, pp. 99-171). New York: Academic Press.

Kuhl, J. (1985). Volitional mediators of cognition-behavior consistency: Self-regulatory processes and action versus state orientation. In J. Kuhl & J. Beckman (Eds.), Action control: From cognition to behavior (pp. 101-128). Berlin: Springer-Verlag.

Kuhl, J., & Kraska, K. (1989). Self-regulation and metamotivation: Computational mechanisms, development, and assessment. In R. Kanfer, P. Ackerman, & R. Cudeck (Eds.), Abilities, motivation, and methodology (pp. 343-375). Hillsdale, NJ: Lawrence Erlbaum Associates.

Maehr, M. L., & Pintrich, P. R. (Eds.). (1995). Advances in Motivation and Achievement: Culture, Motivation and Achievement (Vol. 9). Greenwich, CT: JAI Press.

McInerney, D. M., & Van Etten, S. (Eds.). (2001). Research on sociocultural influences on motivation and learning, volume 1. Greenwich, CT: IAP.

Meichenbaum, D., & Biemiller, A. (1992). In search of student expertise in the classroom: A metacognitive analysis. In M. Pressley, K. Harris, & J. Gutherie (Eds.), Promoting academic competence and literacy in school (pp. 3-56). San Diego, CA: Academic Press.

Midgley, C. (Ed.). (2002). Goals, goal structures, and patterns of adaptive learning. Mahwah, NJ: Erlbaum

Miller, G., Galanter, E., & Pribram, K. (1960). Plans and the structure of behavior. New York: Holt.

Nelson, T., & Narens, L. (1990). Metamemory: A theoretical framework and new findings. In G. Bower (Ed.), The psychology of learning and motivation (Vol. 26, pp. 125-141). New York: Academic Press.

Nelson-Le Gall, S. & Jones, E. (1990). Cognitive-motivational influences on children's help-seeking. Child Development, 61, 581-589.

Nelson-Le Gall, S. (1981). Help-seeking: An understudied problem solving skill in children. Developmental Review, 1, 224-246.

Nelson-Le Gall, S. (1985). Help-seeking behavior in learning. Review of research in education (Vol. 12, pp. 55-90). Washington DC: American Educational Research Association.

Newman, R. (1990). Children's help-seeking in the classroom: The role of motivational factors and attitudes. Journal of Educational Psychology, 82, 71-80.

Newman, R. (1991). Goals and self-regulated learning: What motivates children to seek academic help? In M.L. Maehr & P.R. Pintrich (Eds.), Advances in motivation and achievement: Goals and self-regulatory processes (Vol. 7, pp. 151-183). Greenwich, CT: JAI Press.

Newman, R. (1994). Adaptive help-seeking: A strategy of self-regulated learning. In D.H. Schunk & B. J. Zimmerman (Eds.), Self-regulation of learning and performance: Issues and educational applications (pp. 283-301). Hillsdale, NJ: Lawrence Erlbaum Associates.

Newman, R. (1998a). Adaptive help-seeking: A role of social interaction in self-regulated learning. In S. Karabenick (Ed.), Strategic help-seeking: Implications for learning and teaching (pp. 13-37). Hillsdale, NJ: Lawrence Erlbaum Associates.

Newman, R. (1998b). Students' help-seeking during problem solving: Influences of personal and contextual goals. Journal of Educational Psychology, 90, 644-658.

Newman, R. (2000). Social influences on the development of children's adaptive help seeking: The role of parents, teachers, and peers. Developmental Review, 20, 350-404.

Newman, R., & Goldin, L. (1990). Children's reluctance to seek help with schoolwork. Journal of Educational Psychology, 82, 92-100.

Newman, R., & Schwager, M. T. (1993). Students' perceptions of the teacher and classmates in relation to reported help seeking in math class. Elementary School Journal, 94, 3-17.

Nisbett, R. (1993). Rules for reasoning. Hillsdale, NJ: Lawrence Erlbaum Associates.

Pintrich, P. R. (1989). The dynamic interplay of student motivation and cognition in the college classroom. In C. Ames & M.L. Maehr (Eds.), Advances in motivation and achievement: Motivation-enhancing environments (Vol. 6, pp. 117-160). Greenwich, CT: JAI Press.

