Metacognitive Theory: A Framework for Teaching Literacy, Writing, and Math Skills

John G. Borkowski

This set of articles—on the three Rs—has provided us with innovative, wide-ranging perspectives on how teachers can enhance academic performance. I could devote considerable space to emphasizing the many positive aspects in each of the three major articles. However, the commentators have done a fine job in pinpointing strengths and identifying limitations associated with each position paper. Hence, my goal is to draw the three articles into a more coherent and unified perspective, based in large part on recent advances in metacognitive theory. I will develop three themes: (1) self-regulation as the centerpiece of strategy-based instruction; (2) the reciprocal relationship between self-regulated learning and beliefs about the “self” as a learner; and (3) “working models” and their role in classroom teaching. Hopefully, having stated my case as succinctly as possible, connections will emerge between my preferred metacognitive framework and the major themes in the accompanying articles.

Lessons From Metacognitive Theory

Although the fields of education and psychology have failed to achieve consensus on the boundary conditions that define metacognitive theory (Borkowski, Carr, Rellinger, & Pressley, 1990), its elusive framework continues to stimulate research, especially in the area of learning disabilities (LD). Borkowski, Estrada, Milstead, and Hale (1989) argued that two concepts—self-regulation and the motivational beliefs associated with strategy use—are the major components of metacognitive theory that are relevant to our understanding of a wide range of learning impairments. Additionally, Borkowski and Muthukrishna (in press) have suggested that a teacher’s understanding of these processes, that is, his or her implicit working model of children’s learning and problem solving, is essential for sustained, innovative, strategy-oriented instruction.

Self-Regulation: The Heart of Metacognition

As children mature they acquire, at different rates and to different degrees of competency, executive or self-regulatory skills. These skills form the basis for adaptive, planful learning, thinking, reading, and problem solving across a number of academic domains. Initially, the function of self-regulation is to analyze and “size up” tasks in order to select an approach to problem solving (hopefully, through the choice of a viable strategy). Later, during the course of learning, the job of self-regulation is to monitor the course of learning and, perhaps, to adjust or revise the strategy. These complex components of self-regulation are not easily acquired and generally are not the explicit focus of classroom instruction or discussion in their own right.

Motivational Beliefs: Linkages to Self-Regulation

Our approach to metacognitive theory has for some time contained two important assumptions: Every important cognitive act has motivational consequences, and, furthermore, these consequences potentiate future self-regulatory actions (Borkowski et al., 1989). For instance, as strategic and executive processes become more refined, the young student comes to recognize the importance of being strategic. As a result, feelings of self-efficacy emerge. Simultaneously, children learn to attribute successful academic outcomes to effort (and sometimes ability) rather than to luck or ease of the to-be-learned task. Over time, some children recognize two important aspects about themselves as students: (1) They enjoy learning for its own sake; that is, they become task-oriented rather than ego-
oriented (Nicholls, 1989); and (2) it is through their own self-directed actions that mental competencies are enhanced; that is, they develop “incremental” theories about the growth of the mind (Dweck, 1986).

The final link in the metacognitive chain is between motivational—personal states and future problem-solving behaviors. Borkowski and Muthukrishna (in press) have described the bidirectional relationships between learning and motivation in the following way:

A sense of self-efficacy and an enjoyment of learning flow from individual strategic events but eventually return to energize strategy selection and monitoring decisions (i.e., executive processes). It is this latter connection—the association between the learner’s reasons for learning and the deployment of self-regulation [italics added]—that has been absent from most instructional programs.

**How Working Models Augment Strategic Teaching**

By forming and continually updating their working models of children’s metacognitive development, teachers make explicit commitments to the importance of strategy-based approaches to instruction. The conscious development of working models during teacher training seems especially important. Models need to evolve gradually in the minds of novice teachers and become carefully fitted to their unique dispositions and histories.

It seems imperative for teachers to develop working models of metacognitive development in order to deliver inventive, flexible, strategy-oriented curricula. This idea is built around the rationale developed in other fields of inquiry about the importance of working models in guiding human decision making, as well as observations of seasoned, effective teachers, most of whom display a rich perspective on, and interest in, their own theories of children’s mental development (Pressley et al., 1991).

