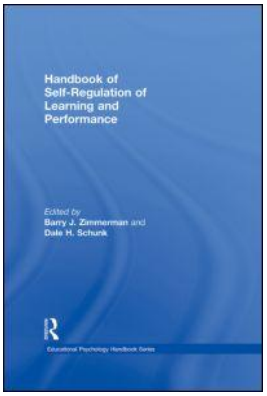


# Handbook of Self-Regulation of Learning and Performance

Barry J. Zimmerman, Dale H. Schunk

## Influences on the Development of Academic Self-Regulatory Processes

Publication details
https://www.routledgehandbooks.com/doi/10.4324/9780203839010.ch3
Allan Wigfield, Susan L. Klauda, Jenna Cambria
**Published online on: 08 Mar 2011**

# 3

# Influences on the Development of Academic Self-Regulatory Processes

Allan Wigfield, Susan L. Klauda, and Jenna Cambria
*Department of Human Development, University of Maryland*

Research on how individuals regulate their behavior has burgeoned in the fields of educational and developmental psychology, and we now have a better understanding of effective ways that children have to regulate behavior, as well as challenges that many children face in doing so (Boekaerts, Pintrich, & Zeidner, 2000). Researchers have shown that children who are able to regulate their behavior in school tend to achieve better, and have other positive developmental outcomes (Zimmerman & Cleary, 2009). Given the links of self-regulation and achievement, it is essential to understand the development of self-regulatory processes, and how some children learn to regulate their behavior effectively, while others have challenges in doing so.

In their social cognitive models of self-regulation Pintrich and Zusho (2002), Schunk and Ertmer (2000), and Zimmerman (2000) discuss separate phases of self-regulation. The first phase is *forethought and planning*, where the individual plans his or her course of action and various motivational beliefs, values, and goals are activated. Next is *performance monitoring* in the learning situation; this phase also involves monitoring of both performance and motivation, and attempts to control these things. For instance, by monitoring their performance students can decide when they may need to change the strategies they are using. Some researchers separate this phase into two phases, *monitoring* and *control* (Pintrich & Zusho, 2002). The third phase is *reflections on performance,* which occur after the learning activities are completed. During reflection the student attempts to understand why different outcomes occurred, manage his or her emotions with respect to the achievement outcomes, and otherwise engage in self-evaluation and reflection about the learning situation just experienced. Pintrich and Zusho (2002) discussed different areas that need to be regulated: cognition, motivation and affect, and behavior.

We organize our discussion of the development of self-regulatory processes in terms of these three phases, and discuss cognitive, motivational, affective, and behavioral factors that are relevant to each phase. More specifically, in the *forethought* phase we discuss the roles of language, goals, self-efficacy and competence perceptions, and task values in students' forethought about their academic activities. In the *performance monitoring* phase, we discuss the development of cognitive strategy use, delay of gratification, and persistence and their relations to self-regulation. In the *reaction and reflection* phase, we discuss children's attributions for

performance, their affective reactions to performance, and the choices they make regarding future academic activities to do. Our choice of these factors is based in their prominence in the literature on self-regulation.

Broadly, we believe there are three fundamental things that develop with respect to self-regulation. First, the *capacity* to regulate in a biological sense develops; younger children may simply have less mental capacity to regulate their actions, and so there will be biological limits on how much they can regulate at different ages. Second, children's knowledge, strategies, and expertise in different areas develop, which likely allows them to regulate their behavior more efficiently (Pintrich & Zusho, 2002). The development of knowledge, strategies, and expertise can be associated with age and biological maturation, but there also can be great differences among same-aged children in their development in these regards. These differences can create great discrepancies in regulatory skills in same-aged individuals. Third, the factors that relate to self-regulation themselves develop. For instance, children's goals change in important ways during the school years, as do their self-efficacy, language skills, cognitive strategy use, affective reactions, and so on. Changes in these factors impact how children regulate themselves at different ages; thus the development of self-regulation is a complex result of changes in the regulatory processes themselves and changes in factors influencing the regulatory processes (Demetriou, 2000).

## FORETHOUGHT AND PLANNING PHASE

### Language Development

There is a long history of research on the potential self-regulatory role of private speech, or the spontaneous self-directed talk that children have often been observed to engage in during play and problem-solving activities. Piaget (1923/1962) characterized private speech as egocentric and did not believe it played a key role in facilitating cognitive development. More research, however, has supported Vygotsky's (1934/1987) view that private speech has social origins and both reflects and promotes children's cognitive development and regulation of behavior (Berk, 1992). According to Vygotsky, parents, teachers, siblings, and others engage in conversations with children to guide them in culturally valued activities. As children develop speech, they employ language similar to that used by others to direct their own activities, gradually internalizing this language into thought (Berk & Harris, 2003; Vygotsky, 1934/1987).

Vygotsky (1934/1987) found that private speech increased and peaked during the preschool years, and then declined and essentially disappeared by 8 to 10 years of age. While much subsequent research has indeed suggested that private speech use follows an inverted U-shape with audible self-talk gradually being supplanted, the age at which it peaks and declines seem to vary with task type and domain as well as child characteristics (Berk, 1992; Winsler, 2009), such as learning disabilities (Berk & Landau, 1993). Moreover, substantial research has demonstrated that children use more private speech when engaged in difficult or novel tasks than easy or familiar ones (Duncan & Pratt, 1997; Winsler, 2009). Furthermore, private speech does not become fully internal by the end of elementary school; Winsler and Naglieri (2003) found, for example, that 10–33% of 11- to 17-year-olds engaged in audible self-talk during various tasks, though its use was associated with achievement only for younger students.

Consideration of the development of private speech is particularly relevant to the forethought phase of self-regulation. Vygotsky (1934/1987) contended that private speech undergoes a temporal and functional shift relative to action. First, it follows and accompanies behavior, serving as commentary and evaluation, and then it precedes behavior, becoming a means of planning. In

accord with this shift toward a planning function, Azmitia (1992) found that expert Lego builders (6 and 8 years old) made more multi-step planning statements during a construction task than did novice Lego builders. In a study of kindergartners, Duncan and Pratt (1997) found that even one previous exposure to a paper-folding task was associated with an increase in the proportion of private speech used for planning. Also, Feigenbaum (1992) found that proportionally more planning statements occurred with age in a cross-sectional study of 4-, 6-, and 8-year-olds playing a board game. Research, however, on an age-related change in use of private speech for planning is limited (Berk, 1992), with, in contrast to Feigenbaum (1992), other cross-sectional studies involving elementary school students finding no age differences in planning statements (Azmitia, 1992; Matuga, 2003).