Pintrich, P. R. (1999). The role of motivation in promoting and sustaining self-regulated learning. International Journal of Educational Research, 31, 459-470.

Pintrich, P. R. (2000a). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. Pintrich, & M. Zeidner (Eds.), Handbook of self-regulation (pp. 451-502). San Diego: Academic Press.

Pintrich, P. R. (2000b). Multiple goals, multiple pathways: The role of goal orientation in learning and achievement. Journal of Educational Psychology, 92, 54-555.

Pintrich, P. R., & De Groot, E.V. (1990). Motivational and self-regulated learning components of classroom academic performance. Journal of Educational Psychology, 82, 33-40.

Pintrich, P. R., & Garcia, T. (1991). Student goal orientation and self-regulation in the college classroom. In M.L. Maehr & P.R. Pintrich (Eds.), Advances in motivation and achievement: Goals and self-regulatory processes (Vol. 7, pp. 371-402). Greenwich, CT: JAI Press.

Pintrich, P. R., Roeser, R., & De Groot, E. (1994). Classroom and individual differences in early adolescents' motivation and self-regulated learning. Journal of Early Adolescence, 14, 139-161.

Pintrich, P. R., & Schunk, D.H. (2002). Motivation in education: Theory, research and applications. Englewood Cliffs, NJ: Prentice Hall Merrill.

Pintrich, P. R., Smith, D., Garcia, T., & McKeachie, W. (1993). Predictive validity and reliability of the Motivated Strategies for Learning Questionnaire (MSLQ). Educational and Psychological Measurement, 53, 801-813.

Pintrich, P. R., Smith, D., Garcia, T., & McKeachie, W.J. (1991). A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ). Ann Arbor, MI: NCRIPTAL, School of Education, The University of Michigan.

Pintrich, P. R., Wolters, C., & Baxter, G. (2000). Assessing metacognition and self-regulated learning. In G. Schraw (Ed.). Metacognitive assessment. Lincoln, NE: The University of Nebraska Press.

Pintrich, P. R., Zusho, A., Schiefele, U., & Pekrun, R. (2001). Goal orientation and self-regulated learning in the college classroom: A cross-cultural comparison. In F. Salili, C-Y. Chiu, & Y-Y. Hong (Eds.), Student motivation: The culture and context of learning (pp. 149-169). New York: Plenum.

Pressley, M., & Afflerbach, P. (1995). Verbal protocols of reading: The nature of constructively responsive reading. Hillsdale, NJ: Lawrence Erlbaum Associates.

Purdie, N., & Hattie, J. (1996). Cultural differences in the use of strategies for self-regulated learning. American Educational Research Journal, 33, 845 – 871.

Rohrkemper, M., & Corno, L. (1988). Success and failure on classroom tasks: Adaptive learning and classroom teaching. Elementary School Journal , 88, 297-312.

Ryan, A. M. (1998). The development of achievement beliefs and behaviors during early adolescence: The role of the peer group and classroom contexts. Unpublished doctoral dissertation. University of Michigan, Ann Arbor.

Ryan, A. M., Gheen, M., & Midgley, C. (1998). Why do some students avoid asking for help? An examination of the interplay among students' academic efficacy, teachers' social-emotional role and classroom goal structure. Journal of Educational Psychology, 90, 528-535.

Ryan, A. M., Hicks, L., & Midgley, C. (1997). Social goals, academic goals, and avoiding help in the classroom. Journal of Early Adolescence, 17, 152-171.

Ryan, A., & Pintrich, P.R. (1997). "Should I ask for help?" The role of motivation and attitudes in adolescents' help seeking in math class. Journal of Educational Psychology, 89, 329-341.

Salili, F., Chiu, C. Y., & Hong, Y. Y. (Eds.). (2001). Student motivation: The culture and context of learning. New York: Kluwer/Plenum.

Sansone, C., Weir, C., Harpster, L., & Morgan, C. (1992). Once a boring task, always a boring task? The role of interest as a self-regulatory mechanism. Journal of Personality and Social Psychology, 63, 379-390.

Sansone, C., Wiebe, D., & Morgan, C. (1999). Self-regulating interest: The moderating role of hardiness and conscientiousness. Journal of Personality, 67, 701-733.

Schneider, W., & Pressley, M. (1997). Memory development between 2 and 20. Mahwah, NJ: Lawrence Erlbaum Associates.

