RASE Special Issue Article

Promoting Metacognition and Motivation of Exceptional Children

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Metacognition fosters independent learning by providing personal insight into one's own thinking. Such awareness can lead to flexible and confident problem solving as well as feelings of self-efficacy and pride. This is especially important for students who encounter difficulty in school because they do not understand how to appraise and manage their own resources for learning. Too often, students develop debilitating expectations and behavior that undermine learning in school and inhibit transfer of effective learning strategies. We describe four general kinds of instruction that help students learn to think: metacognitive explanation, scaffolded instruction, cognitive coaching, and cooperative learning. Teachers can adapt and combine these methods to teach students how to think as they read, write, and compute in classrooms.

In teaching me independence of thought, they had given me the greatest gift an adult can give to a child besides love, and they had given me that also. (Courtenay, 1989, p. 326)

THIS ARTICLE is about metacognition and academic learning. The central message is that students can enhance their learning by becoming aware of their own thinking as they read, write, and solve problems. Teachers can directly promote this awareness by informing students about effective problem-solving strategies and discussing cognitive and motivational characteristics of thinking. The twin benefits of this "consciousness-raising" are that (a) it transfers responsibility for monitoring learning from teachers to students themselves and (b) it promotes positive self-perceptions, affect, and motivation among students. In this manner, metacognition provides personal insight into one's own thinking and fosters independent learning. Self-regulation is critical for children with special needs, disabilities, and talents, because traditional classroom instruction is often frustrating for them (Wong, 1987).

A great deal of research supports the importance of metacognition in cognitive development and academic learning (Brown, Bransford, Ferrara, & Campione, 1983; Paris, Wasik, & Van der Westhuizen, 1988; Pressley, Borkowski, & O'Sullivan, 1985). In the first part of this article we describe two aspects of metacognition—self-appraisal and self-management—and discuss how motivation and metacognition are intertwined. The second half of the article illustrates how instructional interactions can promote metacognition and facilitate self-regulated learning. Our point is not to establish metacognition as a curriculum objective, but rather to show how students' understanding of their own thinking can be enhanced by teachers.

Cognitive Self-Appraisal and Self-Management

Flavell (1978), in his pioneering work, chose to emphasize the learner's knowledge about variables related to the person, task, and strategy in order to compartmentalize metacognitive knowledge that might be germane to remembering. Brown (1978) reviewed the same early research on metacognition but emphasized aspects of executive cognition, such as planning, monitoring, and revising one's thinking. These approaches capture two essential features of metacognition: self-appraisal and self-management of cognition. Self-appraisal includes personal reflections about one's knowledge states and abilities. Metacognitions of this sort answer questions such as, "Do I know the capital of Idaho?" "Can I memorize a list of 20 words in 10 minutes?" "Can I derive a formula to calculate the area of a trapezoid?" In Flavell's terms, they are judgments about one's personal cognitive abilities, task factors that influence cognitive difficulty, or cognitive strategies that may facilitate or impede performance. The appraisals often reflect static judgments, because people are asked to assess knowledge or gauge ability in hypothetical situations. Paris, Lipson, and Wixson (1983) described metacognitive knowledge in terms of declarative, procedural, and conditional knowledge, because self-appraisal answers questions about *what* you know, *how* you think, and *when* and *why* to apply knowledge or strategies.

Many studies have shown that students are not adept at cognitive self-appraisal. For example, young students often mistakenly believe that they understand what they hear or read (Markman & Gorin, 1981); but they have only the illusion of comprehension following reading because they rarely monitor their knowledge (Wagoner, 1983; Winograd & Johnston, 1982). Paris and Myers (1981) observed that 10-year-olds failed to identify many scrambled phrases and nonsense words while reading. Similarly, young students often believe that they are ready for a test before the information has been retained well (Pressley, Snyder, Levin, Murray, & Ghatala, 1987; Wong & Wong, 1986). Children's abilities to appraise various reading purposes, strategies, and their own understanding improve with age and reading ability (Paris, Wasik, & Turner, in press).

