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KAREN R. HARRIS , PATRICIA ALEXANDER & STEVE GRAHAM

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Michael Pressley's Contributions to the History and Future of Strategies Research

Karen R. Harris

*Peabody College
Vanderbilt University*

Patricia Alexander

*Department of Human Development
University of Maryland*

Steve Graham

*Peabody College
Vanderbilt University*

The history of strategies research during the past quarter century has been a story of significant conceptualizations and reconceptualizations regarding the nature, development, and teaching of cognitive and metacognitive strategies. Theoretical models, empirical research, and discussions contributed by Michael Pressley have been central to explicating these central concepts and establishing the characteristics of effective strategies instruction. In this tribute, we cover defining issues that have shaped over 3 decades of strategies research and highlight Michael Pressley's role in bringing those issues to the forefront. Specifically, we discuss his contributions to what we know regarding the nature of strategies, including the role of human consciousness and intentionality in strategic behavior, multiple strategy use in learning and performance, and attributes of effective strategies instruction. Continuing issues and needs in strategies research impacted by the work of Michael Pressley are also addressed.

When Michael Pressley began graduate school at the University of Minnesota in 1973, he had already completed a senior college thesis at Northwestern University on the use of memory strategies by elementary school students. His early interest in the development of strategic behavior among children and the possibilities inherent in strategies instruction stayed with him throughout his career. He once wrote that he felt very fortunate to have started graduate school in 1973, to be part of the dawn of a new age in research in educational psychology, an age that saw the emergence of the constructs of metamemory, metacognition, cognitive self-regulation, new views of motivation, and recognition of the importance of strategies and their development (Pressley, 2005). Michael Pressley was to become not just part of this new age but a major architect in its development and future.

While a doctoral student, Pressley participated in studies related to children's self-reports of memory strategies

and children's abilities to monitor memory performance (Pressley, 2005), but his interests also turned to the use of imagery strategies to understand text and learn vocabulary (cf. Pressley, 1977). This began his career-long interest in both the normal development of, and instruction in, comprehension strategies. After completing his doctoral degree, Pressley continued his work in the areas of metacognition, memory, strategic procedures, and motivation. He and his colleagues developed the "good strategy user" model (cf. Pressley, 1986; Pressley, Borkowski, & Schneider, 1987; Pressley & Levin, 1983). Pressley and his colleagues "conceived of effective strategies use as good information processing" (Pressley & Harris, 2006, p. 267) and developed the highly influential "good information processor" model.

Effective strategies use was seen in this model as good information processing; with the good information processor model developed on the basis of a large body of research on strategy development from the 1960s through the 1980s. This perspective highlighted the importance of working memory capacity and long-term memory (including procedural and declarative knowledge), metacognition (especially use

Correspondence should be addressed to Karen R. Harris, Vanderbilt University, Peabody College, Box 328, Nashville, TN 37203. E-mail: karen.harris@vanderbilt.edu

of conditional and strategy utility knowledge), and motivation and effort. In addition, research on production, utilization, mediation, and retrieval deficiencies in terms of children's strategies research was an important focus, and one the Pressley contributed to frequently (Pressley & Harris, 2006).

One of the major points that Pressley worked to communicate to the field was that strategies use by young children was more complicated than was typically realized. For example, once research indicated that constructing mental images could be a useful strategy for children in acquiring meaning from text, the practitioner literature and professional development providers often recommended encouraging young children to do so while reading, in spite of the fact that research indicated that young children and poor readers can have great difficulty constructing such images and that this may actually interfere with performance (Pressley & Harris, 2006).

In addition, Pressley explored the issues related to whether it was best for children to develop strategic performance independently, with direction, or with instruction. He argued, along with other researchers, that although children do use increasingly effective strategies with age, children do not consistently discover and use the most effective task strategies (Pressley, 1979, 1986; Pressley et al., 1992; Pressley & Harris, 2006). Pressley concluded that one approach, to date, worked better than any other for ensuring that learners are able to use powerful strategies effectively and efficiently—strategies instruction (Pressley & Harris, 1990, 2006). Pressley developed the transactional strategies instruction approach for reading comprehension based on research across multiple domains, an approach that has consistently shown meaningful results among young readers (Pressley et al., 1992; Pressley & Wharton-McDonald, 1997). In the area of strategies instruction, he also made critical contributions to our understanding of how metacognitively rich strategies instruction helped promote both generalization and maintenance of strategic performance (Pressley, Graham, & Harris, 2006; Pressley et al., 1990). Further, when a series of critiques denounced strategies instruction as mechanistic and ineffective, in spite of the large research and literature base that showed effective strategies instruction clearly was neither, Pressley contributed strongly to the discourse on this issue, helping to keep this critical area of research moving forward (Harris & Pressley, 1991; Pressley & Harris, 1990; Pressley, Harris, & Marks, 1992).