Schoenfeld, A. (1992). Learning to think mathematically: Problem solving, metacognition, and sense making in mathematics. In D. Grouws (Ed.), Handbook of research on mathematics teaching and learning (pp. 334-370). New York: Macmillan.

Schuell, T. (1996). Teaching and learning in a classroom context. In D. Berliner and R. Calfee (Eds.), Handbook of Educational Psychology (pp. 726 - 764). New York: Simon and Schuster Macmillan.

Snow, R., Corno, L., & Jackson, D. (1996). Individual differences in affective and conative functions. In D. Berliner & R. Calfee (Eds.), Handbook of Educational Psychology (pp. 243-310). New York: Macmillan.

Sternberg, R. (1985). Beyond IQ: A triarchic theory of intelligence. New York: Cambridge University Press.

Urdan, T. C. (Ed.). (1999). Advances in motivation and achievement (Vol. 11). The role of context. Stamford, CT: JAI Press.

van der Meij, H. (1998). The great divide between teacher and student questioning. In S. A. Karabenick (Ed.), Strategic help seeking: Implications for learning and teaching (pp. 195-218). Mahwah, NJ: Erlbaum.

VanderStoep, S., Pintrich, P.R., & Fagerlin, A. (1996). Disciplinary differences in self-regulated learning in college students. Contemporary Educational Psychology, 21, 345-362.

Volet, S., & Järvelä, S. (2001). Motivation in learning contexts: Theoretical advances and methodological implications. Amsterdam: Elsevier Science.

Weinstein, C.E., & Mayer, R. (1986). The teaching of learning strategies. In M. Wittrock (Ed.) Handbook of research on teaching and learning (pp. 315-327). New York: Macmillan.

Wolters, C. (1998). Self-regulated learning and college students' regulation of motivation. Journal of Educational Psychology, 90, 224-235.

Wolters, C. (1999a). College students' motivational regulation during a brief study period. Journal of Staff, Program, and Organization Development, 16, 103 -111.

Wolters, C. (1999b). The relation between High School students' motivational regulation and their use of learning strategies, effort, and classroom performance. Learning and Individual Differences, 11, 281 – 299.

Wolters, C. (August, 2001). Motivational problems experienced by college students. Presented at the annual meetings of the American Psychological Association, San Francisco, CA.

Wolters, C. (in press). Regulation of motivation: Evaluating an underemphasized aspect of self-regulated learning. Educational Psychologist.

Wolters, C., & Pintrich, P. R. (1998). Contextual differences in student motivation and self-regulated learning in mathematics, English, and social studies classrooms. Instructional Science, 26, 27-47.

Wolters, C., & Rosenthal, H. (2000). The relation between students' motivational beliefs and attitudes and their use of motivational regulation strategies. International Journal of Educational Research, 33, 801 – 820.

Wolters, C., Yu, S., & Pintrich, P.R. (1996). The relation between goal orientation and students' motivational beliefs and self-regulated learning. Learning and Individual Differences, 8, 211-238.

Zimmerman, B.J. (1989). A social cognitive view of self-regulated learning and academic learning. Journal of Educational Psychology, 81(3), 329-339.

Zimmerman, B.J. (1998a). Academic studying and the development of personal skill: A self-regulatory perspective. Educational Psychologist, 33, 73-86.

Zimmerman, B.J. (1998b). Developing self-fulfilling cycles of academic regulation: An analysis of exemplary instructional models. In D. H. Schunk & B.J. Zimmerman (Eds.), Self-regulated learning: From teaching to self-reflective practice (pp. 1-19). New York: Guilford Press.

Zimmerman, B.J. (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P.R. Pintrich, & M. Zeidner (Eds.), Handbook of self-regulation: Theory, research, and applications (pp. 13-39). San Diego, CA: Academic Press.

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., & Martinez-Pons, M. (1990). Student differences in self-regulated learning: Relating grade, sex, and giftedness to self-efficacy and strategy use. Journal of Educational Psychology, 82, 51-59.

Table 1. Phases and Areas for Self-regulated Learning.

