Cognitive Strategy Instruction

Janice A. Dole
University of Utah

Jeffery D. Nokes
Brigham Young University

Dina Drits
University of Utah

To appear in G. G. Duffy & S. E. Israel (Eds.), *Handbook of research on reading comprehension*. Erlbaum.

Cognitive Strategy Instruction
There was a time, and not that long ago, when few people knew what cognitive strategy instruction was. A relatively small group of educational psychologists and reading researchers had conducted two decades of research on cognitive strategies, but they were the only ones familiar with the work. Cognitive strategies and the instructional research behind them remained in rather esoteric research journals read by few other than the people who conducted the research.

Today, though, toward the end of the first decade in the twenty-first century, all reading educators have heard the term *strategy instruction*, and many of them incorporate strategy instruction into their literacy programs. In the translation from research to practice, strategy instruction has made its way into mainstream education. Teacher resource books about teaching strategies abound (Blanchowicz & Ogle, 2001; Harvey & Goudvis, 2000; Keene, 2006; Keene & Zimmerman, 1997; McLaughlin & Allen, 2001; Oczkus, 2004; Outsen & Yulga, 2002; Stebick & Dain, 2007; Tovani, 2004; Wilhelm, 2001; Zwiers, 2004), and practitioner journals frequently publish articles about teaching strategies to both elementary and secondary students (Clark & Graves, 2005; Fischer, 2003; Liang & Dole, 2006; Lloyd, 2004; Neufeld, 2005; Raphael & Au, 2005; Salembier, 1999; Samblis, 2006; Smith, 2006; Stahl, 2004; Wood & Endres, 2005; Zygouris-Coe, Wiggins, & Smith, 2005). Some educators think that teaching comprehension means simply teaching strategies. In the transition from research to practice, strategy instruction has morphed into so many things that it no longer has a shared meaning.

The purpose of this chapter is to help researchers and educators understand cognitive strategy instruction from both research and practice perspectives. It could be argued that the literature is currently saturated with research, articles and books about
cognitive strategies. Nevertheless, there is still much to write about cognitive strategies—both in terms of more recent research and also in terms of how the construct has made its way into the reading instruction practitioner field.

This chapter first focuses on defining cognitive strategy instruction in terms of its genesis and on presenting the landmark studies that defined the field. Then, the chapter reviews several more recent sets of studies in which cognitive strategy instruction was embedded in conceptual and programmatic frameworks for comprehension instruction. Third, the chapter reviews more recent research in the content areas in which cognitive strategy instruction has been adapted for instructional purposes in secondary content areas, especially history. After this research has been reviewed, we take a more applied examination of cognitive strategy instruction as it has been conceptualized in practice. Here we make conceptual distinctions between strategies and the plethora of related constructs in the field today. We conclude with a discussion of the important distinction between the curriculum of cognitive strategies and the instructional delivery system used to teach strategies.

**The Genesis and Key Studies in Cognitive Strategy Instruction**

We begin the chapter with a definition of cognitive strategies and the foundational body of theory and research in cognitive strategy instruction drawn from early cognitive psychological work conducted in the 1970s and 1980s.

**Genesis**

The genesis of cognitive strategies and cognitive strategy instruction lies in the field of psychology. From the ashes of behaviorism and after 50 years of denying the existence of the mind, cognitive psychologists began to focus on the mind exclusively,
thinking about how humans process, organize and store incoming information in memory. Many early cognitive researchers represented the mental processing that occurs in the mind as general activities or cognitive strategies for handling incoming information as well as metacognitive strategies for monitoring and evaluating the understanding of that information (Greeno, Collins, & Resnick, 1996; van Dijk & Kintsch, 1983). It is these constructs that form the foundation of cognitive strategy instruction.

**Cognitive strategies.** What is a strategy? At its simplest level, a strategy is a routine or procedure for accomplishing a goal. A cognitive strategy is a mental routine or procedure for accomplishing a cognitive goal. Van Dijk and Kintsch (1983) provide an excellent description of cognitive strategies:

Thinking and problem solving are well-known examples: We have an explicit goal to be reached, the solution of a problem, and there may be specific operations, mental steps, to be performed to reach that goal. These steps are under our conscious control and we may be at least partly able to verbalize them, so that we can analyze the strategies followed in solving the problem. (p. 68)

Cognitive strategies, then, are mental routines or procedures for accomplishing cognitive goals like solving a problem, studying for a test, or understanding what is being read. While this definition may seem mundane, complications arise in the literature on cognitive strategies as different researchers have focused on different aspects of cognitive strategies over the last several decades. The earliest work using the term strategies focused on general strategies for solving problems (Newell & Simon, 1972). Some of these strategies include trial and error in which an individual randomly tries various ways of solving a problem, means-end analysis in which an individual examines the end and
looks at the sequential steps to get to that end, and working backward to solve a problem. One of the hallmarks of these strategies is that they are transferable across many types of problems.