In contrast, self-management refers to metacognitions in action, or how metacognition can orchestrate cognitive aspects of problem solving. Self-management is reflected in the plans that learners make before tackling a task, in the adjustments they make as they work at it, and in the revisions they make afterwards. Paris and Lindauer (1982) described these executive actions as *evaluating, planning,* and *regulating.* Students who engage in these tactics are good troubleshooters, indeed, even trouble avoiders, because they are resourceful at repairing their own problem solving (Wittrock, 1986). As children become aware of their own thinking, they learn to choose appropriate goals and monitor their own progress; they adjust their expectations and effort accordingly. In this fashion, metacognition is part of adaptive learning and is useful to any domain of problem solving, in or out of school. Cognitive self-management has direct implications for special education because it focuses on improving students' control of their own learning (Wong, 1986).

The Value of Metacognition for Understanding Students' Learning

Self-appraisal and self-management of thinking are important areas of children's learning that have often been neglected. Metacognition as a psychological construct and dimension of thinking has several virtues (Marzano et al., 1987): First, it focuses our attention on the role of awareness and executive management of our own thinking. Metacognition helps learners become active participants in their own performance, rather than passive recipients of instruction and imposed experiences. It is consistent with constructivist accounts of self-regulated learning (Paris & Byrnes, 1989). Second, because metacognition emphasizes *personal* appraisal and management, it is oriented toward analyses of individual differences in cognitive development and learning. Third, metacognition is embedded in cognitive development and represents the kind of knowledge and executive abilities that develop with experience and schooling. It is both a product and producer of cognitive development.

A fourth general virtue of metacognition is that the constructive, personal, strategic thinking involved in metacognition is amenable to classroom instruction. Teachers can encourage metacognitive dialogues and promote self-appraisal and self-management skills. A fifth virtue is that self-appraisal and self-management invite both cognitive and motivational explanations, because skill and will are interwoven in reflection and anticipation about learning (Corno & Mandinach, 1983; Covington, 1983; Nicholls, 1983; Paris & Cross, 1983). Thus, traditional educational problems such as the transfer of learning, production and generalization of strategies, and learned helplessness can be analyzed from new perspectives provided by metacognition.

There is widespread enthusiasm for this emphasis on metacognition, both in teachers' instruction and in students' independent learning. Revived interest in Vygotsky's (1978) theory of socially mediated learning has initiated searches for cognitive variables that are amenable to social exchange. Metacognition is an excellent candidate, because insight about self-appraisal and self-management can be promoted by other people as well as through self-discovery. In a sense, metacognition is a mirror on one's knowledge and thinking, and the reflection can come from within the individual or from other people (Paris, Jacobs, & Cross, 1987). Metacognition fits well in the combined social/cultural/cognitive emphases on learning and development and provides a valuable focus for special education.

Cognitive Tools for the Craft of Learning

How do learners' thoughts and feelings guide their thinking, effort, and behavior? The significance of what subjects report about their own self-appraisal and self-management can be highly significant or inconsequential, depending on the impact it has on their own behavior. Thus, the emphasis on cognitive regulation, whether by self or other people, situates metacognition in contexts as a functional means to learning rather than a goal in itself. Metacognition is embedded in ongoing thinking and problem solving and is an intermediate step to proficiency. Although we have praised the virtues of metacognition, we seek to bury it in student learning. The goal of education is not to create thinkers who are cautious and self-conscious about themselves and their own thinking—that would immobilize learning instead of enhancing it. Instead, metacognition can provide students with knowledge and confidence that *enables* them to manage their own learning and *empowers* them to be inquisitive and persistent in their pursuits.

Metacognition is often relatively brief and infrequent in the classroom, yet it can play a powerful role. Three situations in particular are influenced by the knowledge about thinking that is shared among teachers and students. First, as children acquire new knowledge and skills, they achieve mastery. Metacognition is critical in this phase, because it allows students to understand their own thinking and learning. The awareness stimulated in the mastery phase of learning is particularly vulnerable to outside intervention by teachers and peers. A second occasion for metacognition is in the realm of troubleshooting or debugging. When they encounter problems, students may need recourse to other strategies, such as monitoring their performance or revising their plans. They may also seek help from others. Awareness of the cognitive demands of a task and the benefits of various strategies may provide explicit information about appropriate solutions. A third occasion in which metacognition may be particularly useful is teaching. Describing a new skill to be learned and the steps required to master it requires a tutor to dissect the task and present it in a meaningful way to a novice. Whether the instruction is provided by an expert, teacher, or peer, metacognitive understanding of the task at hand can facilitate instruction. These occasions are important for classroom learning, yet they may involve relatively brief "bursts of metacognitive exchanges" among teachers and students.