	Areas for Regulation			
Phases	Cognition	Motivation/Affect	Behavior	Context
1)Forethought, Planning, and Activation	1)Target goal setting 2)Prior content knowledge activation 3)Metacognitive knowledge activation	1)Goal orientation adoption 2)Efficacy judgments 3)Perceptions of task difficulty 4)Task value activation 5)Interest activation	1)Time and effort planning 2)Planning for self-observations of behavior	1)Perceptions of task 2)Perceptions of context
2)Monitoring	1)Metacognitive awareness and monitoring of cognition	1)Awareness and monitoring of motivation and affect	1)Awareness and monitoring of effort, time use, need for help 2)Self-observation of behavior	1)Monitoring changing task and context conditions
3)Control	1)Selection and adaptation of cognitive strategies for learning, thinking	1)Selection and adaptation of strategies for managing motivation and affect	1)Increase/decrease effort 2)Persist, give up 3)Help-seeking behavior	1)Change or re-negotiate task 2)Change or leave context
4)Reaction and Reflection	1)Cognitive judgments 2)Attributions	1)Affective reactions 2)Attributions	1)Choice behavior	1)Evaluation of task 2)Evaluation of context
Relevant Scales	Rehearsal Elaboration Organization Metacognitive Regulation	Mastery Self-talk Extrinsic Self-talk Relative Ability Self-talk Relevance Enhancement Situational Interest Enhancement Self-consequating	Effort Regulation Time/Study Environment Help-seeking	

Table 2. Coefficient alphas and number of items for regulation of motivation scales across five samples.

	Mastery Self-Talk		Situational Interest Enhancement		Relevance Enhancement		Relative Ability Self-talk		Extrinsic Self-talk		Self-Consequating		Environmental Structuring	
Age Level of Sample	alpha	#	alpha	#	alpha	#	alpha	#	alpha	#	alpha	#	alpha	#
High school	.85	4	.87 [a]	4	.83 [a]	4	.87	5	.84	5	.87	4	.73	4
Junior High	.85	5	.82	4	.80	4	.75	4	.79	5	.74	4	.74	4
College 1999	.90	6	.75	5	.91	6	.86	4	.88	5	.94	5	.79	5
College 2000	.87	6	.88	5	.94	6	.86	4	.82	5	.93	5	.72	5
College 2001	.88	5	.88	5	.91	6	--	--	.84	5	.91	5	.74	5

Note. [a] In Wolters (2000) items for these two scales were combined and labeled Interest Enhancement.
For High School, N = 88; for Junior High, N = 114, for College 1999, N = 168; for College 2000, N = 152; for College 2001, N = 219.

Table 3. Range of Pearson correlations among the regulation of motivation strategies across five studies.

Strategy	1.	2.	3.	4.	5.	6.	7.
1. Mastery self-talk	--						
2. Relevance Enhancement	.69 - .75	--					
3. Situational Interest Enhancement	.45 - .61	.44 - .74	--				
4. Extrinsic self-talk	.33 - .43	.13 - .36	.03 - .21	--			
5. Relative Ability Self-talk	.33 - .51	.25 - .36	.03 - .42	.25 - .50	--		
6. Self-consequating	.27 - .48	.21 - .35	.35 - .51	.26 - .47	.22 - .36	--	
7. Environmental Structuring	.34 - .69	.21 - .54	.19 - .51	.38 - .55	.16 - .38	.40 - .49	--

Table 4. Pearson correlations between the regulation of motivation scales and students' motivational beliefs, motivational engagement, use of learning strategies, and achievement.