On the whole, the development of private speech and its evolution into internal thought appear to be important components of a growing capacity for self-regulation of learning and problem-solving activities. In the planning phase, the use of language, whether external or internal, may be critical in helping children define their goals, express efficacy beliefs to themselves, and describe important task and contextual features that will influence their task approach.

### Goal Setting and Goal Orientations

Forethought and planning involve thinking about upcoming academic tasks, activities, or assignments and planning how to deal with them. As both Pintrich (2000b) and Zimmerman (2000, 2008) noted, goal setting is a particularly important part of this process. Goals serve as criteria by which individuals judge how they are doing in an achievement situation and help them decide whether they should continue to regulate their activity as they are doing or make changes. Proximal (short term) goals and distal (long term) goals have received much research attention, and a variety of studies show that helping children set appropriate proximal goals is more effective than a focus on distal goals with respect to immediate task performance (Bandura & Schunk, 1981; Zimmerman, 2008). However, distal goals also are important for self-regulation, and likely become more so as students get older and think more about their futures (Husman & Shell, 2008). How goals are organized is important as well. Zimmerman (2000) discussed how individuals who are highly self-regulated have a hierarchy of goals organized according to their priority to the individual, and that the proximal goals in this hierarchy relate clearly to the distal goals the individual is trying to accomplish.

A basic developmental question with respect to these goals is what kinds of proximal goals do students of different ages set, and relatedly, how accurate or realistic are these goals? Researchers have found that the most effective proximal goals are those that are appropriately challenging for the individual, are specific to the task, and congruent with other goals (Schunk, 1983; Zimmerman, 2008). These points assume that children can judge things such as challenge, task connections, and goal congruence. The skills to do this likely are rudimentary at best during the early elementary school years, and (hopefully) become better as children go through school.

A second question is what kinds of distal goals do children of different ages have? For early elementary students a distal achievement goal might refer to something happening at the end of the week such as an upcoming spelling test; the distal goal of going to college likely is ill-defined for young students. As they get older many children's distal goals likely get more clearly defined and cover a broader time span, and therefore potentially provide a better guide for students' current achievement activities. For instance, having the goal of being a pre-med major and knowing that this major requires a certain set of courses as prerequisites for admission should help students choose the right set of courses to take in high school. A third question is how do children come to organize their proximal and distal goals into a meaningful hierarchy that guides their approach

to different achievement activities. Balancing different goals and connecting present and future goals requires sophisticated cognitive processing that children likely find challenging (Dowson & McInerney, 2003). There is very little research on the developmental progression of any of these factors and processes.

Students' goal orientations also have received a great deal of attention in the motivation and self-regulation literatures (Maehr & Zusho, 2009; Pintrich, 2000b; Pintrich & Zusho, 2002). Researchers have defined and studied two major goal orientations, mastery and performance, and describe approach and avoidance aspects of each. Mastery approach goals concern learning, improvement, and increasing one's skills, and mastery avoidance goals concern avoiding misunderstanding and perfectionism. Performance approach goals involve demonstrating competence and outperforming others, and performance avoid goals involve not appearing incompetent relative to others (Elliot, 2005; Maehr & Zusho, 2009; Pintrich, 2000b).

Each of these goal orientations has implications for self-regulation; we focus here on the forethought phase, but the implications carry through the regulatory process. When thinking about upcoming tasks, mastery approach oriented students focus on how the task will improve their skills and what strategies they will utilize to assure the improvement occurs. Further, high and low achieving mastery oriented students can take this approach because all mastery-oriented students believe they can improve their performance. Students with performance approach goals focus on how they will be able to outperform others as they do the task and how they can get the highest grade possible. Those with performance avoid goals will plan for how to avoid looking incompetent while doing the activity; such goals may be particularly prominent for low achieving students, who are most at risk for doing worse than others and therefore wanting to avoid activities that produce this outcome (Zimmerman & Cleary, 2009). One part of avoidance is having escape strategies and excuses for poor performance on different tasks that reflect attention away from one's ability (Covington, 2009).

There also are interesting developmental questions about how children understand each goal orientation and when they adopt them. Extant research suggests that performance goals become more prominent as children get older, and that this is particularly true after the transition to middle school (Anderman & Anderman, 1999), in large part because schools emphasize performance more as children move through (Maehr & Zusho, 2009). This change has important implications for students' self-regulation and suggests that students will focus increasingly on the importance of grades rather than on learning and skill improvement. This implies that many students may be more likely to try to engage in effective self-regulatory strategies when they know an assignment has implications for their grades, but be less inclined to do so just to learn something new.

### Self-Efficacy and Competence Perceptions

Self-efficacy is defined as individuals' beliefs that they can accomplish different activities, and competence perceptions refer to their sense of how good they are at different activities (Bandura, 1997; Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006; Schunk & Pajares, 2009). Both of these beliefs relate positively to students' achievement outcomes. These distinct but related beliefs have important implications for students' self-regulation during the forethought phase. Students with high self-efficacy set more ambitious goals, choose more difficult tasks to do, and are more planful about the kinds of strategies they will engage in to accomplish tasks (Pajares, 2008; Zimmerman & Cleary, 2009).

As with goals and goal orientations there are important developmental considerations influencing the relations of self-efficacy and perceptions of competence to self-regulation. One is when students begin to have a reasonably accurate sense of their competence at different activities. Researchers have found that young children's perceptions of competence are overly optimistic

and do not relate closely to achievement indicators; over time the relations of competence related beliefs and achievement become stronger (Wigfield et al., 1997). If children are over confident about their ability to perform different tasks, they may set overly ambitious goals and choose tasks that are too difficult for them. The calibration of self-efficacy and performance is an important developmental process that has implications for self-regulation (Schunk & Pajares, 2009). As children judge their efficacy more accurately, they likely will set goals that they can accomplish and plan the strategies to complete the goals in more effective ways.

There is a large literature showing that children's competence-related beliefs for different academic activities decrease over the school years (Wigfield et al., 2006). In a related finding, Pajares and Valiante (2002) found that elementary school students had more confidence in their ability to self-regulate learning strategies than did secondary school students. These twin sets of findings have important (and troubling) implications for self-regulation. They suggest that as students get older they will be less confident in their ability to accomplish difficult goals and to regulate their learning to accomplish them, so that they will set easier goals and (potentially) not challenge themselves in ways that will lead to more positive learning outcomes.