Metacognition provides cognitive tools for accomplishing the craft of schooling. These tools are the means whereby students achieve self-appraisal and self-management of their own thinking. For example, a common metacognitive tool in elementary reading instruction is the reminder to think about a topic before reading about it. Children are encouraged to read a title and think about what they know in order to activate relevant background knowledge (Langer, 1984; Ogle, 1983). When writing a composition, they are reminded to plan a series of ideas and a conclusion before they begin. Among older students the cognitive tools include a list of strategies such as skimming, summarizing, paraphrasing, predicting, and self-questioning as one reads, writes, or solves problems. Such strategies can be domain-specific, such as the use of algorithms to check mathematical computations, or they can be general heuristics for solving problems, such as planning and monitoring. The breadth of application of the cognitive tool is an empirical issue, not a definitional one.

The metaphor of cognitive tools is consistent with conceptualizations offered by Vygotsky (1978) and others. Collectively, the conceptualizations focus on the use of problem-solving techniques and the coordination of particular tools to solve particular problems. A good craftsman is not simply a person who collects a wide assortment of tools. Good craftsmen use tools selectively to accomplish particular purposes and they learn to use tools at first with guidance and later independently. The analogy works well, too, with the acquisition of cognitive strategies and metacognition for enhancing learning in school. Students should be taught to use particular strategies in particular settings to accomplish specific purposes and not simply be taught an inventory of strategies. Exhortations to "be strategic" or "be metacognitive" are not sufficient to teach students how to use cognitive tools.

Motivational Characteristics of Metacognition

Cognitive evaluations are rarely dispassionate assessments. If children are asked, "Are you a good reader?" "Do you like math?" "Why did you get such a high/low grade?" "Do you think you can solve this problem?" "Which course will you choose?" they might be proud or embarrassed by their own answers. Flavell (1985) referred to the emotional accompaniments of cognitive self-appraisal as "metacognitive experiences." They color what students think about themselves as learners with emotions, such as doubt, shame, and helplessness, or confidence, pride, and self-assurance. Consider this example of an adult's recollection of learning to read:

> Oh, I can remember those agonies but I don't know when that was, of passing the story around the room deal. "OK, Johnny, you read the first four sentences," (Groans and pretends to read.) "Your turn Lee." And you go (strangled sound) (laughs), you just choke right there. God, I read badly. To this day I have difficulty spelling anything except my name. That was probably the worst experience of my life. . . . I think probably that is the most humiliating, embarrassing, and most horrible thing that teachers do to kids. Maybe it was just because I was the one who couldn't do it. "It's your turn to read," and you didn't even know what page they were on. (Laughs). I was off someplace but

> even if I knew what page they were on and you read over a word and you botch the word and you didn't know what it was or they make you "sound it out." You didn't even know what it sounded like. Yuk. No (laughs), I don't remember enjoying that ever. (Taylor, 1983, p. 10)

Self-appraisal and self-management are personal assessments filled with affect. A view of metacognition in the service of academic learning necessarily entails motivated, social interactions. Our perception of academic learning is decidedly different than that of Brown et al. (1983), who said, "Bleak though it may sound, academic cognition is relatively effortful, isolated, and cold" (p. 78). We concur that classroom learning is effortful, but the long-term goal is to lessen the effort required for different cognitive activities so that they flow automatically and smoothly. However, neither the long-term goals of schooling nor the initial stages of learning appear to be isolated, unmotivated, or unemotional.

The important role that affect plays in learning is clearly illustrated by research that examines the differences between good readers and poor readers (e.g., Butkowsky & Willows, 1980; Johnston & Winograd, 1985). Constructs like "learned helplessness" and "passive failure" provide insight into how misconceptions about reading, inappropriate attribution, and low self-esteem can interfere with the development of skilled, strategic reading. Good readers display intentional, effortful behavior as they flexibly transact with text to gain meaning or pleasure. In contrast, many poor readers display intentional, effortful behaviors when they try to avoid reading or thinking about text information. Thus, anxiety about their own abilities and expected failure causes many poor readers to avoid genuine effort in learning.

