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SELF-REGULATED LEARNING

FINDING A BALANCE BETWEEN LEARNING GOALS AND EGO-PROTECTIVE GOALS

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I. INTRODUCTION

In the traditional school setting, students tend to depend on their teachers for the acquisition of information. They expect their teachers to provide learning material, to motivate them, and to take responsibility for the learning process. It is accepted, even expected, that teachers should be largely in control of what is being learned, how it is learned, when it is learned, and to what extent. The generally accepted role pattern wherein teachers convey declarative and procedural knowledge and students must find a way to comprehend, store, and activate that knowledge leads to a situation in which students lack sufficient opportunity to organize and regulate their own learning. A question that should be raised is, "Are teachers well equipped to create conditions that will foster the development of effective self-regulatory skills?" To answer this question we need a clear definition of self-regulation and an understanding of how students and teachers interpret their complementary roles.

Zimmerman and Schunk (1989) defined self-regulated learning (SRL) as students' self-generated thoughts, feelings, and actions, which are systematically oriented toward attainment of their goals. This definition implies that for effective self-regulation to develop, students should be allowed to work in a context in which they can create their own learning episodes according to their own goals. Three constructs are central to this definition of self-regulated learning, namely, learning episodes, self-set learning goals, and goal processes. In the first section of this chapter, we define learning episodes and explain how natural learning episodes differ from teacher-set learning episodes. Self-set goals are compared and contrasted with teacher-set goals. In the second section, we demonstrate that self-regulation processes originate in the identification, interpretation, and appraisal of an opportunity to learn. The Model of Adaptable Learning is presented briefly and later extended to include two new constructs: chronic goals and intentionally induced goals. In the third and fourth sections, goal setting and goal striving are addressed as sequential stages in SRL. Finally, we argue that SRL is not a unitary construct, but refers to a system concept that integrates activity in different control systems.

II. WHAT TURNS A POTENTIAL LEARNING OPPORTUNITY INTO A SITUATION THAT THE STUDENT IDENTIFIES AS SUCH?

Drawing on Ford (1995), who assumes that virtually all human activity is organized in behavior episode form, Boekaerts (1996a) introduced the term "learning episode" and defined it as a situation in which a person is invited, coached, or coaxed to display context-specific, goal-directed learning behavior. If the learner accepts this invitation, his or her learning behavior unfolds over time until one of the following conditions is met: (1) the learning goal that organized the learning episode is attained, (2) the learning goal is attained only partially, but this state of affairs is accepted by the learner, (3) the learning goal is reappraised as unattainable, unattractive, or irrelevant, or (4) another goal takes precedence. In the context of the present discussion it is important to make a clear distinction between learning episodes that occur in a natural context and those that occur in the classroom. The former type of learning episodes differ from the latter on a number of grounds. First, natural learning episodes are often self-initiated or occur spontaneously. Second, they are cumulative, thus creating ongoing and unfolding learning experiences. Third, this type of learning is always socially situated. Fourth, it is driven by personal goals and therefore consequential in nature and affectively charged.

As many educational psychologists have pointed out, most learning initiated in traditional classrooms is neither cumulative nor goal directed

in the true sense of these words. In a traditional scholastic context, learning episodes tend to be fragmented, indirect experiences, steered by teacher-set goals. These deliberately and systematically planned learning experiences may or may not capture the students' interest, meaning that information provided during these episodes may or may not be used by students to activate prior knowledge and to steer the learning process.

There are a number of reasons why self-regulation may be harder to realize in a classroom context than in a natural context. First, most students consider it to be the teacher's role to provide relevant resources and to motivate them to engage in the learning activity. They also expect teachers to monitor their performance carefully and to provide relevant feedback. Such role beliefs are hard to change and inhibit the self-regulation process, mainly because most students do not have a clear conception of their own needs and aspirations concerning the acquisition of new knowledge and skills. They mostly do not feel an urgent need to acquire new knowledge and skills. What usually happens is that teachers must convince students that the opportunity they offer is a unique chance to acquire a valuable skill. Such teacher communications convey a triple message: first, that one should make an effort to acquire a new skill; second, that all other goals should be set aside in favor of this urgent teacher-set goal; and third, that such commitment will be rewarded with teacher regulation and support.

A. WHEN OPPORTUNITY AND FELT NECESSITY COINCIDE

When working with students, one can easily observe that most teacher-provided learning opportunities do not automatically create "felt necessity." Some students may not attach value to the new skill, whereas others may view the skill as valuable, yet do not feel like practicing it on command. Our line of argument is that although most teachers may think that they provide plenty of opportunities for self-regulated learning to develop, in reality the opportunities they create do not guarantee that effective self-regulation will develop. Optimal conditions for the development of self-regulated learning exist when students are given the chance to establish and pursue personal, nontrivial goals. The point being made is that providing opportunity is different from seeking opportunity. For example, accepting the teacher's statement that learning to write in cursive script is a necessary skill is not the same as feeling the need to acquire that skill. Consider the following example as an illustration of natural learning episodes.

When Elaine was two years old, her baby sister, Mia, was born. Elaine went to the hospital with her grandmother and immediately sensed that there was a new rival. As she grew older, Elaine took great pride outsmarting her baby sister. She deliberately used her reading and writing skills to

communicate messages to parents, grandparents, and visitors, realizing all too well that Mia could not share the experience. When Mia was 5 years old, she also started reading words and phrases. Elaine did not like this new development. One day she asked her grandmother whether she could have her birthday present a few months in advance. She explained that she wanted a book that would teach her to write in cursive script. The reason why she wanted such a book was that she assumed that it would take Mia quite a while to learn to read and write printed letters, and in the meantime she could still outsmart her by using a code that Mia would not be able to understand. Elaine designed her own way to acquire the skill of writing in cursive script. She asked older children or relatives to rewrite texts or letters she had printed herself, using the cursive letters as models for her practice sessions. She also found a way to monitor her progress. Whenever she finished copying a text, she asked somebody to read out loud what she had written and used her printed version of the text to check whether she had correctly copied the cursive letters.

These observations illustrate that very young children may set personal goals and design their own learning episodes in accordance with these goals. This example also shows that children are able to represent an immediate or urgent need mentally and link it to their higher-order goals and to specific scripts that they have available in their repertoire (see also Carver & Scheier, 2000, this volume). Elaine used her knowledge of developmental differences in various domains to make a mental representation of her higher-order goal ("I want to outsmart my baby sister") and to transform this abstract goal into various action plans. Using her knowledge about the reading and writing acquisition process, she established a specific short-term goal: "I want to communicate a written message without Mia being able to read it." Elaine realized that such a learning goal called for action. She therefore asked her grandmother to buy her a book. She also designed learning episodes herself. These episodes included copying texts, as well as asking parents, grandparents, and older children to provide feedback on her progress. It is evident that Elaine's behavior was driven by a personal goal. Her learning episodes were self-initiated and she designed them in accordance with her own wishes, expectations, and needs. Moreover, the learning episodes she planned built successively upon one another, making her learning cumulative and making the knowledge and skills she acquired available for use. This example also draws attention to the essential difference between motivational and cognitive accounts of goal-directed behavior. Indeed, Elaine was able to set her own learning targets in accordance with her needs and wishes, developing clear expectancies about the positive and negative consequences of her actions and about the effort required. She also realized that she needed some

standard to guide and evaluate her own and other people's performance: "Grandma, Mia can do it if she really tries hard, but then you have to hold the paper upright and not put it on the table."

This example illustrates that powerful environments for the development of SRL arise when opportunity and felt necessity coincide. When individuals feel a need to extend or adapt their existing scripts, while at the same time perceiving an opportunity to acquire those scripts, they will feel inspired to seek or create learning opportunities based on their own wishes, needs, and expectations. We assume that knowledge and skills acquired in this manner will become an integral part of the network of goals that steer and direct an individual's behavior. An interesting question to raise in the present context is, "Where do personal goals come from?"

B. GOALS VIEWED AS KNOWLEDGE STRUCTURES THAT GUIDE BEHAVIOR

Currently, most theoretical accounts cast goals as concrete anchor points for directing our actions in fulfillment of our needs. Goals are viewed as guiding principles that people consciously and intentionally set to effectively steer their behavior (Austin & Vancouver, 1996). Many authors view the self as a key component in understanding an individual's goal setting and goal striving. Some researchers use the terms "ideal self" or "possible self" when talking about a person's aspirations and strivings. For example, Higgins (1987) contrasted the actual self to the "ideal self" (a presentation of the attributes that a person would like to possess) and the "ought self" (the attributes that a person thinks he or she should possess). Markus and Nurius (1986) contrasted the self that is currently on-line in information processing to "possible selves." Possible selves, ought selves, and ideal selves are viewed by these authors as self-directive standards, goals, or acquired self-guides.