### Task Values

Children's valuing of achievement is defined as their incentives or reasons for doing different tasks (Wigfield, Tonks, & Klauda, 2009). Eccles, Wigfield, and their colleagues defined and studied different aspects of achievement values. Interest value is the enjoyment one gets from doing an activity, attainment value is the importance of the task to the individual and how it fits in with one's sense of self, and utility value is the usefulness of the activity. Research indicates that children's task values relate to their choices of which activities to do and (indirectly) to their performance on these activities in both the short and long term (Durik, Vida, & Eccles; 2006; Meece, Wigfield, & Eccles, 1990). Wigfield, Hoa, and Klauda (2008) and Zimmerman (2000) discussed the important role achievement values have in the regulation of behavior at the different phases of self-regulation. During the forethought phase, if students don't value the tasks they are doing, they will be less likely to set clear goals for accomplishing them, or plan the necessary strategies needed to accomplish them. It is important to point out that this will occur even if they believe they are capable of accomplishing them; it is critical that students value the activities they plan to do along with believing they can do the task.

Students' valuing of different academic activities also decreases over the school years (Wigfield et al., 2006), so that students find the academic subjects they are doing less interesting, important, and useful as they get older. These changes have potentially negative implications for students' self-regulation. If students value academic activities less, they will be less likely to choose them, particularly when other activities become available to them and if the cost of the academic activity becomes too high. Or, even if they choose to do the activity, their goals may focus on completing it quickly rather than engaging in it fully. Thus enhancing students' valuing of different activities likely will lead to better regulation of achievement behavior; we return to this point later.

## PERFORMANCE MONITORING PHASE

### Cognitive Strategy Use

Pintrich and Zusho (2002) stated that in the monitoring and control phase, the self-regulated learner selects and adapts cognitive strategies appropriate to the task at hand, and engages in

metacognitive processes that may offer feedback on the effectiveness of strategy use. Some cognitive strategies, such as rehearsal, organization, and elaboration of information are applicable to a broad array of domains and tasks, whereas others are domain or task-specific, such as summarizing to enhance reading comprehension (Pressley & Hilden, 2006).

Children's strategy development depends more on their experiences and schooling than their chronological age (Alexander, Graham, & Harris, 1998). Further, Alexander et al. asserted that children's strategy use generally changes in five regards with increasing familiarity and practice in a domain or task: (a) children apply strategies more efficiently, as they become routinized through practice; (b) children apply strategies more effectively, as they become better able to judge when to apply strategies and which ones to use; (c) children apply strategies more flexibly, modifying them and combining them to fit a given task; (d) children become less reliant on strategies, as their subject knowledge and familiarity permits them to solve common problems relatively automatically; and (e) children's strategy use undergoes a qualitative shift, for example, from lower-level strategies like rereading to those that involve deeper processing, like summarizing or concept mapping. Kron-Sperl, Schneider, and Hasselhorn (2008) recently conducted a longitudinal investigation of memory strategy use across the elementary years which documented several of these points.

Much research has demonstrated that students' mastery goals, self-efficacy, and task values positively predict cognitive strategy use in varied school subjects in middle and high school, with data collected primarily through self-report measures (Miller, Greene, Montalvo, Ravindram, & Nichols, 1996; Nolen, 1988; Wolters & Pintrich, 1998). Little research, however, has examined whether these relations occur for younger students. Furthermore, several studies suggest that motivation may not be directly tied to adolescents' achievement, but rather indirectly fosters their academic performance by promoting cognitive strategy use (Metallidou & deVlachou, 2007; Pintrich & de Groot, 1990; Wolters & Pintrich, 1998).

Important developmental questions include when and how relations between cognitive strategy use and motivation originate, as well as how they change from the early to later school years, and their causal direction. Unfortunately, most research on links between cognitive strategy use and motivation, including all studies cited in the previous paragraph, has involved students in grade five or higher. For example, Bouffard, Vezeau, and Bordeleau (1998), who studied students at three levels of secondary school, found that only mastery goals positively predicted cognitive strategy use for students at the lowest level (who averaged about 12 years of age), whereas both mastery and performance goals were positively linked to cognitive strategy use for older students. This differing pattern of relations suggests that performance goals may become adaptive for older students as they face the challenge of gaining acceptance to college and other future opportunities for which grades are a key criterion.

Additionally, two longitudinal studies offer somewhat conflicting findings about how goal orientations contribute to changes in strategy use in math class. Over the course of one junior high school year for seventh- and eighth-grade students, Patrick, Ryan, and Pintrich (1999) found that an initial mastery goal orientation for math predicted an increase in cognitive strategy use for females, and no change for males (whereas an initial extrinsic goal orientation predicted a decrease in cognitive strategy use for males only). Pintrich (2000a), on the other hand, found that both males and females initially high in math mastery goals declined in cognitive strategy use from eighth to ninth grade (as did those high in performance goals). Clearly, there are many directions that developmental research on cognitive strategy use could take, especially to further elucidate its relations with other components of self-regulation models.

## Delay of Gratification

Delay of gratification was first studied by Mischel (1958; Mischel & Moore, 1973) and is defined as a strategy or process in which the individual postpones an immediate reward for a more valuable future reward. Bembenutty (2009) reviewed the literature on academic delay of gratification and concluded that there is strong support for its status as a key process in self-regulation. Much of the work on academic delay of gratification was done with college students, so we know little about its development.

Delay of gratification is most relevant to the monitoring and control phases in which it is necessary to put off immediately gratifying activities like watching television or playing video games for a larger long term reward, like being successful in a class. Delay of gratification is also relevant to Pintrich, Marx, and Boyle's (1993) discussion of the hot emotional system and cold cognitive system because delay of gratification has been described as the ability of the cold cognitive system to overpower the hot impulsive reflexes (Tobin & Graziano, in press).

Academic delay of gratification develops as individuals become more concerned with longer term future goals. For instance, Steinberg et al. (2009) gave a delay discounting task to individuals between 10 and 30 years old and found that individuals who are 16 years and older are more likely to accept a larger future reward than a smaller reward that would be received sooner. They also found that this developmental progression was due to increased orientation to the future and not decreased impulsivity. Similarly, Bembenutty (2009) reported that academic delay of gratification is strongest when paired with a future time perspective and perceived instrumentality of the task.