Metacognition helps students to develop intellectual curiosity and persistence, to be inventive in their pursuits of knowledge, and to be strategic in their problem-solving behavior. If metacognition is knowledge about thinking that can be shared among people, then individuals can report it to others, use it to direct another's performance, or use it to analyze and manage their own thinking. For example, metacognition can help students understand that all learning involves overcoming obstacles, confusion, and self-doubt. Low achieving students can gain greater self-efficacy as they learn to understand their own frustrations and to understand that others share those feelings, too. Teachers who understand how their students think and feel about themselves as learners are better prepared to motivate their students and encourage their development in appropriate directions.

Innovations in Classroom Instruction

One important consequence of research on metacognition is the renewed appreciation for the "skill and will" required for effective instruction and learning. Brown et al. (1983) touched upon this issue with the following comments:

> In our previous discussion of training studies we portrayed parents, teachers, and researchers as dispensers of "pearls of cognitive wisdom." Effective mediators do much more than focus on particular concepts and strategies that may improve task performance; they respond to *individuals* who may feel confident, enthused, threatened, defiant, and so forth.
>
> Many of the activities employed by effective mediators are specifically focused on "cold cognitive" aspects of instruction, on particular concepts, factual knowledge, or strategies, for example. But effective mediators do much more than impart cognitive lore. They encourage children, try to help them stay on task, express joy at the children's accomplishments, and so forth. Learning proceeds smoothly when child and mediator are in "synchrony." But, it is often very difficult to establish and maintain this synchrony; many of the moves made by effective mediators are designed to do just this. (p. 148)

Effective teachers display both empathy and expertise; they guide students' learning with sensitivity. Classroom practices should allow teachers and students to discuss their thoughts and feelings about learning in order to promote metacognition and motivation. We briefly describe four approaches that incorporate metacognition in literacy instruction and are designed to facilitate social exchanges of shared knowledge. They illustrate innovative features that are adaptable to many curricula. These four overlapping approaches are *metacognitive explanation and modeling, scaffolded instruction, cognitive coaching,* and *cooperative learning.* We will identify the strengths of each approach.

Metacognitive Explanation and Modeling

A number of researchers have designed instructional programs that provide children with clear explanations about the instruction they are receiving. Winograd and Hare (1988) summarized how direct explanation has been approached across several instructional studies designed to help children become more adept in their use of reading comprehension strategies. Their review revealed that many researchers focused their explanations on five key features:

1. What the strategy is. Researchers described critical features of the strategy or provided a definition or description of the strategy.
2. Why the strategy should be learned. Researchers explained the purpose and potential benefits of the strategy.
3. How to use the strategy. Researchers explained each step in the strategy as clearly as possible. When the

discrete steps in a strategy were hard to explicate, as in getting the main idea, researchers used analogies, think-alouds, and other instructional aids.

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4. When and where the strategy is to be used. Researchers explained to students the appropriate circumstances under which strategies should be employed.
5. How to evaluate the use of the strategy. Researchers often explained how to tell whether using the strategy had proven helpful and what to do if it had not.

Research by Duffy and his colleagues (Duffy et al., 1986) provides a specific illustration of direct explanation. These researchers trained fifth-grade teachers to be more explicit when teaching their low reading groups to use reading skills strategically. The teachers were trained in "(a) how to recast prescribed basal text skills as strategies useful when removing blockages to meanings, (b) how to make explicit statements about the reading skills being taught, when it would be used, and how to apply it, and (c) how to organize these statements for presentation to students" (p. 244). The central tenet of this research is that teachers can assume metacognitive control of their instruction to enhance student awareness and achievement.

The results of this 6-month study showed that teachers did increase the explicit nature of their instruction; they provided more detailed explanations about strategies to students. In general, students' metacognition and strategic reading increased. Duffy et al. (1987) also demonstrated the effectiveness of metacognitive explanations with third graders. However, several trained teachers found it difficult to use explicit explanations consistently. Indeed, finding the appropriate level of detail and explanation about various mental strategies is a critical problem for teachers. Duffy at al. (1986) emphasized four characteristics of direct explanation: First, it provides explicit information, goals, and procedures for students. Second, metacognitive explanations promote students' awareness of how to solve problems they encounter while reading. Third, information about reading strategies is provided during authentic reading activities. And fourth, effective explainers sequence and organize information with increasing complexity.

Scaffolded Instruction

A second line of innovative instruction to foster metacognition is scaffolded instruction. The distinguishing feature of scaffolded instruction is the prominent role of dialogue between teacher and student. The purpose of that dialogue is to provide the learner with just enough support and guidance to achieve a goal that would be impossible without assistance (Wood, Bruner, & Ross, 1976).