Powers (1973) used the goal construct in a slightly different sense. He described the self as a coherent structure of principles or higher-order goals and proposed a goal hierarchy in which goals are described at several levels of abstraction. Powers's "principle control" is akin to Markus and Nurius' "possible selves," Higgins's "ideal self," and Carver & Scheier's (2000) "be goals." The principles specified in Powers's higher-order goals provide the lower-level goals with a reference value, because they specify the quality of the acts that a person wishes to perform. These higher-order goals are connected to action programs that specify *how* the acts should be performed. When the course of action is adapted to a local context, the term "script" is used. Examples of goal hierarchies are given later in this chapter.

Most theorists assume that goals are not equivalent in their relevance to a person. The higher a goal is situated in the hierarchy, the more it contributes to the person's sense of self, yet the more abstract it is (see Carver & Scheier, 2000). Also, goals that are connected to multiple higher-order goals tend to be more highly valued. Several authors (Austin & Vancouver, 1996; Vallacher & Wegner, 1987) have argued that movement in the hierarchy can be top-down or bottom-up. *Top-down movement* means that subgoals have been derived from higher-order goals, implying that action programs and scripts have been consciously and intentionally chosen. *Bottom-up movement* refers to goal processes that reflect the individual's motivation to do something because the environmental conditions are just right or to refrain from doing things because environmental conditions pose an impediment.

Kruglanski (1996) proposed that goals should be viewed as knowledge structures that apply to desirable and undesirable future end states. His conceptualization of goals enables us to borrow the general principles that have been well documented in other areas of psychology, particularly cognitive psychology and text processing (e.g., Wilson & Anderson, 1986), and apply them to the study of goal processes (examples of such processes are preattentional processes, knowledge acquisition processes, knowledge accessibility). Although the exact nature of goal processes is still open to debate, recent research suggests many similarities between goal processing and text processing. For example, Locke and Latham (1990) pointed out that some goals are conscious, whereas others are unconscious; some are internal, whereas others are external to the individual. However, each goal represents a specific content that differentiates it from other goals. Goals must be activated to have an impact on actions. Bargh's (1990) position is that goal activation can be automatic or deliberate and Bargh and Barndollar (1996) demonstrated that some goals may be activated or triggered directly by environmental cues, outside the awareness of the individual. They used the term"auto-motives" to refer to these preattentional goal processes and suggested that a goal may become preconsciously activated, provided it has been encoded in a highly accessible knowledge structure.

Following this line of reasoning, it could be argued that goals are interconnected knowledge structures that differ with respect to their accessibility. Some of these knowledge structures have been "automatized" through being set often and regularly as part of a frequently and consistently repeated action pattern. As a consequence, these knowledge structures become chronic goals, in the sense that they can be discharged readily when a student attends to a specific perceptual category. Bargh and his colleagues proposed that such chronically triggered goals should be distinguished from goals that are intentionally constructed. We will come back to this issue after we have discussed identification, interpretation, and appraisal processes.

III. SELF-REGULATED LEARNING ORIGINATES IN THE IDENTIFICATION, INTERPRETATION, AND APPRAISAL OF AN OPPORTUNITY TO LEARN

An issue that has received little attention in the educational literature is that students may pursue many goals simultaneously and that these goals may be either in harmony or in disharmony (see Wenzel, 1994, for an exception). We already have pointed out that not all teacher-set goals are equivalent in their relevance to the students. A related yet distinct point is that learning goals communicated by the teacher may not tap affectively charged themes. Even worse, these goals may activate negative scenarios that direct the students' attention away from the learning goal (avoidance goals).

Our argument is not that students are unwilling to adopt teacher-set goals and practice strategies that the teacher deems important. Fortunately, many students do adopt teacher-set goals and carry out the required action plans. Rather, our argument is that most goals that students pursue in the context of the classroom are not intentionally constructed on the basis of personal strivings or aspirations to comprehend the dynamics of unfolding learning episodes in the context of the classroom and to understand individual differences in the perception, interpretation, and appraisal of those episodes, consider the following example:

Lia, Bob, and Tim are seventh graders in the same mathematics class. Both Lia and Bob do fairly well in math, whereas Tim's performance usually falls slightly below average. Pat, the mathematics teacher, views both Lia and Bob as active and enthusiastic students. However, she perceives some qualitative differences in the way they approach school tasks. Lia seems to be more concerned with understanding what she is doing, whereas Bob is more interested in getting the job done—and the sooner the better. He likes to show off in front of the class and often makes public announcements about how fast he can do the assignments. Yet, he is very sensitive to social comparisons and fears making mistakes in public. When he does make a mistake, he quickly finds an excuse or makes a funny remark to draw the others' attention away from his mistake. By contrast, Lia is often so focused on a specific problem that she forgets to participate in routine classroom activities. Also, she does her work so meticulously that she often cannot finish it in time and has to take it home. Tim differs from both these students: he cares less about mathematics and is very quiet in the classroom, mostly minding his own business. The teacher has noted that he is very insecure and always in doubt about whether he will or will not be able to complete a task. She knows that whenever Tim feels emotionally threatened, he either withdraws mentally or reacts with suppressed aggression. Despite Tim's low interest in mathematics and his mindless attitude toward school tasks in general, the math

teacher thinks that he has the capacity to do well in mathematics: he lacks only the self-confidence and social support to realize his full potential.

Pat is a very friendly and supportive person who wants to create optimal learning opportunities for her students. Last week, she attended an in-service training program and learned that surprise quizzes are a good tool to keep students alert and make them do their homework. Yesterday, she announced her first surprise quiz: she asked her students to finish their exercises, put their gear in their bags and get ready for the quiz. An increase in the noise level informed her that her students were upset. Some students told her that it is not fair to evaluate students' performance without prior warning. Pat quickly declared that it was not her intention to grade their performance on the quiz, but that she simply wanted to gain more insight into their progress. However, this modifying statement did not decrease the noise level in the classroom.

Let us take a closer look at the way Tim, Bob, and Lia define desirable and undesirable end states that may serve as concrete anchor points for directing their attention and actions. Tim did not pay any attention to the teacher's qualifying statement. The announcement of the quiz, the fact that they had to clear their tables, and the loud complaints from his fellow learners convinced him that this was a test situation. He felt out of control because he had not prepared for the exam. He also felt depressed. When the teacher noticed his passivity, she asked what was the matter. He started complaining that he had a headache and that he could not concentrate on the task. In contrast, both Lia and Bob clearly heard that the teacher had qualified the nature of the assessment episode. This information made Bob focus on the positive consequences of the quiz: He felt confident that he could solve the problems that would be given. The fact that there would be no grading encouraged him to take more risks to show the teacher and his classmates that he is very fast and competent in mathematics. Lia simply welcomed the quiz, viewing it as an opportunity to get feedback on her progress in solving algebraic equations.

We trust that it has become clear that every learning opportunity is unique. A task or an invitation to solve a problem or learn a new skill is always situated in a specific content circle, but also in a wider social context. Perceptions of the content of a task, as well as of contextual factors, will affect a student's reaction to a learning situation. However, the manner in which the same learning situation is interpreted varies across different students, leading to different action patterns.

A. IDENTIFICATION OF A LEARNING SITUATION

It is important to realize that the objective meaning of a (surprise) quiz differs from the subjective meaning that Bob, Tim, and Lia assigned to it. Students' situational construals are not restricted to the perception of the

situation as such (i.e., data-driven or bottom-up processing). As many authors have pointed out (e.g., Bargh & Gollwitzer, 1994; Higgins, 1990), the assignment of subjective meaning involves integration of current informational input with relevant prior knowledge. Much of the significance of events, situations, and other social objects derives from how individuals categorize them. Identification refers to the recognition of an input as an instance of a class of situations, such as an instance of the class of achievement situations, stressful situations, or socially unacceptable situations.