Clearly, Michael Pressley was a leading researcher and contributor in strategies research, one who impacted the work of many other researchers as well as practitioners. We turn now to three areas in more depth, detailing his contributions in terms of conceptualizing and defining strategies, the importance of multiple strategies use in learning and performance, and establishing the characteristics of effective strategies instruction.

THE NATURE OF STRATEGIES

According to Rosenshine (1997), Gagné was perhaps the first to use the phrase “cognitive strategies” in the professional literature. Whoever should be credited with the coining of the term, Michael Pressley was among those researchers who installed the term in the educational vernacular and who helped to spark the onset of a fertile period of strategy research in the decades of the 1970s and 1980s. Since that early period, the term *strategy* has appeared with regularity in the educational literature. Sometimes the focus of the inquiry has been on general problem-solving strategies, such as predicting or summarizing. At other times, the interest has been on domain-specific strategies, such as those involved in finding the main idea in text or determining the most efficient procedure in solving an algebra problem. Across the ensuing decades of research, there has also been solid evidence that more effective learners demonstrate certain cognitive and metacognitive behaviors that facilitate learning and performance (Pressley, Graham, & Harris, 2006) and that there are significant benefits for explicit instruction in strategies for a range of academic domains, including reading, writing, and mathematics (Pressley & Harris, 2006).

Paradoxically, however, as the interest in strategies has grown, the specificity as to what actually constitutes a strategy has become increasingly muddled (Alexander, 2006; Alexander, Graham, & Harris, 1998). This is not an unusual occurrence within the educational literature where no established lexicon exists and, thus, where terminology can be loosely and variably applied (Alexander, Schallert, & Hare, 1991). Even in the current empirical literatures, the precise meaning of a strategy has remained elusive and vague. Still, until recently, there has been little attempt to rectify this growing problem by systematically unpacking the meaning of the term (Alexander et al., 1998; Pressley & Harris, 2006). One reason for the current situation is that the roots of the concept, strategy, have become forgotten or buried over the years. It also appears that many investigators presently engaged in strategy research or classroom intervention studies may simply operate under the assumption that the meaning of the concept is common knowledge and thus requires no explication or elaboration. This seems far from the truth. As Pressley et al. (2006) contested, many misunderstandings about strategies continue to linger. We concur with that perception.

Lately, calls for greater precision in the conceptualization and operationalization of strategies have been made (Afflerbach, Pearson, & Paris, 2006). There appear to be several catalysts for this new interest in the nature of strategies. For one, there was waning interest in the explicit teaching of strategies within particular research communities during the 1990s and early 2000 (see Pressley & Wharton-McDonald, 1997). Such explicit focus on strategies was judged as incompatible with prevailing orientations toward student learning and development, and funding priorities did not match

research on strategies instruction. This did not deter Mike; he stayed the course regardless of funding trends, remaining staunchly committed to strategy inquiry and publishing extensively on strategies in every decade since the 1970s. Thanks to Mike and others like him (e.g., Deshler & Tollefson, 2006; Harris, Graham, & Mason, 2006; Mayer, 1982), we have amassed impressive evidence of the power of strategies for reading, writing, memory, and pedagogical practice. Thanks to that solid empirical evidence and funding initiatives, educational researchers and practitioners have recently discovered or renewed their interest in strategies as tools for improved school achievement, especially in reading and mathematics. However, the period of waning attention meant that certain institutional memory about strategies was lost or overlooked.

Another force in the enhanced dialogue about the nature of strategies is the burgeoning literature in motivation (e.g., Boekaerts, Pintrich, & Zeidner, 2001; Wigfield & Eccles, 2000). As researchers have examined the effects of learner motivation in learning and development, questions about the relation between (a) learners' intentionality, interest, self-efficacy, and goals and (b) their strategic behavior have surfaced. These renewed efforts have left many pondering whether they are teaching students to be skillful or strategic readers or mathematical problem solvers and whether such distinctions really matter in the long run. To address these questions, we resurrect early writings on strategies by Pressley and colleagues as a way to unearth the forgotten or overlooked roots of this critical concept and juxtapose it to more recent works on this topic.

Defining Attributes of Strategies

Michael Pressley was unique among early strategy researchers because he made it his mission not only to study the effects of strategies but also to bring greater clarity to the very concept itself. Some of the defining attributes that Pressley and colleagues ascribed to strategies have been widely accepted and remain distinguishing characteristics in research and practice. In contrast, other attributes can be better described as more controversial or open to interpretation. For example, in 1986, Pressley argued that strategies are essentially synonymous with Ryle's (1949) notion of *procedural knowledge*. In essence, a strategy—whether heuristic or algorithmic in character—represents “how to” knowledge that can be applied in the resolution or solution of a given problem. “Good” strategies, according to Pressley, are those procedures that prove sufficient and necessary for accomplishing a given problem or target goal. Further, good strategies are presumed to consume as few cognitive resources as necessary.