Among the studies on nonacademic delay of gratification, three conclusions can be drawn about the development of delay of gratification that might inform academic delay of gratification. First, based on Tobin and Graziano's (in press) review of the literature, delay of gratification can be taught to preschoolers through modeling, using self or other-induced distractions (Peake, Hebl, & Mischel, 2002; Yates, Lippett, & Yates, 1981), engaging in self-talk about why one should choose the larger delayed reward (Nisan & Koriat, 1984), or providing representations of the delayed reward (Mischel & Moore, 1973). It is possible that these strategies might also be used for students learning to delay more immediately satisfying activities like socializing or watching television in order to do homework or study. Second, both academic and general ability to delay gratification are acquired in conjunction with other important developmental milestones, such as future time perspective or future orientation (Bembenutty & Karabenick, 2004; Husman & Shell, 2008; Steinberg et al., 2009).

Third, the development of delay of gratification skills may trigger the development of other important developmental outcomes. Shoda, Mischel, and Peake (1990) found that preschoolers' skills at delaying gratification were associated with increased ability to cope with stress in adolescence. Bembenutty and Karabenick (2004) concluded that college students with a well-developed ability to delay gratification also have more positive beliefs about their future and are more likely to complete academic tasks. Researchers also have found that delay of gratification is related to important achievement-related outcomes. Shoda et al. (1990) found that longer delay of gratification in preschool children was positively associated with self-control and higher SAT scores when they were adolescents. Mischel and Gilligan (1964) found that choosing an immediate reward was associated with academic cheating in sixth grade boys. Clearly, learning to delay immediate gratification is a key contributor to self-regulation and achievement outcomes.

## Persistence

In the monitoring and control phases of self-regulation, persistence is a key behavioral indicator of self-regulatory capacity. Persistence refers to willing continuation in a challenging learning or problem-solving situation (Peterson & Seligman, 2004; Lens & Vansteenkiste, 2008). Why do some students develop a tendency to persist, whereas others develop a tendency to evade or quickly give up on challenging tasks? Key constructs discussed in the forethought section each offer partial explanation: students who set mastery goals, hold positive self-efficacy beliefs, and strongly value the potential outcomes for the task at hand are all likely to view the effort and time it takes to complete difficult tasks as worthwhile, and therefore to actually persist in them (Bandura, 1997; Pintrich & Zusho, 2002; Wigfield et al., 2008). Additionally, Dweck and colleagues (Burhans & Dweck, 1995; Dweck & Master, 2008) have demonstrated that individuals' theories of intelligence contribute substantially to whether they display a mastery-oriented behavior pattern of high persistence and challenge seeking, or a learned helpless pattern of low persistence and challenge avoidance. For instance, older children and adolescents who believe that intelligence represents fixed ability (entity theory) are likely to show less persistence after failing on a similar task, whereas those who believe that intelligence is malleable (incremental theory) are likely to show more effort and persistence.

A substantial body of research has also examined how environmental factors contribute to the development of persistence, or the lack thereof, in elementary, middle, and high school students. Dweck and her colleagues have conducted studies demonstrating how performance feedback and instruction in theories of intelligence affect students' effort and persistence on difficult tasks (Dweck & Master, 2009). For example, Blackwell, Trzesniewski, and Dweck (2007) found that junior high students who initially viewed intelligence as a fixed trait increased in effort and persistence in math, as well as in achievement, after participating in an intervention that combined teaching about the incremental theory of intelligence with study skills training; conversely, students who only received study skills training actually declined further in these respects. Other studies of environmental influences suggest that autonomy support and more general social support from parents, teachers, and other adults, are also important links to children's and adolescents' persistence in academics and sports (Somers, Owens, & Piliawsky, 2008; Pelletier, Fortier, Vallerand, & Brière, 2001).

Lastly, one important developmental issue to address is whether there are age differences in persistence during the school years. A few studies suggest that broad age differences are limited. Lufi and Cohen (1987), for example, reported no significant differences in 7- to 13-year-olds' persistence, nor did Duckworth and colleagues find any relationship between age and grit in 7- to 15-year-old participants in the Scripps National Spelling Bee (Duckworth, Peterson, Matthews, & Kelly, 2007; Duckworth & Quinn, 2009) or in 11- to 17-year-olds attending a magnet school (Duckworth & Quinn, 2009). (Grit includes the behavioral aspects of persistence as well as the affective element of continued interest in achieving long-term goals.) It appears, then, that individual differences in persistence are more prevalent than developmental differences. In the studies just described, however, persistence and grit were assessed with self-report questionnaires; it would thus be interesting to examine whether employment of observational methods or other informants leads to different conclusions about age differences in persistence.

## REACTION AND REFLECTION PHASE

### Attributions for Performance

Attributions are students' explanations for the outcomes they attain (Graham & Williams, 2009). Given that attributions are made *after* outcomes occur, they are particularly important in the reaction and reflection phase of the self-regulation process as students try to understand their performance outcomes. Schunk (2008) noted, however, that they also are important in the forethought phase; students' attributions for previous performance will impact how they think about upcoming tasks and so influence the kinds of goals they set and their approaches to these tasks. We focus here on their role in reflection.

Weiner (1979) identified the most frequently made attributions for different performance outcomes; they are ability, effort, task difficulty, and luck. A particularly important aspect of this theory for self-regulation is that certain kinds of attributions for success and for failure lead to positive motivation for subsequent activities, whereas others do not. For instance, attributing success to ability and effort relates positively to students' self-efficacy and expectancies that they can perform well in the future. Attributing failure to lack of effort means the student thinks he or she could do better in the future if she works harder (Weiner, 1979; Graham & Williams, 2009). Attributing failure to lack of ability is particularly debilitating to subsequent motivation and self-regulation of achievement behavior; students who believe their failures are due to lack of ability give up quickly when doing similar tasks in the future, and believe that their efforts to do such tasks will not result in success. Attribution re-training, particularly working to change the attributions of students who attribute failure to lack of ability to lack of effort and poor strategy use, has positive effects on students' subsequent motivation, self-regulation, and performance (Graham & Williams, 2009). Schunk and his colleagues showed that providing ability and effort feedback to students following successful performance enhanced students' self-efficacy and self-regulated efforts to continue to improve (Schunk, 1984; Schunk & Rice, 1987).