Variable Sample Age Level	Mastery self-talk	Relevance Enhancement	Situational Interest Enhancement	Relative Ability Self-talk	Extrinsic Self-talk	Self-consequating	Environmental Structuring
Task Value							
High School	.20	.09	.17	.14	.28**	.45***	.25*
Junior High	.67***	.64***	.42***	.33***	.27**	.25**	.51***
College 1999	.49***	.62***	.11	.08	.07	.07	.31***
College 2000	.32***	.57***	.21**	.10	.10	.18*	.35***
College 2001	.48***	.55***	.22***	--	.51***	.39***	.36***
Mastery orientation							
High School	.26*	.32**	.23*	.14	.15	-.08	.18
Junior High	.73***	.64***	.53***	.30**	.31**	.25**	.56***
College 1999	.65***	.63***	.35***	.13	-.02	.15	.25**
College 2000	.60***	.63***	.32***	.23**	.02	.22**	.32***
College 2001	.61***	.58***	.42***	--	.31***	.48***	.36***
Performance extrinsic							
High School	-.04	-.19	-.20	.17	.34**	.22*	.04
Junior High	-.44***	-.32**	-.19*	.01	.11	.04	-.29**
College 1999	-.13	-.35***	.04	.26***	.48***	.12	.17*
College 2000	-.25**	-.27***	-.05	.15	.35***	-.01	-.09
College 2001	-.23***	-.25***	-.05	--	.11	-.10	-.03
Self-efficacy							
High School	-.02	-.07	-.06	.06	.15	-.00	.21*
Junior High	.37***	.30**	.27**	.22*	.23*	.15	.23*
College 1999	.15*	.13	.00	.14	.21**	.20**	.32***
College 2000	.09	.14	-.05	.09	.05	-.03	.26***
College 2001	.25***	.26***	.07	--	.36***	.21**	.38***
Persistence/Effort							
High School	.43***	.36***	.25*	.13	.33**	.25*	.26*
Junior High	.50***	.38***	.34***	.44***	.27**	.26**	.40***
College 1999	.46***	.30***	.06	.08	.19*	.15*	.36***
College 2000	.35***	.25**	.15	.06	.21**	.18*	.49***
Procrastination							
Junior High School	-.43***	-.41***	-.28**	-.21*	-.16	-.12	-.28**
College 1999	-.30***	-.19*	.00	.09	-.00	.01	-.16*

College 2000	-.26***	-.21**	-.11	.01	-.02	-.13	-.35***
College 2001	-.29***	-.20**	-.12	--	-.15*	-.17*	-.19**

Table 4 (continued). Pearson correlations between the regulation of motivation scales and students' motivational beliefs, motivational engagement, use of learning strategies, and achievement.

Variable Sample Age Level	Mastery self-talk	Relevance Enhancement	Situational Interest Enhancement	Relative Ability Self-talk	Extrinsic Self-talk	Self-consequating	Environmental Structuring
Cognitive Strategies							
High School	.45***	.36***	.30**	.14	.35**	.40***	.39***
Junior High	.59***	.59***	.54***	.47***	.33***	.46***	.55***
College 1999	.52***	.52***	.38***	.40***	.43***	.34***	.52***
College 2000	.52***	.48***	.40***	.25**	.36***	.28***	.38***
College 2001	.60***	.54***	.45***	--	.58***	.41***	.47***
Metacognitive Strategies							
High School	.58***	.42***	.30**	.31**	.47***	.51***	.50***
Junior High	.60***	.55***	.56***	.46***	.40***	.48***	.61***
College 1999	.52***	.40***	.34***	.45***	.52***	.45***	.63***
College 2000	.61***	.53***	.43***	.28***	.37***	.35***	.53***
College 2001	.61***	.58***	.44***	--	.59***	.44***	.51***
Achievement							
High School	-.08	-.20	-.11	.16	.26*	.18	.03
Junior High	.10	-.05	.02	.11	.38***	.13	.24*
College 1999	.04	.09	-.15	-.03	-.05	-.04	.12
College 2000	-.01	.00	.03	.14	.06	.10	.08
College 2001	.06	.12	.05	--	.16*	.11	.18**

Note. * $p < .05$, ** $p < .01$. *** $p < .001$.

Table 5. Help-Seeking Scales Descriptive Statistics (n = 852)

Scale	No. Items	alpha	Mean	SD	2-Month Stability
Threat[a]	4	.84	1.5	.7	.48*
Avoidance[a]	3	.69	1.7	.7	.37*
Expedient Goal[a]	3	.64	1.9	.8	.49*
Approach[b]	3	.80	3.4	.7	.47*
Benefits[b]	3	.80	3.5	.9	.47*
Instrumental Goal[b]	3	.61	3.5	.8	.40*
Formal Source[b]	2	.88	3.1	1.0	.38*
Informal Source	2	.87	3.1	1.0	.30*
[a]Approach Orientation			3.2	.7	.50*
[b]Avoidance Orientation			1.8	.7	.52*

Note. * $p < .001$

Table 6. Relationships of Help-Seeking Orientations to Motivational Beliefs and Learning Strategies (n = 852)