Scaffolded instruction derives its conceptual support from theorists such as Vygotsky (1978), who stated:

> Any higher mental function which has emerged in the process of human historical development appears on the scene twice. It first appears as a form of interaction and co-operation among people, as an interpsychological category. Then it appears as a form of individual adaptation, as a part of an individual's psychology, as an intrapsychological category. (p. 128)

An important feature of Vygotsky's (1978) view of socially mediated learning is the notion of the zone of proximal development. Vygotsky defined this as "the distance between the actual developmental level as determined by independent problem-solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers" (p. 76). Reciprocal teaching is a way for teachers to use dialogue to support and guide students by focusing instruction in the zone of proximal development.

Reciprocal teaching emphasizes interactive communication and a mutual flow of information, in contrast to direct instruction, wherein information generally flows from teachers and students. Palincsar and Brown (1984) concentrated on four strategies—predicting, questioning, clarifying, and summarizing—because these are commonly used to foster and monitor reading comprehension. Palincsar and Brown embedded those four activities in training sessions in which the investigator and seventh-grade students took turns leading a dialogue focusing on the text. When the texts were new, the dialogue leaders asked for predictions based upon the title. As the texts were read, the dialogue leaders would ask questions and offer summaries, clarifications, and further predictions when appropriate. Palincsar and Brown observed significant improvements following reciprocal teaching. Talking about thinking as they read helped students to summarize relevant information and detect errors in the text. They also transferred these strategies to lessons in science and social studies.

Cognitive Coaching

Many training studies include multiple components of direct explanation and scaffolded instruction. Cogni-

tive coaching includes dialogues, metacognitive explanations, modeling, and encouragement. These features are evident in the classroom intervention program developed by Paris and colleagues at the University of Michigan (e.g., Paris, Cross, & Lipson, 1984; Paris & Jacobs, 1984; Paris & Oka, 1986) that includes a series of instructional modules, posters, and activities. Each module is focused on a particular strategy, such as finding main ideas in text, and has three separate 45-minute lessons designed for whole group instruction. The important instructional features were the use of metaphors, materials, and discussions to promote children's understanding about reading strategies. Paris and his colleagues tried to make the mysterious, invisible mental processes of reading tangible for 8- to 10-year-olds through metaphors such as "Be a Reading Detective," "Tracking Down the Main Idea," and "Planning Your Reading Trip." The analogies provided concrete representations of mental actions and were illustrated on posters and worksheets. The analogies helped to initiate group discussions about *what* strategies are, *how* they operate, *when* they should be applied, and *why* they are useful. Reading and writing activities were interwoven with these discussions. Thus, explanations about comprehension strategies were incorporated into metacognitive dialogues and instructional activities that were enjoyed and sensible for children.

The data revealed significant advantages of the instruction. Measures of metacognition, strategy utility, error detection, and cloze reading performance all revealed significant improvement from pre- to posttests for children in the experimental classes compared to their peers in other classes. Paris (1986) suggested that three aspects of cognitive coaching may contribute to the effectiveness of metacognitive instruction. First, teachers and students have common goals in coaching situations that provide for cooperation and mutual striving. Second, coaching involves ongoing assessment of students' levels of performance so that task difficulty and expectations can be adjusted to challenging levels. Third, coaching involves mutual regulation. Instructional dialogues enhance teachers' understanding of students' misconceptions and allow students to share their thoughts and feelings about the thinking processes they learn, instead of focusing only on the content of reading selections.

Cooperative Learning

The fourth instructional approach to foster the social exchange of metacognition is cooperative learning. In cooperative learning, students "usually work together to complete tasks, whereas students in other settings work at their seats or receive instruction in large groups in which most interaction occurs between teacher and student" (Webb, 1982, p. 421). Some of the issues pertaining to cooperative learning are particularly relevant to our discussion of metacognition. First, one of the social interaction variables used to explain the positive effects of cooperative learning is helping behavior. As students give and receive help, they learn about strategies, metacognition, and motivation from each other

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(Newman, 1990). After reviewing a number of studies, Webb (1982) concluded that both providing and receiving help resulted in higher achievement. Moreover, "help consisting of explanations has a greater chance of eliminating confusion than does help consisting only of a correct answer" (Webb, 1982, p. 426).