We view the identification process as akin to pattern or template recognition (Neuman, 1984) in the sense that it proceeds smoothly and without much conscious attention. In various areas of psychology evidence is accumulating that implicates precoded information in such categorization processes (Bargh & Gollwitzer, 1994). Drawing on Fodor (1985) and Zajonc (1980), Boekaerts (1987) argued that emotions elicited in a learning context could be conceptualized as the outcome of a primitive data-driven computational unit. This unit detects stimulus features in the input that have been labeled threatening or aversive in the past. Once such a computational unit has been established, it acts as a sentry, watching out for danger signals. If such signals are detected in the input (i.e., a threshold is exceeded), an alarm bell rings (increased level of arousal) and prepares the individual for action.

For example, when the quiz was announced, all students recognized the stimulus configuration immediately as an instance of a previously established class of events, namely, as a test situation. The salient features of such a situation are that it is highly structured, requires students to demonstrate their knowledge and skills, to abide by the rules, and to suffer negative consequences if their performance is below standard. It is assumed that detection of the perceptual knowledge category "test situation" triggers particular behavioral patterns or scripts in all students: They are supposed to work fast, quietly, and independently, and are not supposed to look at each other's work. However, the identification of a learning situation always occurs in a wider context, and aspects of that context will contribute to accurate assessement of the situation. Recall that the teacher provided extra information at the beginning of the classroom episode, and that this additional information should have turned the test situation into a natural assessment situation without personal consequences. Yet, not all students paid close attention to the teacher's remarks, leading to an incorrect identification of the learning situation. What underlies such biased perception? Individual differences in knowledge about the essential features or inherent properties of a situation, as well as the students' past learning history may give rise to biased situation construals. In turn, these construals affect students' attention to salient contextual properties and

restrict the number of action paths that are available, accessible, and perceived as applicable.

Several researchers have pointed to salient properties or dimensions of an individual's situation construal (e.g., Forgas, 1982; Frijda, 1986; Zajonc, 1980). Forgas (1982) showed that social episodes are perceived and cognitively represented in terms of a limited number of connotative attribute dimensions. He found (Forgas, 1985) that individuals interpret social situations in terms of three basic dimensions: intensity of the situation (serious vs. fun situations), interest in the situation (pleasantness), and the social anxiety elicited by the situation (self-confidence). The relative weight that individuals gave to these three relatively independent dimensions was related to the level of their social skills. Forgas reported that social anxiety dominated the episode representation of those who had low social skills. These individuals paid little attention to the potential interestingness of the social episode. Individuals with high social skills paid far more attention to the intensity and interest dimensions and far less to the social anxiety dimension.

In our judgment, learning episodes also can be perceived and cognitively represented in terms of a limited number of connotative attribute dimensions. All of the students in Pat's class view exams as strictly structured situations whose form and implementation lie largely or entirely outside their personal control. However, there are clear individual differences in how students might identify a particular quiz (Trope, 1986), that are rooted in differences in self-regulatory focus and, hence, have implications for the course of subsequent action. We could speculate, then, that Tim failed to take account of the contextual information because his data-driven computational units triggered a generalized response pattern: He felt emotionally threatened and anxious, which made him want to withdraw from the situation. It is highly likely that Tim's identification process activated negative scenarios (Bandura, 1993) that made him anticipate a negative course of action with concomitant negative cognitions and feelings. Higgins and his colleagues proposed that the secondary phase of situation construal should be partioned conceptually into two tightly interwoven processes, namely, the interpretation process and the appraisal process.

B. INTERPRETATION AND APPRAISAL

Higgins, Strauman, and Klein (1986) argued that interpretation and appraisal of an event are distinct from mere identification in that these processes are often, if not always, related to some kind of internal standard, point of reference, ideal self, or ought self. Higgins (1990) stated that during the interpretation process, personal meaning is assigned to an

event. The individual draws inferences about the implications of an event in terms of desirable or undesirable outcomes. Higgins viewed the appraisal process as inherently evaluative: Individuals estimate the personal significance of a situation, thus bringing their hopes, needs, expectations, obligations, and fears to bear on the situation. Other authors have referred to the postidentification process with terms such as "interpretations" (Schachter & Singer, 1962), "meaning analysis" (Mandler, 1984), and "appraisals" (Frijda, 1986). Frijda (1988) argued that events appraised in terms of their meanings are "the emotional piano player's finger strokes; available modes of action readiness are the keys that are tapped; changes in action readiness are the tones brought forth" (p. 351). He also suggested that such situational meaning structures are unique and emotion-specific.

In a similar vein, Lazarus and Smith (1988) referred to processes of evaluating particular relational harms or benefits with the term "appraisals," viewing them as mediators between a situation and subsequent actions. They emphasized that appraisals should be distinguished from the knowledge structures on which they are based. Lazarus and Folkman (1984) described appraisals at two levels: primary and secondary. Primary appraisal concerns the questions, "What is this situation about? Is it benign, neutral, or threatening for my well being?" Secondary appraisal deals with the question, "What is required to deal with the situation and can I handle it under the present conditions?" Following Lazarus and Folkman's theorizing, Boekaerts (1992) assumed that students continuously judge whether a learning situation is benign, neutral, or threatening for their well-being. She defined appraisals as nonstop evaluation processes that result in emotions/action readiness of upcoming and ongoing learning activities. A central role was assigned to these appraisals in her Model of Adaptable Learning. This model was developed in the last decade in an attempt to integrate and extend the fragmented research and theory in the domains of learning, motivation, anxiety, coping with stress, and action control (Boekaerts, 1992, 1996a). In the next section we provide an overview of this model, and thereafter we further discuss and extend it in light of our present discussion, thus representing identification, interpretation, and control processes explicitly in the model.

C. THE MODEL OF ADAPTABLE LEARNING: FINDING A BALANCE BETWEEN PARALLEL GOALS

The Model of Adaptable Learning is a holistic framework that allows us to explore the interaction between intertwined aspects of SRL. Over the years, a number of interrelated processes have been differentiated, including metacognitive control, motivation control, emotion control, and action control. This analytical decomposition of self-regulated learning into dif-

ferent forms of control made it possible to focus on a particular aspect of self-regulation, while keeping the "one reality perspective" manageable.

An important assumption of the model is that individuals inherently self-regulate their behavior in terms of two basic priorities. On the one hand, they want to extend their knowledge and skills so that they can expand their personal resources. On the other hand, they wish to maintain their available resources and to prevent loss, damage and distortions of well-being. It is further assumed that the information processing modes that underlie these two basic priorities coexist, but may fight for dominance in the individual's goal hierarchy. In the original model, a central role was given to the appraisal construct. It was theorized that each learning situation triggers a network of highly specific connotations, because it impinges on a learner's personal strivings and vulnerabilities. This is represented by links between the appraisal process and the contents of a dynamic internal working model (WM), which is constantly fed information from three main sources (cf. Figure 1). The first source of information is the perception of the learning situation, including the task, the instructions given by the teacher, and the physical and social context (component 1). The second source of information concerns activated domain-specific knowledge and skills, including declarative and procedural knowledge, cognitive strategies that have been successful in that domain, and metacognitive knowledge relevant to the learning situation (component 2). The third source refers to aspects of the students' self-system, including their goal hierarchy (ideal and ought selves), values, and motivational beliefs pertaining to the domain that is activated by the situation (component 3).

Although several other models also emphasize that students' expectancies and their goal setting is influenced jointly by situation variables and person variables (e.g., Rheinberg, Vollmeyer, & Rollett, 2000, this volume), the Model of Adaptable Learning differs from this and similar models on many grounds. An important difference that concerns us here is that the Model of Adaptable Learning explicitly differentiates between two types of person variables, namely, those that reflect the individual's metacognition and interact with the content of the task (component 2) and those that reflect the individual's self and motivational beliefs (component 3) (see Boekaerts, 1996a, for a more detailed account). As we explain shortly, this distinction allows us to separate two types of interpretation processes and distinguish between different types of higher-order control processes, including metacognitive control and motivational control.