A working model provides a schema for organizing knowledge, a framework in which to incorporate new information, and a springboard for launching future actions. The adjective working emphasizes the dynamic nature of the concept: The concept helps provide interpretations of present situations and determines a range of alternative future actions (Bretherton, 1985). In the hands of a strategic teacher, a working model assists in decisions as to the next course of action for a class, a small group, or a particular student. The noun model implies an active, personal construction of one’s own theory, as well as its inevitable change in content and function with experience (Bretherton, 1985). Hence, there is ownership of each teacher’s working model of metacognitive development, because it has been carefully crafted, reshaped, and groomed through personal success and failure experiences.

In order for our preferred model of metacognition, or any similar conceptualization of strategy-based learning, to function properly; it must be “internalized and personalized.” It must be owned rather than borrowed. To “own” a model, in this sense, implies that a teacher must practice its major components, receive guidance in modifying related instructional techniques, adapt the model’s characteristics to the unique circumstances of the classroom, and update the model based on personal experiences. In short, an externally imposed model will do little to enhance flexible, transactional, constructively oriented teaching.

They characterize students with LD as “having difficulty with intentional learning accompanied by impoverished understandings regarding the nature and demands of learning, a limited repertoire of strategic approaches to learning, and negative motivational attributions and beliefs.” This description incorporates many of the features of the metacognitive model outlined above, provided that the strategic skills referred to by Palincsar and Klenk include lower level skills (such as summarization) as well as higher order, self-regulatory skills (such as decisions to select a strategy, monitor its effectiveness, and eventually revise it to meet the needs of changing circumstances).

From a metacognitive framework, why is reciprocal teaching (RT) so effective with students with LD? First, as Palincsar and Klenk claim, a sense of “playfulness” is engendered by the RT approach. Children come to see learning as a game rather than a chore or threat. Hence, the RT approach promotes the adoption of task orientations and actively counters ego-oriented reasons for performing academic tasks. Second, RT fosters the development of skills that constitute self-regulation: attending to the demands of each task, planning alternative approaches, selecting a reasonable choice, judging the success of performance as it unfolds, and, finally, trying a different approach if needed. It may be that RT enhances self-regulatory skills even more than it fosters the development of specific strategies. Finally, the motivational consequences of RT are considerable, especially for students with LD who have accumulated histories of academic failure and have formed self-defeating explanations for their failures in extremely personal terms (“I’m a dumb person and nothing I do matters”). Hence, RT has the potential for reshaping negative attributional beliefs, especially if the teacher is aware of their presence and possible destructive consequences, and intentionally provides supportive feedback designed to strengthen the self system.

**Applications to the Teachings of Literacy, Writing, and Mathematics**

**The Hidden Agenda in Reciprocal Teaching**

Palincsar and Klenk (this issue) have provided a rich description of how “supportive contexts” set the stage for the emergence of literacy learning skills in students with learning difficulties.
How is the concept of working models of children’s cognitive, metacognitive, and motivational development applicable to RT? Teachers who are consciously aware of metacognitive linkages are in good positions to reshape self-defeating beliefs, enhance feelings of self-efficacy, foster an interest in learning for its own sake, and, most importantly, associate such changes in the motivational–self systems with the emergence of independent, self-regulatory skills. For instance, it may be helpful to extend RT more explicitly into the delicate realm of motivational retraining, in order to provide students with LD with the energizing factors necessary for independent reading and thinking. Working models would likely be an asset to teachers in diagnosing and understanding the complexities of individual problems and in redirecting classroom dialogues aimed at reshaping personal beliefs about self-efficacy and learning orientations.

Social Contexts: Are Direct Interventions Appropriate?

Englert (this series) has provided a provocative account of how a social constructivist framework can be an effective model for developing writing programs for students with LD. The insightful, interactive dialogues she provides vividly document the value of teaching writing as a holistic, authentic enterprise. My main reservations about Englert’s article are twofold: (1) Can direct strategy instruction enhance, or speed up, the teaching of writing, and is such instruction necessarily antithetical to social constructivism? (2) Can metacognitive theory—especially its self-regulatory and motivational components—broaden the holistic approach to writing instruction?