One important developmental issue is that children (especially young children) do not always distinguish clearly between the different causal dimensions and their understanding of each dimensions changes over time. For instance, young children see ability and effort as complementary and do not fully distinguish between the two constructs; the smart person is one who tries hardest, and ability can be improved through effort (Nicholls, 1978). By age 11 or 12, children come to understand the often reciprocal, compensatory relations between effort and ability: people with less ability need to try harder in order to reach the same level of success as people with more ability. These developmental shifts mean that the neat distinctions between causal categories in Weiner's (1979) model cannot be applied to children of different ages, and by implication, that attributional patterns potentially will not relate to motivation and regulation in the same ways at different ages. There is a need for additional research on relations of attributions to self-regulations in children of different ages.

### Affective Reactions to Performance

Emotional regulation refers to the processes involved in becoming aware of one's affective reactions to performance and having an ability to monitor one's emotional experiences (Schutz & Davis, 2000; Thompson, 1994). Pekrun (2009) discussed how positive academic emotions facilitate self-regulated learning. These processes may be especially important in the reaction and

reflection phase of self-regulation because students use their emotional reactions and appraisals of the task to modify their future academic preparedness (Linnenbrink, 2006; Schutz & Lanehart, 2002).

Emotional regulation in school has also been described as a transactional process between cognition, motivation, and emotions experienced (Schutz, Hong, Cross, & Osbon, 2006). Rice, Levine, and Pizarro (2007) found that 7- to 10-year-old students' ability to cognitively disengage their emotions while watching a sad educational film remembered more about the video than did other students. In terms of motivation, Roth, Assor, Niemiec, Ryan, and Deci (2009) found that parents' support of their children's autonomous study habits was associated with choices about performing academic tasks and regulation of negative academic emotions, which also predicted interest in school.

There are domain and age differences in academic emotions. Goetz, Frenzel, Pekrun, Hall, and Lüdtke (2007) found differences in anger, pride, boredom, and enjoyment reflections based on classroom performance and also achievement domain, with the differences increasing from eighth to eleventh grade. Given that emotional experiences and regulation are related, these findings suggest that emotional regulation is also likely to vary across domains and age groups. However, we still know little about the development of these relations across the school years.

## Choice

After students receive feedback about how they did on an achievement activity, they face many choices about what to do next (Schunk & Ertmer, 2000; Wolters, 2003). Such choices can be complex in different achievement situations where there are many uncertainties about probable outcomes (Busemeyer & Townsend, 1993; Byrnes, 1998). Carver and Scheier (2000) discussed how information processing through feedback loops, affective reactions, and expectancies for success provide the basis for deciding whether or not to continue doing an activity. Obviously, these processes are complex, meaning that young children may have difficulty making reasonable choices about how to approach achievement tasks in the future.

As noted earlier, researchers have found that students' subjective task values predict both intentions and actual decisions to persist at different activities, such as taking mathematics and English courses (Bong, 2001; Durik et al., 2006). The relations appear by first grade, although they strengthen across age (Meece et al., 1990; Wigfield, 1997). Children's achievement values have long term consequences; Durik et al. (2006) reported that the importance children gave to reading in fourth grade related significantly to the number of English classes they took in high school.

There is less research on children's choices of specific academic and other activities. In the early school years, the kinds of choices students have available to them likely are limited. As they get older, students have many more choices and decisions to make about different activities to pursue, where to focus their energy and effort, and the relative balance of activities in different domains. Research is needed to document the most salient kinds of choices children of different age have to make, as well as the processes involved in how they make these decisions. Students' goals likely are particularly important here, and research shows that children have a variety of goals for different activities that sometimes conflict (e.g., doing homework versus calling a friend) and sometimes converge (e.g., calling a friend to get help with homework; Dowson & McInerney, 2003). Understanding how these patterns develop over time should be an important priority in research on self-regulation.

## RESEARCH DIRECTIONS AND IMPLICATIONS FOR PRACTICE

We have made numerous research suggestions throughout the chapter, and so we make only a few additional suggestions in this final section. At the outset of this chapter we stated that both self-regulatory skills themselves and the factors that influence them develop across the school years. This point implies that the relations between regulatory skills and the factors change over time as well. There is some research that has addressed how certain of the factors and self-regulation relate at different ages, but little research looking at the interrelations among multiple cognitive and motivational constructs and self-regulation. Wolters and his colleagues' work (Wolters, 1999; Wolters, Yu, & Pintrich, 1996) perhaps is the best example, and they have shown how goals, task values, self-efficacy, strategy use, and self-regulation relate. However, the youngest children in their samples were in middle school. Researchers should do similar work with younger children.

Before this relational work can be undertaken, we must learn more about how well children can understand and calibrate things such as their self-efficacy for different tasks and valuing of them, which cognitive strategies are most appropriate for which kinds of tasks and activities, and how much children know about whether they are using such strategies effectively. If, for example, children's judgments of their self-efficacy are not well calibrated to their performance, then the relations of efficacy to self-regulation will be affected; we noted earlier that young children tend to be over optimistic about their abilities, which means they are not well calibrated in this regard. Similar points can be made about cognitive strategy use and self-regulation, goals and self-regulation, and so on.

We have discussed self-regulation somewhat generally here, but it is likely that self-regulation varies across achievement domains and in different classroom contexts. An important research question is whether different kinds of regulatory skills are needed in different academic domains (e.g., reading versus math), and how the various factors we have discussed operate differently in these areas and in their impact on students' regulation. For instance, the regulatory skills needed to read several chapters in a book and summarize what is learned may be different from the regulatory skills needed to do one's math homework. Pintrich and Zusho (2002) described classroom contexts as an important area for self-regulation; such contexts can differ greatly even within a given content domain. Researchers increasingly are interested in how motivation, strategy use, and self-regulation differ across classroom contexts (Nolen & Ward, 2008; Perry, Turner, & Meyer, 2006), and so research on self-regulation and the factors that influence it must attend to the role of contextual differences in these relations.

With respect to instructional practice, researchers have shown that training children to regulate themselves in academic settings can improve their academic performance (Paris, Byrnes, & Paris, 2001; Schunk & Ertmer, 2000). One good example of this kind of work is Cleary and Zimmerman's (2004) Self-Regulation Empowerment Program (SREP). This program involves diagnosing students' self-regulatory skills to understand how self-regulatory problems contribute to poor performance in different academic areas, working with students to train their regulatory skills, providing students with clear feedback about their performance and regulation, and assessing change in both self-regulation and performance. This program has been effective at both the middle and high school levels (Zimmerman & Cleary, 2009).