Van Dijk and Kintsch (1983) identified many types of strategies used for different cognitive tasks. These strategies include language strategies, grammatical strategies, discourse strategies, cultural strategies, social strategies, interactional strategies, pragmatic strategies, semantic strategies, schematic strategies, and stylistic and rhetorical strategies. They further delineated specific strategies involved in comprehension, including sociocultural strategies, communicative strategies, general reading strategies, local comprehension strategies, local coherence strategies, schematic strategies and knowledge use strategies.

Weinstein and Mayer (1986), in their review of research on the teaching of learning strategies, conceptualized two main categories of strategies, 1) teaching strategies, such as the teacher presenting material in a certain way, and 2) learning strategies, such as the learner summarizing material in a certain way. They further differentiated eight categories of learning strategies, including basic and complex rehearsal strategies, basic and complex elaboration strategies, basic and complex organizational strategies, comprehension monitoring strategies and affective and motivational strategies.

As they reviewed the research, Pressley and Woloshyn (1995) identified a number of cognitive strategies for various tasks in different domains of knowledge. For example, they identified strategies for analyzing and solving problems (general strategies), memorizing a series of events or a timeline for a test (study strategies), planning,
drafting, reviewing and revising a critical essay (writing strategies), and self-questioning, constructing mental representational images, activating prior knowledge, rereading difficult-to-understand sections of texts, predicting or summarizing a text (reading strategies). What the strategies have in common is that they are cognitive procedures that aid in performance of specific cognitive tasks.

*Metacognitive strategies.* A specific set of general cognitive strategies is particularly relevant to comprehension; these are called *metacognitive strategies.* Metacognitive strategies are routines and procedures that allow individuals to monitor and assess their ongoing performance in accomplishing a cognitive task. For example, as students are studying for a test they might ask themselves, “Are things going well? Is there something I don’t understand? Am I learning this material? Are there any gaps in my knowledge or understanding? If I do find a gap in my knowledge, do I know what to do about it? Can I repair the gap so that my understanding is complete?” Students who use metacognitive strategies are aware of the cognitive resources they have to accomplish a goal, they check the outcome of their attempts to solve problems, they monitor the effectiveness of their attempts, they test, revise and evaluate their strategies for learning, and they use compensatory strategies when comprehension breaks down. These compensatory strategies restore understanding and learning (Baker & Brown, 1984).

Metacognitive strategies have most often been conceptualized as comprehension monitoring (Weinstein & Mayer, 1986). Wagoner (1983) defined comprehension monitoring as “an executive function, essential for competent reading, which directs the reader’s cognitive processes as he/she strives to make sense of incoming information” (p. 344). As students read, they often think about and monitor their ongoing understanding of
a text. Baker and Brown (1984) reviewed an extensive body of work that demonstrated the kinds of metacognitive strategies or comprehension monitoring that good readers execute as they read. They found that good readers make hypotheses about the most likely interpretation of a text and then check that interpretation against the new, incoming information in a text. As they read, the original hypotheses are either confirmed or discarded for new hypotheses. Comprehension monitoring proceeds in this way until a breakdown occurs. Once a breakdown occurs, then good readers must decide whether further action is necessary. If it is, then good readers decide what type of compensatory strategy is most likely to repair the comprehension breakdown.

Another way to understand comprehension monitoring is to contrast good readers with young and less skilled readers who fail to use metacognitive strategies as they read. They proceed, instead, on “automatic pilot” (Duffy & Roehler, 1987), failing to notice when comprehension breaks down. Many young and less skilled readers have little awareness that they must make sense of text, they are often poor at evaluating their own performance, and they do not keep track of how their comprehension is proceeding (Baker & Brown, 1984). Further, they often do not know how to repair comprehension breakdowns.

A key issue in metacognitive strategies is the extent to which these strategies are under the conscious control of readers. Even though there is an assumption that metacognitive strategies are conscious processes, it is also understood that readers can proceed without monitoring their comprehension at a conscious level. Paris, Wasik and Turner (1991) refer to strategies as “actions selected deliberately to achieve particular goals” (p. 611). Strategies are conscious, deliberate and open to inspection. However,
with time and practice, the use of both cognitive and metacognitive strategies can become less effortful and can be carried out more efficiently and effectively (Pressley & Afflerbach, 1995; Schneider, Dumais, & Shiffrin, 1984).

Knowledge about cognitive and metacognitive strategies. Thus far, we have defined cognitive and metacognitive strategies. In their influential essay, Paris, Lipson, and Wixon (1983) applied the research on these strategies to reading comprehension and to students who become good, strategic comprehenders. They asked the question, “What would it take for students to become strategic in their reading?” They identified several of the factors necessary for students to become strategic readers, specifically the “interrelations among awareness, motivation, instructional agents, and strategic behavior” (p. 294).