A review of the literature has served to substantiate Pressley's initial depiction of strategies as procedural, essential, and facilitative (Alexander et al., 1998). Further, those core attributes apply whether one is describing a general, cogni-

tive strategy (Gagné, 1977) or a learning or study strategy (Weinstein & Mayer, 1986). They fit whether one is dealing with strategies specific to a certain academic domain (e.g., history or mathematics; Mayer, 1982; VanSledright, 2002) or a particular task (Harris & Graham, 1999a; Pressley & Schneider, 1997). They are also apropos for those procedures that teachers implement to promote student learning and academic achievement (i.e., instructional strategies; Pressley et al., 1990). Moreover, even when a strategy is efficiently or eloquently executed, researchers widely agree that time is required, cognitive resources are expended, and cognitive effort is consumed either in selection, execution, or evaluation of the strategic process (Garner, 1990).

Perhaps the most controversial dimension of Pressley's characterization of strategies pertains to the attribute of consciousness or intentionality. In essence, the critical question is whether strategies constitute deliberate or intentional acts or whether they can operate at the realm of the unconscious. Specifically, it was Pressley's (1986) contention that “although not always conscious, strategies are always potentially conscious and potentially controllable” (p. 140). As a member of an expert panel on the topic of strategy research at a symposium at the American Educational Research Association (McKeachie, 1996), Pressley maintained his position that strategies do not require purposeful or intentional effort on the part of the learner, even in the face of heated debate.

It is somewhat understandable that consciousness or intentionality did not play a significant role in Pressley's initial explication of strategies. When strategies became popular in the 1970s and 1980s, it did not matter to cognitive researchers concerned with information processing and memory whether the execution of these procedures was deliberate or not (Afflerbach et al., 2006). Both procedures contributed positively to the acquisition and recall of information and both differentiated between expert and novice performance. Consequently, even routine procedures were catalogued under the heading of strategies: “As such, mathematical algorithms and problem-solving routines qualify as strategies” (Pressley, 1986, p. 140).

Yet as the confusion between strategies and skills has grown, the distinction between typical or habitual cognitive behavior (i.e., skills) and more intentional or deliberate acts (i.e., strategies) has gained importance (Afflerbach et al., 2006; Alexander, 2006). On both sides of this issue, it would be fair to say that much of the intentionality or deliberation that separates mindful and habitual processing of these cognitive and metacognitive procedures would seem to occur upfront as a task or performance is gauged and a path to resolution or optimization identified. It is quite conceivable that learners let the strategic process unfold without continued monitoring or awareness once they are in the throes of the procedure, unless further concerns or reevaluation is required. Moreover, even though Pressley did not hold that consciousness was an essential attribute of strategies, he

recognized the significance of learner regulatory or control behavior in the efficient and effective execution of strategies. For example, in articulating his good strategy user model, Pressley (1986) wrote,

Specific strategy knowledge is emphasized in the good strategy user model because it is metacognition critical to tailoring cognitive processing to situational demands. Higher order strategies assemble strategy sequences on the basis of matching subtask requirements to specific strategy knowledge. Monitoring procedures make online adjustments through a consideration of task demands and specific strategy knowledge that is stored with each processing alternative that could be rotated into the sequence. Specific strategy knowledge plays a prominent role in all aspects of strategy functioning. (p. 141)

Critical Insights

As this brief overview suggests, we owe much to Michael Pressley when it comes to answering the question, What are strategies? Without some of the issues and debates that his empirical and theoretical writings helped put on the table, we would be ill equipped to conceptualize and operationalize strategies in our investigations of students' and teachers' learning and development. Further, especially given the current emphases in educational policy and practice sparked by such legislation as No Child Left Behind (Pub. Law 107–110, 2002), the potential for confusion as to what merits the label “strategy” versus other related constructs, most notably skills, remains great. Therefore, it is important that educational researchers, practitioners, and those involved in making educational policy revisit or familiarize themselves with such classic works as Pressley's (1986) articulation of the good strategy user model, where conceptual definitions and salient attributes are specified.

Certainly, this conceptual and operational specificity must be dealt with even before researchers can begin to formulate measures or interventions that are presumed to target students' general or domain-specific strategic processing. Until the educational community can fundamentally agree on what strategies are, for instance, how do we address the question as to how and when regulatory control is shifted to the learner, whether single or multiple strategies should be part of intervention, or what signs students or teachers should manifest when they are thinking or behaving strategically? Such conceptual and operational clarity is also required before educators create lessons or instructional environments that are expected to foster strategic behavior in students' and, thus, promote learning or achievement. For the sake of such conceptual clarity, therefore, we offer what we perceive as a viable definition of strategies that is duly reflective of the educational and psychological research. Specifically, we hold the following:

A *strategy* is a special form of procedural knowledge that is intentionally, purposefully, and effortfully applied to a given task or situation for which one's typical or automatic pattern of thought or behaviors is perceived as inadequate or nonoptimal.