A student's appraisal of a particular learning situation is considered to be unique because the information stemming from the three sources differs for every learning opportunity, thus eliciting specific experiential states (positive and negative affects) and specific behavioral intentions. In the original model it was assumed that the students' unique appraisals steer and direct their behavior in the classroom, including their goal setting (learning or coping intentions) and their goal striving (activity in

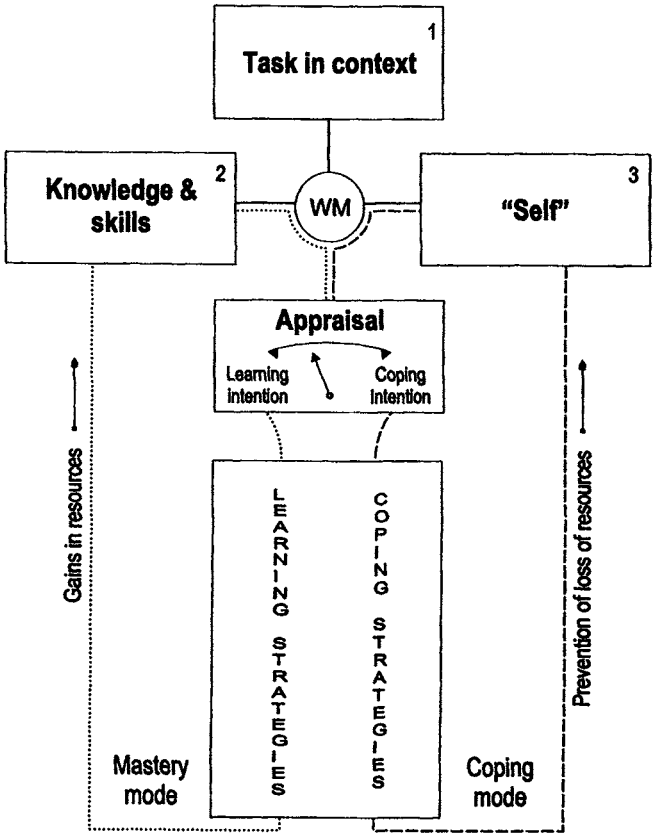

FIGURE 1 The original model of adaptable learning. From "Coping with stress in childhood and adolescence." In M. Zeidner & N. S. Endler (Eds.), *Handbook of Coping. Theories, Research, Application* (pp. 452–484). New York: Wiley. Copyright 1996 by John Wiley & Sons, Inc. Reprinted with permission.

the mastery mode or the well-being mode). Boekaerts and her colleagues hypothesized that positive appraisals are evoked when the information in the dynamic working model is primarily positive, either because relevant scripts are available (domain-specific input from component 2) or because the activity that has to be performed is inherently linked to personally relevant goals and personal gains (input from component 3). By contrast, it was hypothesized that negative appraisals arise when no relevant scripts can be located (input from component 2) or when the learner is not inclined to invest energy in the task (input from component 3).

Empirical work based on the model, featuring children in different age groups doing tasks in different subject-matter areas, has revealed that the joint effect of positive and negative task judgments influences the students' intention to learn (formation of a learning goal) and their experiential state (cf. Boekaerts, 1999; Boekaerts, Seegers, & Vermeer, 1995). More

specifically, task attraction is a crucial aspect of a student's situation construal. It is directly influenced by activated positive and negative scenarios (measured at the middle level; goal orientation, achievement motivation, fear of failure), by value-related perceptions of the situation at hand (e.g., its relevance and importance), and by perceived subjective competence (which includes perception of difficulty, success expectation, and self-efficacy). A negative emotional state (feeling anxious, tense, and not happy) during the formation of a learning intention was influenced directly by unfavorable appraisals (low task attraction, low perceived relevance, and low subjective competence).

The Model of Adaptable Learning further assumes that predominantly positive appraisals steer and direct students' attention and energy to adaptive payoffs (increase in competence and other resources; left pathway in Figure 1), whereas largely negative appraisals urge students to protect their ego or restore their well-being (prevention of loss of resources; right pathway in Figure 1). These two parallel processing modes are referred to as (1) the mastery or learning mode and (2) the coping or well-being mode. Pioneering work in relation to these two processing modes was carried out by Diener and Dweck (1978). In a series of studies, they examined children's reactions to failure in academic settings that followed a successful performance. Based on their prior work on learned helplessness, Dweck and her colleagues classified these subjects into two groups: a group that was likely to adopt a pattern of engagement that reflects helplessness and another group that tended to exhibit mastery behavior. Interestingly, these children, who shared the same ability level, did not show any differences in strategy use or reported interest when they experienced success. However, after the children had been through a failure experience, two clearly different behavioral patterns emerged. The helpless group began to express negative emotions and engaged in task-irrelevant verbalizations. They also began to attribute their failure to lack of competence and insufficient skills, and tried to compensate the noted failure by speaking about their abilities in other domains. In contrast, the mastery group demonstrated more enthusiasm when facing obstacles and new challenges set by difficult tasks: They became more involved with the procedure and increased their effort expenditure. In addition to more careful planning and monitoring, students who belonged to the mastery group engaged in intense motivation control and maintained their positive attitude toward the performance situation despite the failure context.

These striking differences only occurred after failure and this finding neatly illustrate the situationally sensitive nature of children's reactions. In the present context, we go one step further and argue that children may generalize either one of these engagement patterns to all situations they have come to define as functionally equivalent. In addition to our own studies (Boekaerts, Seegers, & Vermeer, 1995; Niemivirta, 1998, 1999), a

substantial body of experimental and correlational evidence supports this assumption (see Jagacinski, 1992; Pintrich, Marx, & Boyle, 1993; Kuhl & Beckmann, 1994).

It is important to note that in the original model of adaptable learning, the distinction between the two fundamentally different types of processing modes was largely categorical. It was argued that the action patterns that students display when in one of the two processing modes may differ. However, it was not made clear why students' action patterns take on different forms. Current conceptualizations of identification and interpretation processes allow us to connect students' perceptions of situational constraints and the availability and accessibility of personal resources to their self-regulatory focus. In light of these conceptualizations, the model has been extended to include the strength of the associations between an action plan (learning or coping strategies) and (1) knowledge associated with a given perceptual category (identification process), (2) knowledge structures in component 2 (interpretation process based on activated domain-specific knowledge and skills), and (3) knowledge structures in component 3 (interpretation process based on motivational beliefs). In the next two sections we focus on the hypothetical relationships between, on the one hand, the origins of the goal processes (identification, interpretation, and appraisal processes) and, on the other, goal setting and goal striving.

IV. GOAL SETTING: AN ESSENTIAL ASPECT OF SELF-REGULATED LEARNING

It is clear, that the same learning situation may be interpreted differently by different students and that this may lead to diverse action patterns. As several authors have argued, there are various ways (means) leading to the attainment of a goal. However, not all students perceive a choice among alternative action paths. We have hinted that those who do may have an advantage over those who do not by initiating a self-directed learning episode. It is evident from the work of motivation researchers such as Deci and Ryan (1985) and Ford (1995) that goal setting, choice of goals, and goal striving are essential aspects of goal-directed behavior, because these constructs link goals to action plans. As early as the 1940s, Lewin, Dembo, Festinger, and Sears (1944) made a distinction between goal setting and goal striving. Later, Kuhl (1984) described the process of making decisions about which goals to adopt as "motivation" and used the term "volition" to refer to the phase where the choice has been made and the individual initiates and executes the actions that lead to goal attainment. A model that deals explicitly with choice and personal preferences is the Action Phase Model (Heckhausen & Gollwitzer, 1987; Gollwitzer,

1990). It goes beyond the conceptual distinction of goal setting and goal striving, providing a coherent framework for bridging the gap between motivation and volition. Four phases are distinguished, namely, the predecisional, preactional, actional, and postactional phases. These phases are separated by particular transition points, namely, making a decision, initiating the action, and perceiving the action outcomes.

During the predecisional or motivational phase, individuals translate their needs, expectations, and wishes into intentions. They weigh the feasibility and desirability (Heckhausen & Gollwitzer, 1987), in other words, the outcome expectancy and outcome-consequence expectancy of alternative goals, using their own criteria (see also Winne, 1997; Winne & Perry, 2000, this volume). They make a choice among alternative goals, which leads to a goal intention. This choice represents a leap from a state of uncertainty about the goal to a commitment to a desired end state (cf. Gollwitzer, 1990).

Although several researchers (e.g., Smith & Lazarus, 1993) have described the predecisional phase as one where individuals deliberately scan alternatives, Kruglanski (1996) has argued convincingly that out-of-consciousness factors also may affect goal formation. He pointed out that need for closure may affect the extent of information processing in forming a goal, although it may not figure officially as a reason for a person's choice among alternatives. Our point is that the predecisional stage necessitates some degree of open mindedness and heightened receptivity to incoming information (data-driven processing), lest subjectively relevant information be activated from memory that biases accurate perception, information processing, and goal setting. As we have argued previously, not all students attend automatically to relevant clues. Gollwitzer and his colleagues (e.g., Bargh & Gollwitzer, 1994; Gollwitzer, 1996; Gollwitzer, Heckhausen, & Ratajczak, 1990) demonstrated in a series of studies that goal congruent information becomes readily accessible and is processed effectively when individuals are striving for desirable goals. A lot less is known about situations where goals remain implicit or where externally set goals are in conflict with personal strivings and vulnerabilities.