	Approach Orientation	Avoidance Orientation
Motivation Beliefs		
Mastery Approach	.45***	-.20***
Mastery Avoid	.05	.31***
Performance Approach	.00	.49***
Performance Avoid	-.12***	.62***
Task Value	.43***	-.20***
Self-Efficacy	.27***	-.15**
Test Anxiety	.02	.22***
Interest	.31***	-.13*
Learning Strategies		
Rehearsal	.31***	.07*
Elaboration	.36***	-.08*
Metacognition	.50**	-.00

Note . *$p < .05$ **$p < .01$ ***$p < .001$

Table 7. Relationships of Perceived Teacher Support of Questioning with Help-Seeking Orientations and Achievement Goals (n = 852)

	Perceived Support
Help-Seeking Orientation	
Approach	.40***
Avoidance	-.24***
Achievement Goals	
Mastery Approach	.45***
Mastery Avoid	-.06
Performance Approach	.40***
Performance Avoid	-.09*
alpha	.79
Mean	3.85
SD	.77

Notes. *p < .05 **p < .01 ***p < .001

Appendix A

Strategies for the Regulation of Academic Cognition

Rehearsal Strategies

When I study for this class, I practice saying the material to myself over and over.
When studying for this class, I read my class notes and the course readings over and over again.
I memorize key words to remind me of important concepts in this class.
I make lists of important terms for this course and memorize the lists.

Elaboration Strategies

When I study for this class, I pull together information from different sources, such as lectures, readings, and discussions.
I try to relate ideas in this subject to those in other course whenever possible.
When reading for this class, I try to relate the material to what I already know.
When I study for this course, I write brief summaries of the main ideas from the readings and the concepts from the lectures.
I try to understand the material in this class by making connections between the readings and the concepts from the lectures.
I try to apply ideas from course readings in other class activities such as lecture and discussion.

Organization Strategies

When I study for the readings for this course, I outline the material to help me organize my thoughts.
When I study for this course, I go through the readings and my class notes and try to find the most important ideas.
I make simple charts, diagrams, or tables to help me organize course material.
When I study for this course, I go over my class notes and make an outline of important concepts.

Metacognitive Self-Regulation

During class time I often miss important points because I'm thinking of other things. (REVERSED)
When reading for this course, I make up questions to help focus my reading.
When I become confused about something I'm reading for this class, I go back and try to figure it out.
If course materials are difficult to understand, I change the way I read the material.
Before I study new course material thoroughly, I often skim it to see how it is organized.
I ask myself questions to make sure I understand the material I have been studying in this class.
I try to change the way I study in order to fit the course requirements and instructor's teaching style.
I often find that I have been reading for class but don't know what it was all about. (REVERSED)
I try to think through a topic and decide what I am supposed to learn from it rather than just reading it over when studying.
When studying for this course I try to determine which concepts I don't understand well.
When I study for this class, I set goals for myself in order to direct my activities in each study period.
If I get confused taking notes in class, I make sure I sort it out afterwards.

Strategies for the Regulation of Academic Motivation

Mastery Self-talk

I tell myself that I should keep working just to learn as much as I can
I persuade myself to keep at it just to see how much I can learn.
I challenge myself to complete the work and learn as much as possible.
I convince myself to work hard just for the sake of learning.
I tell myself that I should study just to learn as much as I can.
I think about trying to become good at what we are learning or doing.

Relevance Enhancement

I tell myself that it is important to learn the material because I will need it later in life.
I try to connect the material with something I like doing or find interesting.
I think up situations where it would be helpful for me to know the material or skills.
I try to make the material seem more useful by relating it to what I want to do in my life.

I try to make myself see how knowing the material is personally relevant.
I make an effort to relate what we're learning to my personal interests.

Situational Interest Enhancement

I make studying more enjoyable by turning it into a game.
I try to make a game out of learning the material or completing the assignment.
I try to get myself to see how doing the work can be fun.
I make doing the work enjoyable by focusing on something about it that is fun.
I think of a way to make the work seem enjoyable to complete.

Performance/Relative Ability Self-Talk

I think about doing better than other students in my class.
I tell myself that I should work at least as hard as other students.
I keep telling myself that I want to do better than others in my class.
I make myself work harder by comparing what I'm doing to what other students are doing.

Performance/Extrinsic Self-Talk

I remind myself about how important it is to get good grades.
I tell myself that I need to keep studying to do well in this course.
I convince myself to keep working by thinking about getting good grades.
I think about how my grade will be affected if I don't do my reading or studying.
I remind myself how important it is to do well on the tests and assignments in this course.