A major criticism of strategy instruction has been that it does not place sufficient emphasis on the learner’s active construction of knowledge. Indeed, if strategy instruction considers the learner merely as a passive participant and the teacher as simply a manager, then children will work on highly specified strategies that have little meaning to them (Poplin, 1988a, 1988b). Englert refers to this approach as “emphasizing writings as the mastering of a series of skills”—children are simply drilled on what strategy to apply, and asked to memorize and reproduce strategy sequences. The resulting effects are often inconsequential and short-lived.

Although some constructivists describe direct strategy teaching as incorporating features of behavioral instruction and, hence, mechanical in nature, Pressley, Harris, and Marks (in press) believe that good strategy instruction is, in fact, constructivist. They argue that characteristics of constructivist instruction are consistent with the principles of effective strategy instruction. Their conclusions are based on qualitative research in school settings that practice strategy-based instruction (see Pressley, El-Dinary, et al., in press, for a review): Effective teachers have an explicit strategy-based teaching agenda, possess the ingredients of a working model of development, but nonetheless are constructivists in their approach to children’s learning. Students are stimulated to explore new strategies, with competent teachers guiding their students to discover the effectiveness of individual strategic sequences. Thus, understanding is constructed through interactions with the more competent problem solvers. The net result is that strategies evolve through a process of “guided discovery.”

An important component of good strategy instruction is scaffolding. The teacher assumes control in promoting attention to the task and to appropriate strategies, controls frustration, decreases the risk inherent in problem solving by reducing the number of steps in the process, and makes overt any discrepancies between the child’s response and more appropriate strategy use. Teachers do not merely deliver content to students but, rather, model strategic processing. During extensive practice sessions, effective teachers discuss and illustrate how content can be understood using study strategies. A critical aspect of this process is that the students’ responses have substantial impact on the course of student–teacher interactions.

Strategy instruction, including the kind of scaffolding provided to particular students, is unique because the components of teacher–student interactions are not scripted but, rather, develop as instruction unfolds. The nature and content of each interaction is determined by the teacher’s perception of a student’s progress in acquiring an individual strategy. Thus, the ultimate goal of strategy-oriented scaffolding is to develop student independence through the gradual internalization of the processes that are encouraged during instruction. Descriptive data, provided by Pressley, El-Dinary, et al. (in press), have revealed that effective teachers generally promote a view of reading as an interactive task of “constructing meaning”: Students come to realize that comprehension depends on a combination of their own personal effort and strategy use in searching for understanding. In short, the aim of good strategy instruction is to provide opportunities for students to personalize strategies. It should be noted, however, that teachers do not have to choose between constructed and instructed orientations to instruction. By incorporating the concept of guided discovery, strategy instruction provides ample opportunities for constructive processes to develop and operate effectively.

The main point here is that the effects produced by the holistic approach to writing might be enhanced by incorporating more explicit, direct instructions. This is especially true in the development of more regulated forms of writing, as well as in the motivational antecedents necessary for completing complicated, lengthy, and thought-provoking writing assignments. Perhaps an explicit concern for the motivational underpinnings of writing would aid the emergence of the self-regulating skills that seem essential for success in these more advanced writing tasks.
Teaching Mathematics: Decomposing Cognitive Regulatory Skills

In many respects, Montague’s (this issue) classification of cognitive and metacognitive strategies resembles the model discussed earlier in this article. The language used—strategy use, its regulation, and inspiration—is parallel to Montague’s concepts of cognitive—metacognitive strategies. More importantly, Montague’s data, though not terribly compelling (i.e., the maximum performance gain at transfer was around 20%), hint at the value of disentangling, at least conceptually, lower level strategies from the higher level executive routines that are necessary for their implementation. The issue of decomposition merits further consideration.

Is Self-Regulation Only in the Eyes of the Beholder? Assuming that significant temporal and setting generalization effects were detected in Montague’s study, can they “safely” be assigned to cognitive, metacognitive, or combined causes? The question of decomposing lower and higher level strategies is conceptually complex (see Borkowski & Turner, 1989). My own perspective is to insist that changing tasks represent the necessary conditions for demonstrating self-regulatory processes.