In our opinion, the Model of Action Phases seems to be most applicable to situations that allow several alternative routes to goal attainment, thus dealing with choice and personal preferences. We are not so sure that the model works equally well in situations where habitual engagement and/or externally set goals are prominent. For example, in the test situation that Lia, Bob, and Tim encountered, limited goal choice is offered. The task is assigned by the teacher, thus providing both an externally set goal and a framework for action. In other words, the students' alternatives are limited. They have to concentrate on the set task, deciding whether they are going to engage seriously (mindfully) in the quiz or not.

Let us return to the Model of Adaptable Learning. As already explained, this model gives a central position to appraisals. Appraisal processes are considered to be based on activated domain-specific knowledge and skills, including knowledge about how things work in general, and in the present context in particular (component 2), and beliefs about the self, including a student's goal hierarchies and the consequences of specific actions in the present context (component 3). Boekaerts (1992, 1996a, 1996b) took the position that students' appraisals of a learning situation affect their goal setting (learning or coping intention) and goal striving (learning and coping strategies) in important ways. As can be seen in Figures 2 and 3, our present approach is slightly different. Two generalized action patterns (a, b and a', b') originate in component 1 and map automatically onto specific emotions (component 4) and modes of action readiness (component 7). Please note that these generalized action patterns bypass secondary appraisal (component 5) and goal setting (component 6). These fast processing, or "curtailed," goal paths will be discussed next. In Figure 3, several control processes are depicted. These slower processing paths draw heavily on interpretation processes and secondary appraisal, and pass through the goal setting and goal striving components.

A. CURTAILED GOAL PATHS

We have explained already that goals may become preconsciously activated, provided they have been encoded in a highly accessible knowledge structure. We speculate further that interactive episodic confrontations with specific learning situations in the past, for example with testlike situations, may result in data-driven computational units, capable of triggering a generalized response pattern. Bargh and Gollwitzer (1994) state, "It is assumed that the habitual serving of a goal within a given situation not only connects the goal with the situation but also those goal-directed behaviors that have been effective in satisfying the goal in the past" (p. 78). Such direct links are depicted in Figure 2 as connections between components 1 and 4 (identification process; paths a and b), leading to component 7 and feeding back to components 2 and 3 (generalized action pattern; paths a' and b'). Tim's identification of the quiz as a member of the class of threatening situations produced arousal that was labeled negatively, thus activating a network of knowledge structures that represents his preconceptions and vulnerabilities (situational meaning structure represented by component 4). Tim curtails the goal setting phase because he relies predominantly on a fast estimate of the personal significance of the learning episode in terms of well-being without considering mindfully what is required to deal with the situation and whether or not he can handle it under the present conditions. His primary appraisal maps onto goal striving, which is oriented to restore well-being. More specifically, Tim uses

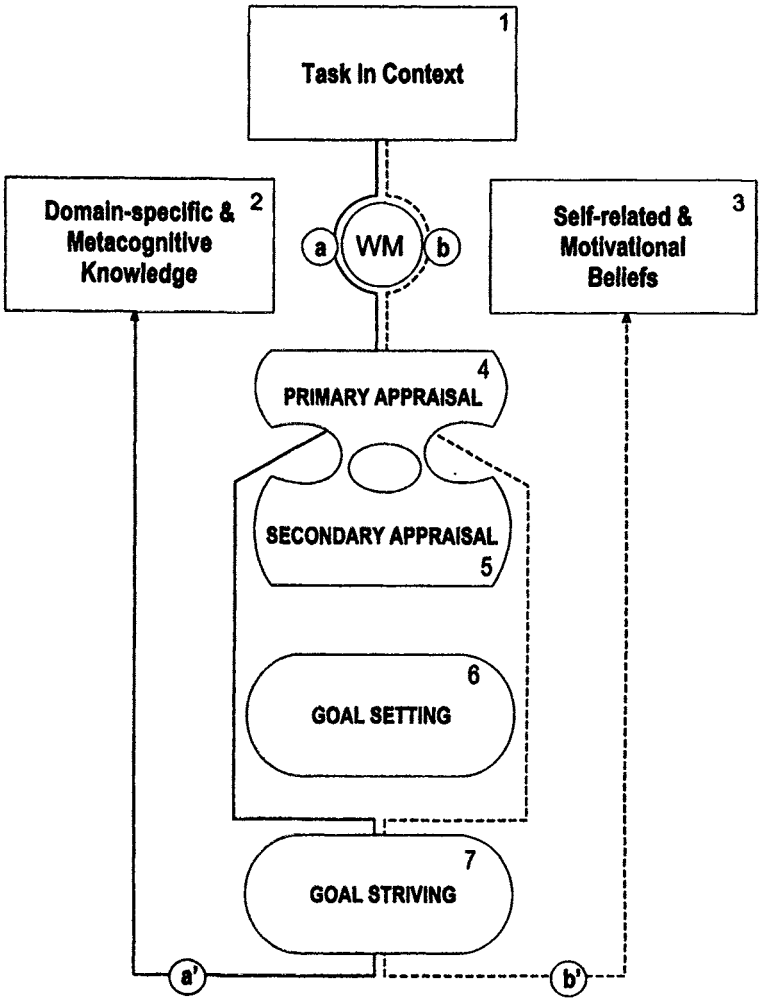

FIGURE 2 Illustration of pathways a and b, which represent behavior induced by situational identification (chronic goals). Please note that the origins of these goal processes are in box 1, leading to primary appraisal.

mental withdrawal or suppressed aggression (b') to control his own actions and bring them in line with his self-related and motivational beliefs (component 3). It is important to note that the other fast processing path, labeled a', feeds back to component 2. Activity in this fast path may be initiated, for example, when a teacher-set task triggers knowledge structures that are congruent with the students' learning goal and other available resources.

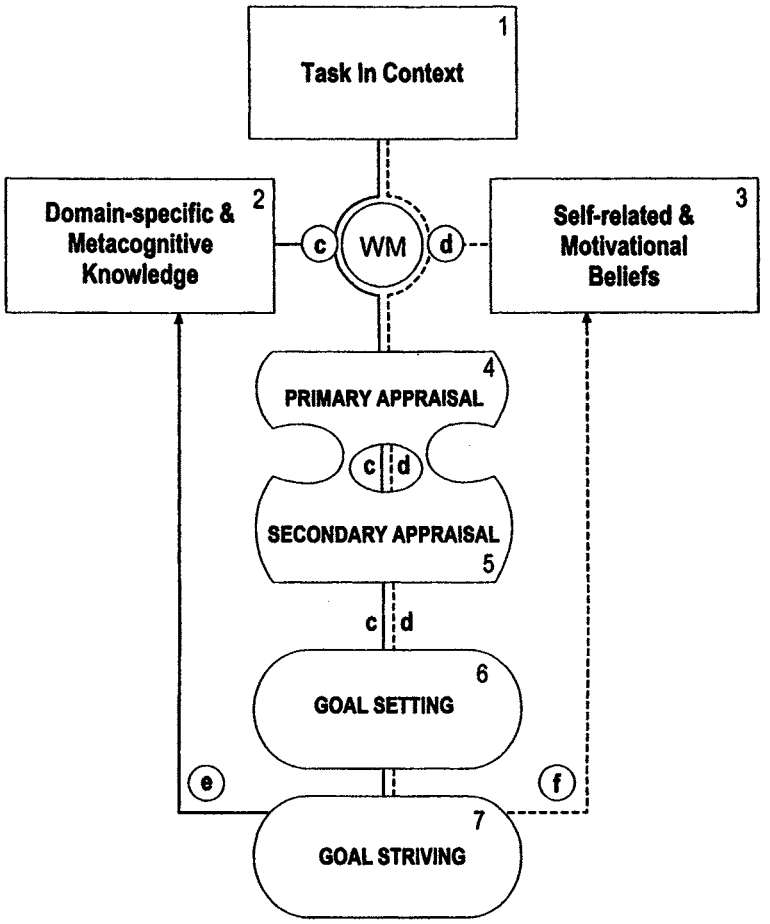

FIGURE 3 Illustration of pathways c, d, e, and f, which represent behavior induced by interpretation processes (intentionally induced goals). Please note that the origins of these goal processes are in boxes 1, 2, and 3, leading to secondary appraisal, goal setting, and goal striving. Goal setting is based on c, task-focused interpretation, and d, self-focused interpretation. Goal striving can move in two directions: e, problem-focused actions to continue or discontinue ongoing behavior to achieve gains (positive goals); f, emotion-focused actions to continue or discontinue ongoing behavior to prevent losses (negative goals).