There is no doubt that the extensive body of literature on strategies has been greatly enriched by the work of Michael Pressley; he worked diligently and consistently to establish the very attributes of the concept for generations of educational researchers and educational practitioners. Our own programs of research (e.g., Alexander, Sperl, Buehl, Fives, & Chiu, 2004; Harris et al., 2006) are a testament to that diligent and consistent—dare we say strategic—effort. His efforts influenced not only our programs of research, but also a large number of other researchers who also worked independently of Mike's research program.

FROM SINGLE COGNITIVE STRATEGIES TO A TRANSACTIONAL STRATEGY APPROACH

During the 1970s and much of the 1980s, cognitive strategy instruction research typically involved teaching single strategies. As cognitive researchers identified specific mental operations underlying successful performance in an academic area, applied researchers began to test if teaching a strategy for carrying out one of these mental operations enhanced performance. For example, in an area such as reading comprehension, most of the strategy instructional research during this era involved teaching youngsters a strategy for carrying out an essential comprehension process, such as summarizing text or asking questions about it (Pressley, El-Dinary, et al., 1992). Although it was clearly understood at this time that complex processes such as reading comprehension involved the use and coordination of a variety of strategies, instructional researchers focused their efforts more narrowly, isolating the impact of single strategies on students' understanding or recall of text.

This is not surprising for three reasons. One, demonstrating that acquisition and use of a specific strategy (i.e., how to form mental images of text) enhanced performance, (i.e., reading comprehension) as expected, provided further validation that the processes evoked by the strategy were important. This was a needed and critical step in the scientific process, as it yielded evidence that there was a causal link between specific mental processes and students' performance. Two, it is risky to build a multistrategy approach until there are some data on which strategies can be profitably taught. Three, educational psychologists and researchers, as a group, spend most of their time designing and evaluating smaller, focused interventions where they can more readily determine what is responsible for changes in performance (Pressley et al., 2006). As a result, some strategy instructional studies today still focus on the teaching of a single strategy.

Michael Pressley's first foray into the strategy instructional research arena aligned comfortably with the cutting edge research of the day. He examined the effectiveness of teaching a mental imagery strategy to young children to enhance recall of information read (Pressley, 1976). Within a relatively short period, Pressley became a key figure in strategy instructional research, publishing a seminal review of the literature in 1979 (Pressley, 1979) and providing influential summaries of individual strategies that worked (e.g., Levin & Pressley, 1981; Pressley, Johnson, Symons, McGoldrick, & Kurita, 1989). While he continued to investigate the effectiveness of individual strategies (see Pressley, Symons, McDaniel, Snyder, & Turnure, 1988), his interest turned quickly to teaching multiple strategies. Initially, this involved teaching a task specific strategy in conjunction with a self-regulatory strategy, such as self-monitoring. In the early 1980s, for example, Pressley and his colleagues began a series of studies (Ghatala, Levin, Pressley, & Lodico, 1985; Lodico, Ghatala, Levin, Pressley, & Bell, 1983) studying the effects of teaching students a specific memory strategy along with a strategy for monitoring the impact of applying the memory strategy. At this juncture, his focus expanded from just validating the effectiveness of an individual strategy (i.e., the memory strategy) to enhancing the effectiveness of that strategy by teaching students other strategies designed to help them regulate its use (Hilden & Pressley, 2007).

Why did Pressley's research so quickly venture down this new avenue? Based on his own research experience and the available evidence, he believed that cognitive strategy instruction improved academic performance (Pressley & Levin, 1983), but he became increasingly concerned that these effects were short lived (Pressley et al., 1990). To increase both durability and generalizability of strategy effects, he began to push the strategy instructional envelope by exploring if consistent and flexible strategy use could be promoted by teaching students processes for self-regulating the use of an inculcated academic strategy. This research along with the work of others (e.g., Meichenbaum, 1977) provided the underpinnings for current instructional approaches that teach students how to both apply and regulate their use of academic strategies (e.g., the Self-Regulated Strategy Development model; Graham & Harris, 1993; Harris & Graham, 1999b).

Pressley's vision of the good strategy user also helped set the stage for another shift in strategy research that began during the 1980s. According to this model, good strategy users have at their disposal a variety of strategies for accomplishing important goals; they know how and when to use them, and they can apply them flexibly and in combination with each other (Pressley, 1986). Thus, teaching single strategies in isolation is not enough, as students must learn how to apply and coordinate multiple strategies conjointly. This understanding helped fuel efforts to examine the effects of teaching multiple strategies to students (e.g., Englert, Raphael, Anderson, Anthony, & Stevens, 1991; Palincsar & Brown, 1984). For

instance, Pressley and his colleagues (Lysynchuk, Pressley, & Vye, 1990) tested the effectiveness of 13 sessions of reciprocal teaching (Palincsar & Brown, 1984), as a means for teaching four reading comprehension strategies (predicting, questioning, seeking clarification, and summarizing) to students in Grades 4 and 7 who were adequate decoders but poor comprehenders. Teaching multiple strategies to these students had a positive but moderate impact on generalized reading comprehension, as measured by a standardized reading test.