The concept of executive functioning (or self-regulation) has been operationally identified as follows: “A subject spontaneously changes a control process or sequence of control processes as a reasonable response to an unexpected change in an information processing task” (Butterfield & Belmont, 1977, p. 284). In other words, if strategy A is used with task X, and if task Y is then introduced, the subject is said to employ executive functioning if strategy B replaces A. Or, if strategy A on task X is found to be ineffective and hence is replaced by strategy B during the course of problem solving, the substitution becomes an instance of regulation. Hence, generalization tests can only indirectly measure the existence and adequacy of the executive system, in that the changes in materials and/or tasks from the training phase to the transfer phase provide an opportunity for observing the selection and revision of lower level strategies. The difficulty with Montague’s generalization tests is that they failed to allow for clear, unequivocal opportunities for “switches” in strategy use. Rapid, dramatic changes in strategy actions provide the most interpretable “moment” for inferring the operation of higher order regulatory processes.

Working Models and Classroom Teaching. Borkowski and Muthukrishna (in press) believe that a metacognition-based working model can supplement the general models of classroom interactive decision making, such as Shavelson and Stern’s (1981), by providing greater content specificity. Thus, the concept of the working model has profound implications not only for the way in which teachers interact with students, but also for the way they organize their short- and long-range classroom activities. Because the focus of instruction should be on each student’s learning process, the teacher becomes adept at hypothesizing about how a student is processing information at any moment and modifies the teaching strategy to alter not only the course of learning but also cognitive development itself.

In this light, teachers’ working models need “fleshing out,” in terms of possible interactive routines that might be drawn upon to spur metacognitive development. Hence, Montague’s focus on how strategy and regulatory skills might be taught (in sequence or in combination) is highly relevant as a framework for conducting classroom dialogues. The problem, however, is that her methods for instructing metacognitive processes (especially higher level executive skills) are underspecified. Teachers desperately need explicit examples of how to teach children to carry out task analyses, how to scan past experiences for a range of viable strategies, how to match task demands to the strategy set in order to select the best strategy, and how to monitor and revise the initial strategy selection.

It may well be premature to conduct instructional, manipulative research on self-regulatory processes. Perhaps qualitative research can best yield the rich dialogues that are needed to help students acquire essential self-regulatory skills as well as to foster the emergence of motivational states necessary for their implementation. Armed with more precise hypotheses about the nature of self-regulation and its interface with lower level strategies and motivational dispositions, experimental research might be in a better position to produce educationally significant findings.

ABOUT THE AUTHOR

John G. Borkowski is the Andrew J. McKenna Professor of Psychology at the University of Notre Dame, where he has taught for the past 25 years. He received his MA from Ohio University and PhD from the University of Iowa, and taught at Oberlin College for 2 years. Professor Borkowski’s research has focused on the development of metacognitive theory and its application to classroom settings. A special interest has been exceptionality, especially learning disabilities, mild mental retardation, and giftedness. Address: John G. Borkowski, Department of Psychology, University of Notre Dame, Notre Dame, IN 46556.

REFERENCES


Harris, J. Guthrie (Eds.), Promoting academic literacy. Orlando, FL: Academic Press.


Pressley, M., Harris, K.R., & Marks, M.B. (in press). But good strategy instructors are constructivist. Educational Psychology Review.


(Continued from p. 252)


---

### Bankson Language Test–2

Nicholas R. Bankson

- **The Bankson Language Screening Test (BLST), a popular and useful test of language competence in young children, has been revised. The new test, the Bankson Language Test–2 (BLT–2) provides examiners with a measure of children's psycholinguistic skills. The device is organized into three general categories that assess a variety of areas.**

1. **Semantic Knowledge** – Body parts, nouns, verbs, categories, functions, prepositions, opposites.
2. **Morphological/Syntactical Rules** – pronouns; verb usage/verb tense; verb usage (auxiliary, modal, copula); plurals; comparatives/superlatives; negation; questions.
3. **Pragmatics** – ritualizing, informing, controlling, imagining.

The BLT–2 will be a valuable assessment instrument for use by speech-language pathologists, special educators, and anyone else whose responsibility it is to assess language competence in young children.

**#0115 BLT–2 Complete Kit**

**$84.00**

---

*Boxed Version Available*