As already described, some classroom behaviors may be initiated "mindlessly" by the environmental cues or situational features. Even though such habitual or automatic processes play an important role in students' goal-directed activities, most learning situations require conscious control and deliberation. For a student to engage in action effectively, he or she must not have only an idea of what is needed to attain a goal, but also

believe that he or she has access to the means needed and that the goal can be attained under the current conditions (see Skinner, 1995; Chapman, Skinner, and Baltes, 1990). The impact of such representations on further action is discussed next. At this point, we want to emphasize the crucial role of task-focused and self-focused interpretation processes in SRL.

B. GOAL SETTING BASED ON TASK-FOCUSED AND SELF-FOCUSED INTERPRETATION

Interpretation processes feed and influence upcoming and ongoing appraisal processes, thus affecting goal setting as well as goal striving. We differentiate between task-focused and self-focused interpretation. The former refers to the process of assigning meaning to a task (activity, situation, event) based on one's mental representation of the inherent properties of the task and one's metacognitive knowledge about it (component 2). Self-focused interpretation refers to the activation of one's current goals, ideal selves, and ought selves, and using this information to make a mental representation of the perceived valence, relevance, congruence, and control of a task and its context (component 3). We focus, first, on the effect of interpretation processes on goal setting, turning to goal striving in the next section.

Unlike Tim, who is inclined to identify test situations as "problematic" and approach them in a generic way, Bob and Lia's behavior is more situationally and momentarily dynamic. Their goal setting is represented in Figure 3 by several pathways, connecting components 1, 2, and 3 to primary appraisal (component 4), and then further to secondary appraisal (component 5). It is noteworthy that even though both Lia's and Bob's major goal is to do well, they use different interpretative frameworks to assign meaning to the quiz situation: Their goal structures are similar in some respects and different in others. For example, they share the higher-order goal "I want to do well at school." Lia wants to acquire understanding (action program) by using scripts, such as using elaborate strategies and asking the teacher for feedback. In contrast, Bob wants to perform well in tests (action program) by using scripts, such as avoiding help and be the first to hand in the test.

Tim's goal hierarchy, which is totally different, shows that goals can be treated as organizing structures of students' behavior. Knowledge of a student's goals can indeed help us understand how they perceive and approach a quiz (see Figure 4). However, goals are but one component in a student's situation construal. At this point, we want to add a layer of complexity and illustrate that the outcome of a student's interpretation process influences goal setting to a considerable extent. Recall that Lia is often so focused on a specific problem that she forgets to participate in routine classroom activities. She likes mathematics and does her work

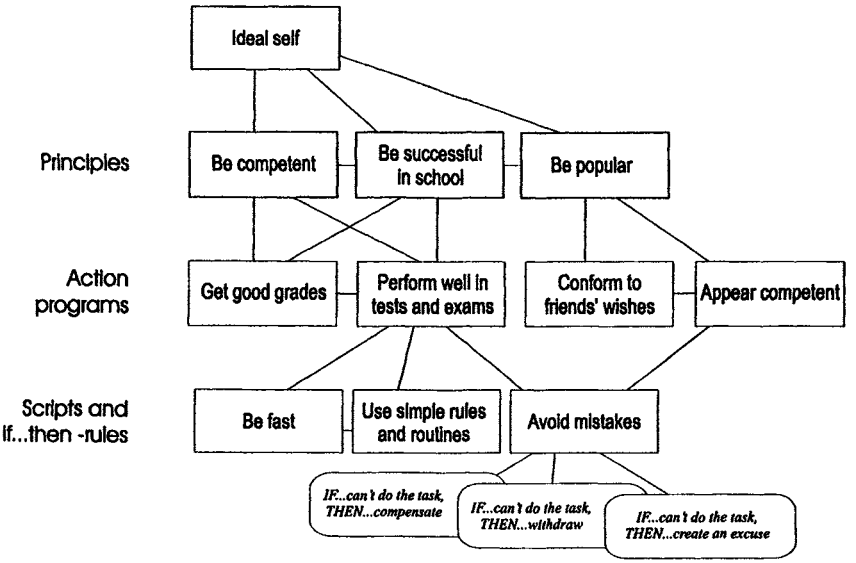

FIGURE 4 Bob's goal structure.

meticulously, often losing track of time. When faced with a mathematics problem, she usually is aware of the availability and accessibility of domain-specific knowledge and relevant scripts, and she also has a clear idea of the strategies that will and will not be effective (means–ends beliefs; metacognitive knowledge in component 2). She feels confident that she will know what to do and will not lose confidence in her problem-solving capacity (agency beliefs in component 3), even when faced with a difficult problem or with an interruption of her plan. Her usual approach is to orient herself to the problem mindfully, breaking it into parts and searching for available scripts. We have represented these content-based control processes in Figure 3 by a path that connects component 2 (domain-specific knowledge and metacognition) to secondary appraisal (component 5). Our position is that Lia's self-regulation process in the goal setting stage is primarily governed by task-focused interpretation (path c), which we consider to be an aspect of metacognitive control.

Let us now focus on Bob's interpretative framework in the goal setting stage. Two interesting aspects of his interpretation process need to be mentioned: First, teacher-set goals are not always congruent for him. Second, he explicitly judges his personal resources to do a task before he commits himself. Bob's self-regulation seems to originate in self-focused interpretation processes (path d). In relation to this particular learning episode, he perceives the goal as desirable, even though his feasibility judgment is biased by the possibility of failure. We postulate that Bob's

self-regulation process in the goal setting stage is governed by self-focused interpretation as an important aspect of motivation control. In other words, his motivational beliefs (including his self-efficacy judgment, attributions, goal orientation, and attitudes) shape his goal setting.

In short, there are similarities and differences in these students' situation construals. For both Lia and Bob the situation is motivationally relevant (although for different reasons) and congruent (they both want to succeed). Also, the situation has positive valence for both of them: an opportunity to get feedback for Lia and an opportunity to demonstrate ability for Bob. The fundamental difference between Lia's and Bob's goal setting processes is captured in their expectancy pattern: Lia uses activated metacognitive knowledge to estimate the probability of success. She uses her own reference norms, which means that activity-related incentives guide her performance. In contrast, Bob uses social reference norms, thus focusing primarily on the consequences of his action. Our main message here is that even though Lia's and Bob's situation construals are based on a positive categorization of the learning situation (i.e., they are perceived as controllable), their secondary appraisal is different because it is fed by different interpretation processes. Lia's interpretation process is primarily based on the inputs from component 2, whereas Bob's interpretation process is essentially fueled by the contents of component 3.

There is abundant evidence that supports this view. The literature on goal orientation (Dweck, 1986, and Niemivirta, 1998, 1999) shows that learning-focused goals are associated with specific means–end beliefs and that performance goals are connected to ability-related beliefs. Also, there is accumulating evidence that instructional practices that force students to demonstrate ability (Nicholls, 1990), encourage the use of social reference norms (Rheinberg, 1989), or emphasize evaluation procedures (Boggiano et al., 1989) automatically increase self-focus, thus biasing the interpretation process. Rheinberg and his colleagues reported that students who are encouraged to estimate the probability of success on the basis of their own reference norms, rather than on the basis of social reference norms, are more likely to use activity-related incentives when they are confronted with a learning situation. Interestingly, they found that activity-related incentives decreased as a function of the value students attach to the consequences of an action. In light of this evidence, it is not surprising that most students do not find quizzes and exams motivating, mainly because these classroom episodes force them to focus on the consequences of their actions.