During the early 1990s, Pressley's work took another shift, as he began a series of descriptive studies examining how strategies were taught in school settings where there was at least some evidence that such instruction was effective (e.g., Pressley et al., 1991). By this time, Pressley's strategy work primarily focused on reading, and this was reflected in the sites he studied. He found that a small number of previously validated reading strategies were taught in these settings, with most of the instruction occurring during reading groups, with group members using strategies together to construct meaning. This instruction was long term, occurring over the course of semesters and years (not just for several weeks or months as was the case in most research studies). He further observed that students were explicitly taught how to coordinate the strategic processes they were learning and that both instruction and meaning making was transactional. Students and teachers conjointly constructed understanding of text as they interacted with it, using the strategies they were learning, with both students and teachers actions and responses influencing the direction of the discussion and the use and teaching of the strategies. He labeled this approach Transactional Strategies Instruction (TSI; Pressley, El-Dinary, et al., 1992).

Pressley, El-Dinary, et al. (1992) claimed that this type of instruction was advantageous for four reasons. One, it provided students with a diverse set of effective strategies as well as practice adapting and coordinating them with other strategies, within the context of what students' currently knew (durable and flexible strategy use). Two, it helped students understand when, where, and how to apply the strategies (metacognitive knowledge). Three, the transactional nature of instruction facilitated the acquisition of knowledge from material that was read. Four, students were motivated to use the strategies and knowledge they learned, as the teacher supported their learning (helping to ensure success) and each student contributed to the reading group and the interpretation of text.

The strongest evaluation of TSI was conducted by Pressley and his colleagues (Brown, Pressley, Van Meter, & Schuder, 1996). In this yearlong quasi-experimental study, low-achieving readers in five second-grade classes receiving TSI were compared to similar students in five second-grade classes where strategy instruction in reading comprehension was not evident. At the end of the school year, the TSI students used reading comprehension strategies more often, made more diverse and richer interpretations of text

read, acquired more content, and demonstrated greater improvement on measures of comprehension and word attack skills than children in the control condition.

In summary, Pressley's thinking and research, which greatly influenced the field of strategy instruction, moved in a relatively brief span of time from the teaching of individual strategies to teaching students how to regulate their use of individual strategies, to teaching a small number of strategies together for a short time, to teaching a small number of strategies together for longer periods in a transactional manner. As Pressley moved into the new millennium, he continued to be interested in multiple strategies instruction, but this was subsumed within his study of schools that produced exceptional levels of literary achievement (e.g., Pressley, Mohan, Raphael, & Fingeret, 2007). Although TSI was not evident in all of these settings, teachers did teach multiple strategies to students, while encouraging student self-regulation.

We suspect that if Michael Pressley had lived longer, this progression from single strategy instruction to transactional, multiple strategies instruction would have taken additional twists and turns, as he was constantly rethinking and challenging his own viewpoints. Instead of trying to predict this journey, we offer some direction for future research and issues that need to be addressed in terms of multiple strategies instruction. Although research to date indicates that multiple strategies instruction may be necessary for the most effective performance, more research is needed on this issue.

First, and perhaps foremost, we need much more research examining the effects of multiple strategies instruction when it is carried out for an extended period. Take for example the area of writing. A recent meta-analysis (Graham & Perrin, 2007) found that teaching planning and revising strategies to students in Grades 4 to 12 had a strong positive impact on the quality of children's writing (Cohen's $d = .82$). However, few of the studies involved teaching multiple strategies, and no study involved instruction that spanned the course of a single school year (most studies involved at best 1 month of instruction). In fact, we cannot identify a single study where students were taught multiple strategies across multiple school years.

A basic assumption underlying long-term multiple strategies instruction is that it produces learners who can skillfully and flexibly apply and orchestrate strategies when needed and that such instruction improves performance as well as produces more knowledgeable and motivated students (e.g., see Pressley's claims about TSI cited earlier). Rarely do researchers examine the multiple possible influences of strategies instruction (see Harris et al., 2006, as a counterexample), but such evaluations are needed to determine the overall impact of this instruction. Just as important, we know very little about durability of multiple strategies instruction (too often maintenance is not assessed, or when it is assessed, it is frequently limited to a single month). Pressley's concern about durability and flexibility of single strategy instruction may be a concern for multiple strategies instruction, too.