A second variable that contributes to the positive outcomes of cooperative learning is the nature of the cognitive processes that help group members learn. Oral discussion, for example, can help members of a group debate and restructure their ideas. Even disagreements may help individuals seek new information or consider old information from a new perspective. A third variable, which we find particularly interesting, concerns the socioemotional variables that may mediate achievement in cooperative learning situations (Webb, 1982). Students in cooperative learning situations may be more motivated and less anxious than students working in other instructional settings.

Cooperative learning often involves a mixture of many instructional practices, including modeling, direct explanation, scaffolded instruction, and group activities. This kind of eclectic program is illustrated by the Cooperative Integrated Reading and Composition model (CIRC) described by Stevens, Madden, Slavin, and Farnisch (1987). Instruction in the CIRC model begins with direct teacher explanation and cognitive modeling. Practice activities occur in cooperative groups where oral reading among pairs of students is common. Partners focus on the content of the stories as well as on strategies for predicting, summarizing, and analyzing story structure. In writing and language arts, students use peer conferences for planning, revising, and editing each other's compositions. The model is characterized by a combination of direct instruction and team practice, integrated across reading and writing activities. Data collected from 43 classes of third- and fourth-grade students revealed significant improvements on standardized measures of reading comprehension, reading vocabulary, language mechanics, language expression, and spelling. The students who participated in CIRC activities were also

significantly better on measures of writing and oral reading.

All of these instructional innovations provide explicit information to students about thinking processes. They also explicitly encourage appropriate learning goals and feelings of self-efficacy. All of the methods involve dialogues and discussions among students and teachers, so that metacognitions can be exchanged publicly. Learning is student-centered and dynamic rather than teacher-directed. Each of these methods gives credibility to students' interpretations and perceptions of their learning tasks and situations (Shulman, 1986). Furthermore, the methods are flexible so that they can be used with pairs of students or groups with mixed abilities. They avoid the potential stigma of instructional grouping by similar abilities and provide alternatives to traditional methods. Finally, all of these methods allow a closer alignment among the curriculum, instruction, and assessment because teaching and learning are reciprocal and interactive (Winograd & Johnston, 1987).

Conclusions

Recent research in educational and developmental psychology has revealed the importance of student learning that is self-regulated, independent, and flexible. Less-skilled learners and exceptional children in particular need to manage their own learning by planning, evaluating, and regulating their performance on academic tasks. They need to set reasonable goals for themselves, persist in the face of failure, and adopt intrinsic standards for success. The cognitive consequence of self-regulated learning is that students become enabled to select and attack problems strategically. The motivational consequence is that students feel empowered to be successful and thereby invest effort in relevant, challenging tasks. These twin concepts summarize many of the virtues of instruction designed to increase student's metacognition about learning.

One broad goal of education is to encourage the application and transfer of skills, rather than simple demonstrations of knowledge or competence in the classroom. Using knowledge to solve problems in everyday tasks is at the heart of self-regulated learning because it involves decisions about what tasks to pursue, how hard to try, when to seek help, and how to overcome obstacles. Self-management of all available resources, both internal and external, depends on metacognition and motivation. Thus, enhancing students' understanding of academic tasks and learning processes is an appropriate goal for instruction because that awareness fosters self-regulated learning.

The cognitive dimension of self-regulated learning should not be emphasized exclusively; equally important are students' motivational consequences, because self-regulated learning depends on a positive view of one's competence and expectations for future achievements. Effort, tenacity, and pride emerge from intrinsic motivation and self-standards (Rohrkemper & Corno, 1988). Empowerment, the will to achieve a goal, is as essential as enablement, the ability to achieve a goal. Optimistic beliefs off self-competence help students to carry out their plans and choose challenging tasks. Positive self-evaluations of competence, control, and purpose, as well as understanding instrumental functions of academic strategies, contribute to students' sense of power in the classroom. These feelings promote ownership of ideas and authority of knowledge-seeking so that students are willing to risk failure to achieve greater understanding.

Instruction that promotes awareness and optimism can promote metacognition in students and teachers. Metacognitive explanation, scaffolded instruction, cognitive coaching, and cooperative learning all combine an emphasis on cognitive strategies and motivational encouragement. We remain optimistic that teachers can enhance students' thinking skills and positive attitudes toward learning with these types of instruction.

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Note

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