In conclusion, we adopt the view that SRL does not proceed in a linear way through the different phases of the model. Students may or may not become aware of certain dimensions of the unfolding learning episode and this awareness may prompt them to backtrack to a previous phase or to bypass components. Accordingly, we proposed that Tim used a shortcut,

thus jumping several phases. Both Lia and Bob accessed the information in components 2 and 3 to make a mental representation of the learning goal and to orient themselves on the quiz. Lia's mental representation is the result of mindful activation of information in component 2 and reflection on it (metacognitive control), whereas Bob's mental representation is predominantly based on the contents of component 3: His main focus is on the actions that are necessary and sufficient to demonstrate ability (motivation control). Both these mental representations will be used in the postdecision stage to steer and direct their actions. These are discussed in the next section.

V. SELF-REGULATED LEARNING IMPLIES GOAL STRIVING

Let us now turn to goal striving. In the Action Phase Model, the postdecisional phase begins when the goal has been set. The student then shifts from the motivational to the volitional stage. Kuhl and Goschke (1994) illustrated that good intentions (component 6) do not necessarily lead to goal striving and goal attainment, even though they may have been strong in the predecisional stage. Some further planning is required. Also, the individual needs to reflect on his or her actions while performing them, and to maintain motivation and goal striving.

A. IMPLEMENTATION INTENTIONS

In the preaction phase, decisions concerning when, where, and how to get started are made. Gollwitzer (1993) referred to these decisions as implementation intentions: These decisions support goal intentions and set the stage for the transformation of a learning intention into a series of "self-set tasks," which require different metacognitive and motivation control processes. According to Gollwitzer (1996), implementation intentions not only help people to get started with their goal-directed actions, they also increase their commitment to goal intentions. It is important to note that involvement in creating an action plan and preparing for the execution of the successive steps induces a state of cognitive tuning that is different from the deliberate mindset of the predecisional phase. Gollwitzer's studies (1996) warrant this conclusion. He found that an "implementation mindset" facilitates a person's perceptual and behavioral readiness to take in goal-relevant information while simultaneously lowering the likelihood of attending to expectancy-value cues that are typical of the predecisional phase.

In other words, effective planning of an action involves the activity itself as well as the monitoring processes that are necessary to direct one's

striving. It is beyond the scope of this chapter to discuss the problem-solving processes that are part and parcel of the planning process. Suffice it to say here that problem-solving theories primarily describe search processes, how individuals construct alternative problem-solving paths, and how they specify various subgoals. In the educational literature these processes are described under the general heading of metacognitive skills, which include identifying the problem, examining and comparing solutions, executing the action plan, and monitoring (cf. Pintrich, 2000, this volume).

Apart from searching for and generating relevant problem-solving plans, students should also be aware of the conditions that facilitate and restrict their learning in a specific domain. Indeed, SRL implies that students are mindful to situational cues that provide information on the conditions that surround the implementation path. Gollwitzer, Heckhausen, and Ratajczak (1990) asked students to name unresolved personal problems that needed to be handled (for example, continuing or changing one's major). They found that students who committed themselves to a specific implementation path progressed better in these personal projects than subjects who only considered alternative routes or imagined the positive consequences of fulfilling their wishes. Other researchers (Carver & Scheier, 1989; Gollwitzer 1996; Taylor & Gollwitzer, 1995) have shown that an implementation mindset supports goal commitment by bolstering self-confidence, control perceptions, and optimistic expectations concerning goal achievement.

B. DEALING WITH STRATEGY FAILURE

Up to now, we have kept the discussion relatively simple by pretending that our three students monitor the environment and their own performance in relation to a single goal (e.g., doing well on the test). We shift our attention now to multiple goals, focusing more explicitly on conflict between goals. Students may pursue different goals simultaneously, even though they are not always aware of it. Their ever-changing goal structure may be consciously perceived when they experience incoherence in their goal system. Boekaerts (1998a, 1998b) argued that students may experience a feeling of disconnection, incoherence, or a conflict between goals when they are asked to accomplish a goal that they find unappealing, uninteresting, too difficult or too easy, threatening, or boring. Likewise, incongruence or disconnection may be experienced when students' self-defined goals are thwarted or when they experience strategy failure. Incoherence in the goal striving phase, particularly in relation to strategy failure, calls for different forms of control.

Kuhl and Goschke (1994) described a number of control mechanisms that underlie goal striving, including attention and intention control, motivation and emotion control, action control, and volitional control.

Attention and intention control refer to the maintenance of an intention in terms of selectively activating supporting representations in the form of either selectively activating action-related knowledge or selectively processing intention-relevant external information. *Emotion and motivation control* refer to both the processes of inhibiting emotional states that may undermine the efficiency of current engagement and the processes of generating action-related emotions that increase the evaluative strength of an intention and the degree of initiative. *Action control* refers to the inhibition of counterintentional impulses. *Volitional control* refers to a set of functions that mediate both the maintenance of goals in the face of distractions or competing action tendencies and the disengagement from an intention.

Winne (1997; Winne & Perry, 2000) pointed out that adaptive self-regulatory processes are necessary to strike a balance between maintaining and shifting goals on the basis of a constant monitoring of the current situation with respect to prior reference values. He articulated how children detect and search for regularities in their intentions, behaviors, and corresponding outcomes. In the course of development, they acquire implicit rules, such as working carefully and diligently on a math task produces more correct answers. However, in novel situations where the strategy does not apply directly (e.g., when speed is rewarded more than accuracy), disengaging from the current strategy and implementing another strategy requires the enactment of effective forms of control.

Boekaerts (1998a) argued that students who have formed a learning intention need several forms of control to continue their striving, particularly when they encounter strategy failure. Strategy failure calls for a change of strategy, for a coping response, a reconsideration of the goal, and for a decision concerning whether more or less effort is in order. This conceptualization of goal striving implies that there are multiple pathways along which self-regulation in this stage of the learning episode materializes. Boekaerts differentiated between five basic ways to react to strategy failure, namely, (1) mindful effort, (2) disengagement, (3) danger control, (4) self-handicapping, and (5) avoidant behavior. Students who engage in mindful effort differ in important ways from those who use other forms of control. First, they are likely to label an increase in the level of arousal in terms of goal-congruent emotions (e.g., surprise that the strategy does not work, curiosity, challenge and anticipated pleasure, or pride). In other words, perception of increased arousal is viewed as a signal that close monitoring is in order, rather than as a danger signal. This positive interpretation (task-focused reinterpretation) results in an increased rate of task-relevant (meta) cognitions, including reflections on the source of difficulty and the amount of effort needed to solve the problem (path e). The outcome of this reflection process is the decision to continue with the current scripts and pay more attention, or to decide that alternative scripts

should be selected from the action hierarchy because the ones that had been selected before cannot do the job. When these students consider it meaningful to invest resources, they will continue striving, investing effort to adapt the action plan so that it will fit the local conditions better (see Figure 3, path e).

Imagine that Lia encounters strategy failure and cannot retrieve an adequate solution strategy, despite her feeling of knowing. She may then feel an urge to move on to the next problem so as not to lose too much time. However, her feeling of knowing may force her to concentrate better on the task. She may heuristically try different alternatives to help her retrieve knowledge more effectively. It is important to note, however, that this sort of redirected and intensified engagement is likely to occur only through supportive secondary appraisals, meaning that the outcome of the secondary appraisal process should be that the task is difficult but still solvable. Boekaerts, Seegers, and Vermeer (1995) found that primary school students who feel confident that they know how to solve a problem in the goal setting stage deal swiftly with an interruption of a concrete action plan in the action stage. These students treat the noted imbalance and the concomitant increase in the level of arousal as a signal that close monitoring is in order or that a change of plan should be contemplated. Girls experienced more imbalance in the goal setting stage than boys did, even when controlled for their competence level. No differences were noted in the goal striving phase. Efklides, Samara, and Petropoulou (1997) provided evidence that the feeling of difficulty that students may report before, during, and after doing a mathematics problem refers to a complex experience that becomes progressively differentiated during the problem-solving process.

It is interesting to note that students also may opt to disengage temporarily from the behavior that caused the disturbance. Researchers and teachers should differentiate between students who disengage from a task on rational grounds and those who avoid the task on emotional grounds. Students who have access to metacognitive knowledge that helps them to represent strategy failure mentally may realize what it takes to overcome the perceived difficulties (cf. Winne, 1997), yet they may consider the current conditions suboptimal and judge it better to postpone effort investment until later. In other words, disengagement is a form of volitional control (path e) that should be separated from various forms of emotion control (path f) that may look similar to the untrained observer.