We need to pay careful attention to individual differences when considering multiple strategies instruction. For example, when Pressley and colleagues (Lysynchuk et al., 1990) examined the impact of reciprocal teaching with youngsters in Grades 4 and 7, the effects of treatment varied considerably across students. Future research needs to better isolate the variables responsible for such variability as well as determine the characteristics of children who are unresponsive to instruction. One important purpose of collecting such information is to use it to modify instruction so that is more effective with a broader range of students. Teachers are more likely to use an instructional procedure if it improves performance across their weaker, average, and better students.

It is also important to carefully consider what we know about development when designing multiple strategies instruction. The strategies that students need and can apply, as well as the methods for teaching them, are likely to differ as they move from initial acclimation in a domain to greater competence (Alexander et al., 1998).

Finally, Pressley often noted that strategies instruction places great responsibility on both teachers and students. Consider our earlier description of TSI and the many demands it makes of all classroom members. If we are to bring multiple strategies instruction to scale, we need to have a much better idea of how to prepare teachers for such instruction. This necessitates descriptive studies of how excellent schools and teachers implement and carry out such programs as well as systematic experiments examining different implementation models.

EFFECTIVE STRATEGIES INSTRUCTION

Michael Pressley's work has helped to establish much of what we know about how to conduct powerful strategies instruction in addition to the importance of teaching multiple strategies. Areas of research he has impacted include the components of strategies instruction, achieving maintenance and generalization, and issues related to teachers and schools in creating effective strategies instruction not just in research, but in practice.

Components and Nature of Strategies Instruction

Although initial models of strategies instruction varied in numerous ways, over time these models have converged to include typical components (Pressley & Harris, 2001, 2006), an evolution strongly influenced by Pressley's research and writing. A critical factor in this recognition of core components was the articulation of the good information processor model. According to Pressley and his colleagues, the good information processor knows a large number of strategies and understands when, where, and why these strategies matter; is reflective and planful, selecting and monitoring strategies wisely; believes in the incremental development of abilities

and the importance of effort; is intrinsically motivated, task oriented, and establishes mastery goals; accepts failure as a part of learning; has strong relevant knowledge and can access that knowledge rapidly; and has been supported in the development of these attributes by family, school, and society (Borkowski, Carr, Rellinger, & Pressley, 1990; Borkowski & Muthukrishna, 1992). The evolution of this model was based on the work on numerous researchers and theorists working from differing theories and viewpoints (cf. Pressley, 2005). Thus, it is not surprising that common components of strategies instruction have their bases in multiple areas of research from multiple theoretical perspectives, including research on development, behavior, learning, and motivation (cf. Pressley & Hilden, 2006). Together, these components work to create change across affective, behavioral, and cognitive attributes of learners (Pressley et al., 2006; Pressley & Harris, 2001).

Components common to many approaches to strategies instruction, including the TSI approach developed by Pressley and colleagues, include teacher modeling and explanations; powerful task strategies; self-regulation strategies (such as self-instructions, goal setting, self-monitoring, and self-reinforcement) for effective use of task strategies; support for working and long-term memory; teacher support (scaffolding) that is gradually faded until students develop independent use and ownership of the strategies; developing understanding of what is being learned, why, and where it can be used; and developing attributions for effort and strategy use and other means of enhancing motivation (Pressley & Harris, 2006; Pressley & Hilden, 2006; Pressley et al., 1990). These components alone, however, are not adequate in creating effective strategies instruction. Pressley and his colleagues strongly emphasized that the nature of strategies instruction is as important as its components. Good strategies instruction is based on collaboration among teachers and students; emphasizes interactive learning that requires understanding and meaningful processing; requires teachers to be enthusiastic and responsive to the instructional needs of learners varying in cognitive capacity, relevant knowledge, motivation, and other characteristics; and requires assessment of changes in affect, behavior, cognition, and metacognition.

Generalization and Maintenance

Effective strategies instruction is obviously complex. One factor contributing to this complexity, and to the components and nature of effective strategies instruction as we have described them, is the need to work for both maintenance and generalization of strategic performance. As we noted earlier, Pressley and his colleagues realized early in their research that effects of strategies instruction could be short lived if maintenance and generalization were not planned for and supported. Based on the research base and literature, Pressley argued frequently that maintenance and transfer of learned strategies requires strategies instruction that that is

metacognitively rich (as evidenced in many of the components and characteristics we have noted) and that demands self-regulated use of the academic strategies that have been developed.

In addition, maintenance and transfer of strategic performance must be planned for and supported (Pressley et al., 2006; Pressley & Harris, 2001). Learners must be supported in not only when and where a strategy can be used but also in how the strategy can be adapted to new tasks and situations. Initially assisting students in making such transfers and adaptations should be a part of strategies instruction, as should monitoring this over time. Further, the ability to adapt and transfer strategies must be supported over time, as development plays a role in students' abilities to understand strategies and their uses. Transfer and maintenance are also enhanced by the motivational information and development inherent in good strategies instruction, and motivation must be attended to over time. Motivational information includes recognition of the positive effects produced by strategies use and reflections on performance before and after strategies have been learned (Pressley & Hilden, 2006). Finally, maintenance of learned strategies will often require "booster" sessions, where students have the opportunity to revisit and use strategies they have learned but have not used for some time. Some students, especially those with learning problems, will need more frequent booster sessions. Although the components and nature of effective strategies instruction are indeed complex, research indicates that this complexity is warranted, because the effects of good strategies instruction are often quite large, with effect sizes frequently among the largest obtained in instructional research (Graham & Perrin, 2007; Harris et al., 2006; Pressley & Harris, 2006; Pressley & Hilden, 2006).