Self-Consequating

I promise myself I can do something I want later if I finish the assigned work now.
I make a deal with myself that if I get a certain amount of the work done I can do something fun afterwards.
I promise myself some kind of a reward if I get my readings or studying done.
I tell myself I can do something I like later if right now I do the work I have do get done.
I set a goal for how much I need to study and promise myself a reward if I reach that goal.

Environmental Structuring

I try to study at a time when I can be more focused.
I change my surroundings so that it is easy to concentrate on the work.
I make sure I have as few distractions as possible.
I try to get rid of any distractions that are around me.
I eat or drink something to make myself more awake and prepared to work.

Strategies for the Regulation of Academic Behavior

Effort Regulation

I often feel so lazy or bored when I study for this class that I quit before I finish what I planned to do. (REVERSED)
I work hard to do well in this class even if I don't like what we are doing.
When course work is difficult, I give up or only study the easy parts. (REVERSED)
Even when course materials are dull and uninteresting, I manage to keep working until I finish.

Regulating Time and Study Environment

I usually study in a place where I can concentrate on my course work.
I make good use of my study time for this course.
I find it hard to stick to a study schedule (REVERSED)
I have a regular place set aside for studying.
I make sure I keep up with the weekly readings and assignments for this course.
I attend class regularly.
I often find that I don't spend very much time on this course because of other activities. (REVERSED)
I rarely find time to review my notes or readings before an exam. (REVERSED)

General Intention to Seek Needed Help

If I needed help in this class I would ask someone for assistance.
If I needed help understanding the lectures in this class I would ask for help.
If I needed help with the readings in this class I would ask for help.

General Intention to Avoid Needed Help

If I didn't understand something in this class I would guess rather than ask someone for assistance.
I would rather do worse on an assignment I couldn't finish than ask for help
Even if the work was too hard to do on my own, I wouldn't ask for help with this class.

Perceived Costs of Help-Seeking (threat)

Getting help in this class would be an admission that I am just not smart enough to do the work on my own.
I would not want anyone to find out that I needed help in this class.
Asking for help would mean I am not as smart as other students in the class.
Others would think I was dumb if I asked for help in this class.

Perceived Benefits of Help Seeking

Getting help in this class would make me a better student.
Getting help in this class would make me a smarter student.
Getting help in this class would increase my ability to learn the material

Instrumental (Autonomous) Help-Seeking Goal

I would get help in this class to learn to solve problems and find answers by myself.
If I were to get help in this class it would be to better understand the general ideas or principles.
Getting help in this class would be a way for me to learn more about basic principles that I could use to solve problems or understand the material.

Expedient (Executive) Help-Seeking Goal

The purpose of asking somebody for help in this class would be to succeed without having to work as hard.
If I were to ask for help in this class it would be to quickly get the answers I needed.
Getting help in this class would be a way of avoiding doing some of the work.

Seeking Help from Formal Source (teachers)

If I were to seek help in this class it would be from the teacher.
If I were to seek help in this class I would ask the teacher.

Seeking Help from Informal Source (other students)

If I were to seek help in this class it would be from another student.
If I were to seek help in this class I would ask another student.

Perceived Teacher Support of Questioning

The instructor tells students to interrupt him/her whenever they have a question.
The instructor provides sufficient time for students to ask questions.
The instructor responds to questions by trying to answer them as carefully and thoroughly as he/she can.
The instructor generally feels good when students ask questions.
The instructor compliments students who ask questions.
The instructor believes that questions are important

Appendix B

Sample instructions that precede presentation of the regulation of motivation items

In this next section, we ask about what students do when they are **reading or studying** for their algebra course but then do not feel like working hard to finish or for some reason lose motivation for doing the work they need to get done. Students might feel this way for many different reasons. For example, they might get bored because the work is too easy or uninteresting, or they might get tired of working hard because the material is difficult to understand or seems unimportant. No matter what the reason, students can sometimes feel like they do not want to put a lot of effort into **reading or studying** for their algebra course, even when the work is not yet finished and they know they need to do more.

Read each statement below and circle a number from 1 to 7 to indicate how often you do what the item describes when you lose motivation while **reading or studying** for your algebra course.