We believe it is essential that schools and teachers attend more closely to students' self-regulatory skills and the relations of self-regulation to the motivational, cognitive, and affective factors we have discussed in this chapter. Following Zimmerman (2000), we suggest that students will best learn regulatory skills from effective models to observe and emulate, followed by scaffolded practice as their skills develop. Each of the phases of self-regulation (forethought,

performance, reflection) should be emphasized so that children begin to understand the importance not just of their performance, but also of how to plan their academic activities and reflect on them after they are completed. An important developmental question with respect to self-regulatory programs is how they need to be modified for use with children of different ages.

## REFERENCES


Alexander, P. A., Graham, S., & Harris, K. R. (1998). A perspective on strategy research: Progress and prospects. *Educational Psychology Review, 10*, 129–154.

Anderman, L. H., & Anderman, E. M. (1999). Social predictors of changes in students' achievement goal orientations. *Contemporary Educational Psychology, 25,* 21–37.

Azmitia, M. (1992). Expertise, private speech, and the development of self-regulation. In R. M. Diaz & L. E. Berk (Eds.), *Private speech: From social interaction to self-regulation* (pp. 101–122). Hillsdale, NJ: Erlbaum.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W. H. Freeman.

Bandura, A., & Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology, 41*, 586–598.

Bembenutty, H. (2009). Academic delay of gratification, self-regulation of learning, gender differences, and expectancy-value. *Personality and Individual Differences, 46,* 347–352.

Bembenutty, H., & Karabenick, S. A. (2004). Inherent association between academic delay of gratification, future time perspective, and self-regulated learning: Effects of time perspective on student motivation. *Educational Psychology Review, 76,* 35–57.

Berk, L. E. (1992). Children's private speech: An overview of theory and the status of research. In R. M. Diaz & L. E. Berk (Eds.), *Private speech: From social interaction to self-regulation* (pp. 17–53). Hillsdale, NJ: Erlbaum.

Berk, L., & Harris, S. (2003). Vygotsky, Lev. In L. Nadel (Ed.), *Encyclopedia of cognitive science* (Vol. 6, pp. 532–535). London: Macmillan.

Berk, L. E., & Landau, S. (1993). Private speech of learning disabled and normally achieving children in classroom academic and laboratory contexts. *Child Development, 64,* 556–571.

Blackwell, L. S., Trzesniewski, K., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development, 78*, 246–263.

Boekaerts, M., Pintrich, P. R., & Zeidner, M. (Eds.). (2000). *Handbook of self-regulation*. San Diego, CA: Academic Press.

Bong, M. (2001). Role of self-efficacy and task value in predicting college students' course enrollments and intentions. *Contemporary Educational Psychology, 26*, 553–570.

Bouffard, T., Vezeau, C., & Bordeleau, L. (1998). A developmental study of the relation between combined learning and performance goals and students' self-regulated learning. *British Journal of Educational Psychology, 68*, 309–319.

Burhans, K. K., & Dweck, C. S. (1995). Helplessness in early childhood: The role of contingent worth. *Child Development, 66*, 1719–1738.

Busemeyer, J. R. & Townsend, J. T. (1993). Decision field theory: A dynamic cognitive approach to decision making in an uncertain environment. *Psychological Review, 100*, 432–459.

Byrnes, J. P. (1998). *The nature and development of decision-making: A self-regulation perspective.* Mahwah, NJ; Erlbaum.

Carver, C. S. & Scheier, M. F. (2000). On the structural of behavioral self-regulation. In M. Boekaerts, P. R., Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 41–84). San Diego: Academic Press.

Cleary, T. J., & Zimmerman, B. J. (2004). Self-regulation empowerment program: A school-based program to enhance self-regulated and self-motivated cycles of student learning. *Psychology in the Schools, 41*, 537–550.

Covington, M. J. (2009). Self-worth theory: Retrospection and prospects. In K. R. Wentzel & A. Wigfield (Eds.), *Handbook of motivation at school* (pp. 141–170). New York: Routledge.

Demetriou, A. (2000). Organization and development of self-understanding and self-regulation: Toward a general theory. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 209–251). San Diego, CA: Academic Press.

Dowson, M., & McInerney, D. M. (2003). What do students say about their motivational goals? Towards a more complex and dynamic perspective on student motivation. *Contemporary Educational Psychology, 28,* 91–113.

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*, 1087–1101.

Duckworth, A. L., & Quinn, P. D. (2009). Development and validation of the short grit scale (Grit-S). *Journal of Personality Assessment, 91*, 166–174.

Durik, A. M., Vida, M., & Eccles, J. S. (2006). Task values and ability beliefs as predictors of high school literacy choices: A developmental analysis. *Journal of Educational Psychology, 98*, 382–393.

Dweck, C. S., & Master, A. (2008). Self-theories motivate self-regulated learning. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research, and applications* (pp. 31–51). New York: Erlbaum.

Dweck, C. S., & Master, A. (2009). Self theories and motivation: Students' beliefs about intelligence. In K. R. Wentzel & A. Wigfield (Eds.), *Handbook of motivation at school* (pp. 123–140). New York: Routledge.

Duncan, R. M., & Pratt, M. W. (1997). Microgenetic change in the quantity and quality of preschoolers' private speech. *International Journal of Behavioral Development, 20*, 367–383.

Elliot, A. J. (2005). A conceptual history of the achievement goal construct. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 52–72). New York: Guilford.

Feigenbaum, P. (1992). Development of the syntactic and discourse structures of private speech. In R. Diaz & L. Berk (Eds.), *Private speech: From social interaction to self-regulation* (pp. 181–198). Hillsdale, NJ: Erlbaum.

Graham, S., & Williams, C. (2009). An attributional approach to motivation in school. In K. R. Wentzel & A. Wigfield (Eds.), *Handbook of motivation at school* (pp. 11–34). New York: Routledge.

Goetz, T., Frenzel, A. C., Pekrun, R. H., Hall, N. C., & Lüdtke, O. (2007). Between- and within-domain relations of students' academic emotions. *Journal of Educational Psychology, 99*, 715–733.