Considering Demands on Teachers and Students

As we noted previously, Michael Pressley and his colleagues frequently asked the field to consider the demands that effective strategies instruction places on both teachers and students, as these demands must be carefully thought out to enhance the transition from research to practice and to sustain effective strategies instruction in schools (Pressley, 2005; Pressley & Harris, 2006). In the area of reading comprehension strategies instruction, Pressley strongly voiced concerns about both the lack of adequate preservice and inservice professional development and the too frequently poor commercial materials being produced in this area (Pressley, 2005). Professional development in strategies instruction requires that teachers understand how to foster the development of metacognition and effective strategies use in their students. Teachers who lack this understanding are less likely to have adequate internal models of what it means to be reflective and strategic—or in other words, to be a good thinker—and thus less likely to focus on the development

of metacognition in their students and to understand the demands this places on students (Borkowski & Muthukrishna, 1992).

Without good professional development, it is unlikely that teachers will be committed to implementing strategies instruction. Further, like all effective interventions, strategies instruction can be done poorly, a concern shared by Pressley and others (Harris & Pressley, 1991). A shared concern among strategies researchers and others is that teachers may see the strategies as an end unto themselves rather than part of a strategic, problem-solving process that involves good strategy use (cf. Beck, McKeown, Sandora, Kucan, & Worthy, 1996; Sinatra, Brown, & Reynolds, 2002). They may, therefore, focus on teaching the strategies without sufficient investment in instruction to allow students to come to own the strategies and use them powerfully. Further, some research indicates that for students who struggle, strategies instruction must be well scaffolded to allow students to reach effective, independent use of the strategies; discussing, explaining and even modeling the strategies is not sufficient for these students (Harris, Graham, Brindle, & Sandmel, in press). Like other research-based interventions, strategies instruction is significantly underused in schools, and we face numerous challenges in large-scale implementation.

Further, Pressley and his colleagues voiced concerns regarding insufficient support in schools for teachers to implement effective strategies instruction. Such instruction takes time; Pressley noted that teachers typically need at least a year's experience and support with TSI before they are comfortable with the approach (Pressley, 2005; Pressley et al., 1989; Pressley et al., 2007). Not only must teachers have the time and support to become comfortable with strategies instruction, schools must also allow adequate time for this instruction to occur. Pressley argued that even using to learn a small repertoire of comprehension strategies can take a school year and considerable time in the classroom, with several years of strategies instruction likely necessary to truly internalize, maintain, and transfer the repertoire of comprehension strategies students need to be strong readers (Pressley, 2005; Pressley & Harris, 2006). Some teachers may expect results more quickly and not persist with strategies instruction in spite of its demonstrated effectiveness and lack of strong effects with other approaches. It is important that teachers, support personnel, and administrators plan for strategies instruction and supporting it within and across the grades (Pressley, Goodchild, et al., 1989).

Future Research Needs in Strategies Instruction

In each of these areas—components and nature of strategies instruction, obtaining generalization and maintenance, and demands on teachers and students—Pressley voiced calls for continuing research, using multiple research methods. In the area of components and nature of strategies instruction, we note two issues where he strongly encouraged further re-

search. First, he emphasized the need for longitudinal studies of strategies instruction in schools and its effects on students and teachers (Pressley, 2005; Pressley & Hilden, 2006; Pressley et al., 2007). He voiced concern that such research was expensive and required researchers who had strong experience with both research and strategies instruction, but he realized that such research was necessary to move strategies instruction forward in both research and schools. Scaling up studies such as this are badly needed. In addition, he also argued for the development of more and better measures to assess not only the impact of strategies instruction but also illuminate how it works (Pressley et al., 2006). Such measures will allow badly needed analytical research addressing the contributions of the multiple components and characteristics of today's strategies instruction models and will allow us to determine if instruction affected performance as intended.

Obtaining generalization and maintenance of strategic performance requires considerably more study and needs to be included in longitudinal research. We need greater understanding of how metacognitive knowledge, as well as other forms of knowledge, impact transfer and maintenance, and we need to know how increasing age affects these processes (Pressley & Hilden, 2006). As a part of this research, we need to know a great deal more about how cognitive monitoring, or awareness of how one is doing on a task, is related to maintenance and generalization (Pressley, 2005).