C. CURTAILED GOAL STRIVING SHOULD NOT BE EQUATED WITH FAILURE OF SELF-REGULATION

It is important to note that students who lack the metacognitive knowledge and skills to interpret strategy failure may find it difficult to determine which forms of control are needed to protect the self from esteem-

threatening situations. When faced with a difficult problem or with an obstacle during the implementation process, the possibility of losing face may surface and cause a switch in a student's goal structure. The student may then concern himself or herself with the question, "Can I do something to prevent loss of face?" Rather than spend time to find out what the source of the difficulty is (metacognitive control or problem-focused actions), students may opt to attempt to protect their egos (emotion control or emotion-focused actions), because they have lost confidence in their problem-solving capacity (agency beliefs in component 3). Many studies stemming from the literature on goal orientation (Dweck, 1986; Nicholls, 1990; Niemivirta, 1998, 1999), coping with stress (Boekaerts, 1998a; Compas, Malcarne, & Fondacaro, 1988), and learned helplessness (Seligman, 1975) support this view.

Jones and Berglas (1978) and Covington (1992) described a form of emotion control that is characterized by deliberate attempts to withhold effort and even put obstacles in one's own performance path. This self-handicapping strategy is considered to be maladaptive by most teachers. It refers to individuals' attempts to strategically control their attributions to save face by externalizing the source of possible failure. Deliberately withdrawing effort during a test or attending a party the night before an exam are illustrations of self-handicapping. Tim's behavior is an attempt to provide an acceptable explanation for potential failure at the onset of the quiz. From his vantage point, the criteria for a successful course of action are not based on the actual task outcomes, but on his success in dealing with the disturbance itself. Once he believes that the teacher will attribute his low performance to his headache rather than to low capacity, he feels safe and can discharge tension (see Figure 4).

Interestingly, most teachers and parents praise increased effort in reaction to strategy failure or any other interruption of plan. As a result, many students display increased quantitative effort after strategy failure, reflected in working faster, producing more material, increasing the number of responses, repeating answers randomly, and blind substitution of scripts. There is abundant evidence in the literature on mathematical problem solving that describes such mindless or undirected effort (Lester, Garofalo, & Krole, 1989). Leventhal (1980) labeled this coping strategy "danger control," explaining that individuals who are inclined to focus on the changed demand–capacity ratio tend to restore the noted imbalance by increasing rather than decreasing effort. Their focus is on reallocating resources to control the danger (protecting their ego) rather than on the activity itself. Importantly, this form of control (emotion control; path f) produces rumination, which interferes with the learning process itself and may lead to an increase rather than a decrease in the level of anxiety. It is easy to imagine that Bob may use different types of coping strategies when he is confronted with an interruption of plan. He may adopt a danger control strategy when he feels the need to prevent negative outcomes from

occurring. Also, when Bob realizes that he cannot find a solution fast, the task may no longer be congruent with his major goal to be the first to hand in the quiz sheet. Because Bob believes that quick performance is a sign of competence, he may monitor his progress and his rate of progress simultaneously (cf. Carver & Scheier, 1990). The mere observation that some of his classmates have finished the quiz would trigger negative affect and emotion control.

Leventhal contrasted danger control with anxiety control, which has the potential to reduce anxiety, simply because the source of stress is ignored, avoided, or attenuated. Avoidant behavior occurs when students no longer perceive a link between their action and the outcome of their actions. They may then give up on the activity or task and turn their attention to other activities, thus communicating to teacher and peers that they do not even care about the negative outcomes. None of the students in our quiz example demonstrated this behavior. However, all students may be inclined to avoid some activities.

Similar to what has been described in relation to goal setting, we propose that goal striving does not proceed in a linear fashion: Awareness of different dimensions of the unfolding learning episode may initiate different forms of monitoring and control. It is important to realize, though, that some forms of control are considered maladaptive forms of engagement by the teacher. However, from the perspective of the student, each form of control may be highly adaptive because it serves different functions, such as selective perception of external and internal information, inhibiting emotional states, increasing or decreasing the evaluative strength of an intention, and protecting one's self-esteem and well-being.

In conclusion, we adopt the view that SRL does not proceed in a linear way through the different phases of the model. Students may or may not become aware that their goal striving is not in accordance with their goal setting. Those who closely monitor the unfolding learning episode may backtrack several times to a previous phase, meaning that the mental representations they formed in the preactional phase are used in the postdecisional phase to steer and direct their actions. For example, students who formulate the intention to invest effort in a task, yet decide to disengage from the task later because it is too easy (or not personally relevant) or because they do not have access to the necessary recources (path e, in Figure 3) are mastery oriented. Their mental representation in the preaction stage is congruent with their actions in the postdecisional phase. In contrast, students who started mindfully and diligently on a task, but later deliberately withhold effort to feel safe (self-handicapping) or use danger control (path f in Figure 3) are switching from the mastery to the ego-protective mode. These students experience difficulty in finding a balance between learning and ego-protective goals. Much more research is needed to document this nonlinear process.

VI. CONCLUSIONS AND FUTURE DIRECTIONS

In this chapter, we defended the view that for effective self-regulation to develop, students should be allowed to work in a learning context in which they can create their own learning episodes according to their own goals. We argued that identification, interpretation, and appraisal processes are the gateways to self-regulation. In light of present conceptualizations of goal processes, the model of adaptable learning was extended to include an identification process, two interpretation processes (task-focused interpretation and self-focused interpretation), and primary and secondary appraisal processes. We focused on the hypothetical relationships between these five key processes of a student's interpretative framework and theorized how these processes may affect goal setting and goal striving. We also pointed to different levels of awareness and differentiated between different forms of control that interact while the learning process is unfolding over time.

A central message throughout this chapter is that SRL is not a unitary construct. Rather, it has been presented as a generic term used for a number of phenomena, each of which is captured by a different control system. In our judgment, self-regulation is a system concept that refers to the overall management of one's behavior through interactive processes between these different control systems (attention, metacognition, motivation, emotion, action, and volition control). We adopted the view that no single control system is appropriate to explain all the phenomena of control that are at work in SRL. In the past decade, researchers involved in educational research have concentrated mainly on activity in one control system—the metacognitive control system—thus ignoring the interplay between the metacognitive control system and other control systems. However, it is evident that the different control systems share information and processing capacity with the metacognitive control system and that resources may flow freely from one control systems to another.

In our opinion, three issues should be addressed in future research on SRL. First, we need to know in what ways students who are capable of regulating their learning efficiently differ from those who are less efficient. More specifically, we need to know how they integrate information stemming from the interconnected control systems. Researchers should go beyond the mere description of activity in control systems, specifying the properties that emerge from the interaction of these control systems. Only through the investigation of these mutual influences will new properties of the system, as a whole, be revealed.

Second, it follows from the adoption of SRL as a system construct that single feedback loop systems are insufficient to explain SRL. Multiple feedback systems provide information about the learning activity that is going on. We need to know how these interacting feedback loops operate

and how students learn to integrate this information and act upon it. Carver and Scheier described positive and negative feedback loops that are part of the self-regulation process. Positive feedback loops lead to change, growth, and development, whereas negative feedback loops provide information about discrepancies between desirable states (a standard of performance) and the present state. This information allows the individual to keep activity in a control system within reasonable bounds. It is important that researchers pay attention to the feedback loops that operate within each control system. They should seek further insight into the way students plan an activity, monitor that activity, and use feedback to modify the activity. However, they also should examine how feedback processes operate between control systems. This will help them to understand how different forms of control are achieved and how the interacting processes are coordinated (overall self-regulation). A good starting point for the study of these multiple feedback loops is Powers's (1973) goal hierarchy. He views the goals for a given unit in his model as the output of higher-order units, thus positioning feedback loops within the configuration of hierarchically arranged loops (see Vancouver, 2000, this volume, and also Figure 4).

Third, future research should address the dynamics of the interacting control systems that affect each student's learning process as well as his or her relationship with significant others. If students are not aware that their attempts at self-regulation are situated within a social context with changing personal and social goals, they may never learn to regulate their learning in an optimal way. Very little is known about the nature of conflicting goal processes in a classroom context. Boekaerts (1998a) addressed this issue and raised a number of questions. She argued that students are also part of larger groups, such as families, peer groups, communities of learners, school, and youth cultures. When students interact in the context of these larger groups, they influence each other, leading to changes in the functioning and interaction of the different control systems. As such, the study of self-regulated learning should also involve the effect of social forces (social control) on the individual's learning.

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