Husman, J., & Shell, D. F. (2008). Beliefs and perceptions about the future: A measurement of future time perspective. *Learning and Individual Differences, 18*, 166–175.

Kron-Sperl, V., Schneider, W., & Hasselhorn, M. (2008). The development and effectiveness of memory strategies in kindergarten and elementary school: Finding from the Würzburg and Göttingen longitudinal memory studies. *Cognitive Development, 23*, 79–104.

Lens, W., & Vansteenkiste, M. (2008). Promoting self-regulated learning: A motivational analysis. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research, and applications* (pp. 141–168). New York: Erlbaum.

Linnenbrink, E. A (2006). Emotion research in education: Theoretical and methodological perspectives on the integration of affect, motivation, and cognition. *Educational Psychology Review*, *18*, 307–314.

Lufi, D., & Cohen, A. (1987). A scale for measuring persistence in children. *Journal of Personality Assessment, 51,* 178–185.

Maehr, M. L., & Zusho, A. (2009). Achievement goal theory: Past, present, and future. In K. R. Wentzel & A. Wigfield (Eds.), *Handbook of motivation at school* (pp. 77–104). New York: Routledge.

Matuga, J. M. (2003). Children's private speech during algorithmc and heuristic drawing tasks. *Contemporary Educational Psychology, 28*, 552–572.

Meece, J. L., Wigfield, A., & Eccles, J. S. (1990). Predictors of math anxiety and its consequences for young adolescents' course enrollment intentions and performances in mathematics. *Journal of Educational Psychology, 82*, 60–70.

Metallidou, P., & Vlachou, A. (2007). Motivational beliefs, cognitive engagement, and achievement in language and mathematics in elementary school children. *International Journal of Psychology, 42*, 2–15.

Miller, R. B., Greene, B. A., Montalvo, G. P., Ravindram, B., & Nichols, J. D. (1996). Engagement in academic work: The role of learning goals, future consequences pleasing others, and perceived ability. *Contemporary Educational Psychology, 21*, 388–442.

Mischel, W. (1958). Preference for delayed reinforcement: an experimental study of a cultural observation. *Journal of Abnormal Psychology, 66,* 57–61.

Mischel, W., & Gilligan, C. F. (1964). Delay of gratification, motivation for the prohibited gratification, and responses to temptation. *Journal of Abnormal and Social Psychology, 69,* 411–417.

Mischel, W., & Moore, B. (1973). Effects of attention to symbolically presented rewards on self-control. *Journal of Personality and Social Psychology, 28,* 172–179.

Nicholls, J. G. (1978). The development of the concepts of effort and ability, perceptions of academic attainment, and the understanding that difficult tasks require more ability. *Child Development, 49,* 800–814.

Nisan, M., & Koriat, A. (1984). The effect of cognitive restructuring on delay of gratification. *Child Development, 55,* 492–503.

Nolen, S. B. (1988). Reasons for studying: Motivational orientations and study strategies. *Cognition and Instruction, 5*, 269–287.

Nolen, S. B., & Ward, C. J. (2008). Sociocultural and situative approaches to studying motivation. In M. L. Maehr, S. Karabenick, & T. Urdan (Eds.), *Advances in motivation and achievement* (Vol. 15: Social psychological perspectives, pp. 425–461). Bingley, UK: Emerald Publishing Group.

Pajares, F. (2008). Motivational role of self-efficacy beliefs in self-regulated learning. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research, and applications* (pp. 111–139). New York: Erlbaum.

Pajares, F., & Valiante, G. (2002). Students' self-efficacy in their self-regulated learning strategies: A developmental perspective. *Psychologia, 45*, 211–221.

Paris, S. G., Byrnes, J. P., & Paris, A. H. (2001). Constructing theories, identities, and actions of self-regulated learners. In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-regulated learning and academic achievement: Theoretical perspectives* (2nd ed., pp. 253–287). Mahwah, NJ: Erlbaum.

Patrick, H., Ryan, A. M., & Pintrich, P. R. (1999). The differential impact of extrinsic and mastery goal orientations on males' and females' self-regulated learning. *Learning and Individual Differences, 11*, 153–171.

Peake, P. K., Hebl, M., & Mischel, W. (2002). Strategic attention deployment in waiting and working situations. *Developmental Psychology, 38,* 313–326.

Pekrun, R. (2009). Emotions at school. In K. R. Wentzel & A. Wigfield (Eds.), *Handbook of motivation in school* (pp. 575–604). New York: Routledge**.**

Pelletier, L. G., Fortier, M. S., Vallerand, R. J., & Brière, N. M. (2001). Associations among perceived autonomy support, forms of self-regulation, and persistence: a prospective study. *Motivation and Emotion, 25*, 279–306.

Perry, N. E., Turner, J. C., & Meyer, D. K. (2006). Classrooms as contexts for motivating learning. In P. A. Alexander & P. H. Winne (Eds.), *Handbook of educational psychology* (2nd ed., pp. 327–348). Mahwah, NJ: Erlbaum.

Peterson, C., & Seligman, M. E. P. (2004). Persistence. In *Character strengths and virtues: A handbook and classification* (pp. 229–247). Washington, DC: American Psychological Association.

Piaget, J. (1962). *The language and thought of the child.* (M. Gabain, Trans.). Cleveland, OH: Meridian. (Original work published 1923)

Pintrich, P. R. (2000a). Multiple pathways, multiple goals: The role of goal orientation in learning and achievement. *Journal of Educational Psychology, 92*, 544–555.

Pintrich, P. R. (2000b). 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, CA: Academic Press.

Pintrich, P., & 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., Marx, R.W., & Boyle, R. A. (1993). Beyond cold conceptual change: The role of motivational beliefs and classroom contextual factors in the process of conceptual change. *Review of Educational Research, 63,* 167–199.

Pintrich, P. R., & Zusho, A. (2002). The development of academic self-regulation: the role of cognitive and motivational factors. In A. Wigfield & J. S. Eccles (Eds.), *Development of achievement motivation* (pp. 249–284). San Diego, CA: Academic Press.

Pressley, M., & Hilden, K. (2006). Cognitive strategies. In D. Kuhn & R. S. Seigler (Eds.), *Handbook of child psychology* (6th ed., Vol. 2, pp. 511–556). Hoboken, NJ: Wiley.