Pressley voiced many areas of need in terms of the demands strategies instruction places on teachers, students, and schools (Pressley, 2005; Pressley et al., 2006; Pressley & Harris, 2006; Pressley & Hilden, 2006). Among them is the need for careful analysis of what strategies need to be taught at and across grade levels and across multiple academic domains. Such an analysis will require the cooperation of teachers, specialists, administrators, and researchers. Research on effective professional development and obtaining successful implementation of strategies instruction in schools is also badly needed. Further, Pressley noted that we need to develop far better understandings of excellent teachers, including those who excel at strategies instruction, in terms of their practices and characteristics (Pressley, 2005). Individual differences among teachers may affect their abilities in terms of becoming reflective, excellent strategies instructors.

Demands on students also warrant a great deal more research. For example, we need to know much more about how individual differences interact with effective strategies instruction. Pressley suggested that researchers carefully study concepts such as mediational, production, and utilization deficiencies and investigate how individual differences here might be helpful in understanding when some students do not benefit as much from strategies instruction as others (Pressley, 2005; Pressley & Harris, 2006). The roles of procedural, declarative, conditional, and strategy utility knowledge similarly would be further illuminated by research examining individual differences in response to strategies instruction. Similarly, we need to know more about how to support and

develop working memory even more effectively, as working memory is critical to effective strategies use. Strategies instruction, and our understanding of learning and development, will be further enhanced by research in all of these areas.

CONCLUSION

In this article, we have traced Michael Pressley's emergence as a researcher in the area of strategies and strategies instruction and have highlighted his contributions to major conceptualizations and issues in the field. His work has had a strong and lasting impact in understanding the nature of strategies, their development, and strategies instruction. We have also highlighted a number of areas that his work has indicated deserve further attention and research. We close this article by noting two last issues that Pressley felt strongly about in terms of strategies research and practice.

First, to date strategies instruction research is most prevalent in four areas: reading, writing, mathematical problem solving, and foreign language learning (Pressley & Harris, 2006). Although further work remains to be done in all of these areas, there are many more areas where strategies and strategies instructional research should be conducted. Further, Pressley felt strongly that it is important for researchers to determine how use of sophisticated strategies, such as comprehension strategies, as well as cognitive monitoring and other metacognitive processes can become automatic habits of mind (Pressley, 2005). Pressley argued that such automatic habits, or skills, can be used without demanding a great deal of cognitive capacity to decide to use them or execute them once selected. In short, he argued that cognitive skills work much better when they are automatized than when students have to think hard about what to do and think hard as they do it.

Finally, in recent years, Michael Pressley voiced concerns regarding issues of ethics and educational intervention research, including strategies research. Although noting that educational interventionists have good track records with respect to research ethics, he believed there are challenges on the horizon (Pressley et al., 2006). Random assignment of teachers or schools to control conditions and interventions, including strategies instruction, may mean that individual teachers and students do not have the choice on whether to participate. Further, it may mean that interventions research indicates are effective are withheld from some students while they are studied further with others. Pressley believed that educational intervention researchers today need to confront the boundaries of ethical and unethical intervention research, particularly in light of the demands and incentives from governments to conduct randomized field experiments not only in classrooms but also in schools and school districts. This concern turned out to be farsighted. As we write this article, for example, Congress is weighing whether to abort plans

for a \$5 million evaluation of the national Upward Bound program, with the major issue being that individual Upward Bound programs would be forced to participate in evaluations that deny services to control-group students (Viadero, 2007).

Michael Pressley influenced not only us but also so many others in the field. He served as an early career mentor to each of us, as he did to numerous other researchers, always giving unstintingly. When he became aware of good work in the field by other researchers, he shared it widely, always promoting the importance of the work regardless of the fact that it was not his own, and he pushed other researchers for yet more. Further, he reached out to many other researchers, including many early in their careers, with offers to collaborate. Early career scholars, indeed all of us, can learn much by emulating these behaviors.

We close with one of our favorite stories about Mike, shared with us by his wife, Donna (personal communication, 2007):

Mike was doing an observation in the back of a classroom. The class was writing books that they were going to "publish" and the teacher was talking about the parts of a book. When they talked about the dedication page, a rather disgruntled student sitting close to Mike grumbled that no one would ever dedicate a book to him. Mike told him he would see what he could do about that, and you never know what could happen. The student just stared at him rather skeptically. I don't think that the student had a clue about the books Mike wrote. Mike was just a grown up sitting in the back of the classroom. When Mike got home, he was chuckling as he told me this story. I asked him what he was going to do, and without any hesitation he said that he was going to dedicate his next book to this boy. And he did.

The book was *Reading Instruction That Works: The Case for Balanced Teaching* (3rd ed.), and Donna made sure that the student received a copy. The field of strategies research has lost one of its preeminent researchers and thinkers, but the work of Michael Pressley will clearly impact us for years to come. He has, indeed, left a legacy for researchers and practitioners.

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