Rice, J. A., Levine, L. J., & Pizarro, D. A. (2007). "Just stop thinking about it": Effects of emotional disengagement on children's memory for educational material. *Emotion, 7*, 812–823.

Roth, G., Assor, A., Niemiec, C. P., Ryan, R. M., & Deci, E. L. (2009). The emotional and academic consequences of parental conditional regard: Comparing conditional positive regard, conditional negative regard, and autonomy support as parenting practices. *Developmental Psychology*, *45*, 1119–1142.

Schunk, D. H. (1983). Reward contingencies and the development of children's skills and self-efficacy. *Journal of Educational Psychology, 73*, 93–105.

Schunk, D. H. (1984). Enhancing self-efficacy and achievement through rewards and goals: Motivational and informational effects. *Journal of Educational Research, 78*, 29–34.

Schunk, D. H. (2008). Attributions as motivators of self-regulated learning. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and self-regulated learning* (pp. 245–266). New York: Erlbaum.

Schunk, D. H., & Ertmer, P. A. (2000). Self-regulation and academic learning: Self-efficacy enhancing interventions. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 631–649). San Diego, CA: Academic Press.

Schunk, D. H., & Pajares, F. (2009). Self-efficacy theory. In K. R. Wentzel & A. Wigfield (Eds.), *Handbook of motivation in school* (pp. 35–54). New York: Taylor Francis.

Schunk, D. H., & Rice, J. M. (1987). Enhancing comprehension skills and self-efficacy with strategy value information. *Journal of Reading Behavior, 19*, 285–302.

Schutz, P. A., & Davis, H. (2000). Emotion and self-regulation during test taking. *Educational Psychologist, 35,* 243–256.

Schutz, P. A., Hong, J. Y., Cross, D. I., & Osbon, J. N. (2006). Reflections on investigating emotions among educational contexts. *Educational Psychology Review, 18,* 343–360.

Schutz, P. A., & Lanehart, S. L. (2002). Emotion in education. *Educational Psychologist, 3,* 67–68.

Shoda, Y., Mischel, W., & Peake, P. K. (1990). Predicting adolescent cognitive and self-regulatory competencies from preschool delay of gratification: Identifying diagnostic conditions. *Developmental Psychology, 26,* 978–986.

Somers, C. L., Owens, D., & Piliawsky, M. (2008). Individual and social factors related to urban African American adolescents' school performance. *The High School Journal, 91*, 1–11.

Steinberg, L., Graham, S., O'Brien, L., Woolard, J., Cauffman, E., & Banich, M. (2009). Age differences in future orientation and delay discounting. *Child Development*, *80*, 28–44.

Thompson, R. A. (1994). Emotional regulation: a theme in search for definition. In N. A. Fox, The development of emotion regulation: behavioral and biological considerations. *Monographs of the Society for Research in Child Development, 59*, 25–52.

Tobin, R. M., & Graziano, W. G. (in press). Delay of gratification: A review of fifty years of regulation research. In R. Hoyle (Ed.), *Handbook of self-regulation and personality*. Mahwah, NJ: Blackwell.

Vygotsky, L.S. (1987). Thinking and speech. In R. W. Rieber & A. S. Carton (Eds.), & N. Minick (Trans.), *The collected works of L.S. Vygotsky: Vol. 1. Problems of general psychology* (pp. 37–285). New York: Plenum. (Original work published 1934)

Weiner, B. (1979). A theory of motivation for some classroom experiences. *Journal of Educational Psychology, 71*, 3–25.

Wigfield, A. (1997, April). *Predicting children's grades from their ability beliefs and subjective task values: Developmental and domain differences*. Paper presented at the biennial meeting of the Society for Research in Child Development, Washington, DC.

Wigfield, A., Eccles, J. S., Schiefele, U., Roeser, R., & Davis-Kean, P. (2006). Development of achievement motivation. In W. Damon (Series ed.) & N. Eisenberg (Vol. ed.), *Handbook of child psychology* (6th ed., Vol. 3, pp. 933–1002). New York: Wiley.

Wigfield, A., Eccles, J. S., Yoon, K. S., Harold, R. D., Arbreton, A., Freedman-Doan, C., & Blumenfeld, P. C. (1997). Changes in children's competence beliefs and subjective task values across the elementary school years: A three-year study. *Journal of Educational Psychology, 89*, 451–469.

Wigfield, A., Hoa, L. W., & Klauda, S. L. (2008). The role of achievement values in the regulation of achievement behaviors. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research, and applications* (pp. 169–195). New York: Erlbaum.

Wigfield, A., Tonks, S., & Klauda, S. L. (2009). Expectancy–value theory. In K. R. Wentzel & A. Wigfield (Eds.), *Handbook of motivation in school* (pp. 55–76). New York: Routledge.

Winsler, A. (2009). Still talking to ourselves after all these years: A review of current research on private speech. In A. Winsler, C. Fernyhough, & I. Montero (Eds.), *Private speech, executive functioning, and the development of verbal self-regulation* (pp. 3–41). New York: Cambridge University Press.

Winsler, A., & Naglieri, J. A. (2003). Overt and covert verbal problem-solving strategies: Developmental trends in use, awareness, and relations with task performance in children age 5 to 17. *Child Development*, *74*, 659–678.

Wolters, C. A. (1999). The relation between high school students' motivational regulation and their use of learning strategies, effort, and classroom performance. *Learning & Individual Differences, 11,* 281–301.

Wolters, C. A. (2003). Regulation of motivation: Evaluating an underemphasized aspect of self-regulated learning. *Educational Psychologist, 38,* 189–205.

Wolters, C. A., & 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. A., Yu, S. L., & Pintrich, P. R. (1996). The relation between goal orientation and students' motivational regulation and their use of learning strategies, effort, and classroom performance. *Learning and Individual Differences, 8*, 211–239.

Yates, G. C., Lippett, R. M., & Yates, S. M. (1981). The effects of age, positive affect induction, and instructions on children's delay of gratification. *Journal of Experimental Child Psychology, 32,* 169–180.

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

Zimmerman, B. J. (2008). Goal setting: A key proactive source of academic self-regulation. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research, and applications* (pp. 267–295). New York: Erlbaum.

Zimmerman, B. J., & Cleary, T. J. (2009). Motives to self-regulate learning: A social cognitive account. In K. R. Wentzel & A. Wigfield (Eds.), *Handbook of motivation at school* (pp. 247–264). New York: Routledge.