Paris et al. (1983) argued that strategies are deliberate actions, and they can often be difficult to learn and employ. Their value lies in their social nature, in that students and teachers can “publicly” share, evaluate, and understand the functions and the value of the strategies. This public nature of strategy understanding and application is especially important for beginning and low-achieving readers, because they are not aware of how to employ strategies or what purpose or function they serve.

To accept and use strategies, beginning and low-achieving readers must understand the purpose of the reading task and the different actions they can take to achieve their reading goals. Students must have the knowledge about strategies to choose to use them. A major contribution of the Paris et al. (1983) work was the researchers’ addition to our understanding of the knowledge readers must have to become strategic readers. In addition to declarative and procedural knowledge, the authors added the idea
of conditional knowledge. Declarative knowledge is the knowledge about what strategies are, and can “help in setting goals and adjusting actions to changing task conditions” (p. 303), and procedural knowledge is knowledge about how to employ strategies. Conditional knowledge adds the critical elements of “knowing when and why to apply various actions” (p. 303). Different strategies can be useful in different circumstances; not all strategies are useful all the time. Strategies must be used flexibly since different strategies are most effectively used in specific situations. By providing reasons to apply specific strategies in certain situations, conditional knowledge also gives value to these strategies.

To become strategic readers, however, these three kinds of knowledge are necessary, but not sufficient, the authors argued. Motivation is also necessary. Students must be persuaded to see that the goals of the strategies have personal relevance and meaning for them, that the various strategies have value and utility for them, and that self-managing their time and effort in using the strategies will aid them in achieving their reading goals.

The social context, including parents, peers, and teachers, assist students in acquiring both the motivation and the knowledge to use strategies by helping them understand that the strategies they are learning are useful and necessary. To use strategies effectively in learning to read, the authors concluded, children must be told when and why to use strategies in order to become agents of their own strategy use, and “conditional knowledge is the glue that holds skill and will together” (pp. 310-312).

A further clarification of the nature of strategic reading comes from Alexander, Graham, and Harris (1998). They describe strategies as procedural in the sense that
individuals must know specific procedures, whether these are algorithms or heuristics, in implementing a strategy. Strategies are *purposeful* in that readers have to make a choice in the use of a particular strategy. They are *effortful* in that strategy use is time-consuming and requires a certain amount of cognitive resources. Strategies are *willful* in that readers must have the motivation to actually use the strategy; knowing how to use it is not enough. Strategies are *facilitative* in that selecting and using strategies appropriately leads to better performance on cognitive tasks. Lastly, strategies are *essential* in that individuals are unlikely to achieve competence or proficiency in cognitive tasks without them.

*Landmark Studies*

The facilitative and essential aspects of strategy use are the focus of this next section of the chapter. It is one thing to demonstrate that humans use cognitive and metacognitive strategies to process and monitor incoming information, to solve problems and to comprehend. It is quite another to demonstrate that these strategies can lead to improved performance. Yet, the cognitive research conducted during the 1970s and 1980s is replete with studies demonstrating that, in fact, cognitive and metacognitive strategies can be taught, and when taught, they can lead to increased performance. In this section, we highlight some of the key studies within this genre of research. We recognize that these are a very few among literally hundreds of studies demonstrating the effectiveness of strategy instruction.

We delimit our area of concern only to instructional studies in which groups of students were taught to use cognitive and metacognitive strategies, since this chapter concerns cognitive strategy *instruction*. As we do this, we do not differentiate cognitive
from metacognitive studies, as many of the instructional studies we review did not make such a differentiation. Thus, even though we defined each separately for this chapter, throughout the rest of the chapter, cognitive and metacognitive studies will be discussed together as cognitive strategy instructional studies.

Single strategy studies. It is fitting to begin this review with an early study of Pressley (1976) since he was arguably the most influential proponent of cognitive strategy instruction and since his books remain among the seminal works of the practical application of cognitive strategy instruction (Gaskins & Elliot, 1991; Pressley & Woloshyn, 1995; Wood, Woloshyn, & Willoughby, 1995). In one of the first comprehension instructional studies, Pressley (1976) measured the effectiveness of training 86 third-grade students to use mental imagery on their reading comprehension scores. Students in the experimental condition were taught to create mental images of a text by being told that creating mental images was an effective way to remember, being shown pictures that contained the necessary elements for the text, and being given practice in this procedure. Students in the control condition were instructed to recall the text and “do whatever you can or have to in order to remember the story” (p. 257). Results showed that average and poor readers in the experimental groups answered significantly more questions correct than their counterparts in the control group. There was little difference in scores between good readers in the two conditions. Pressley (1976) concluded that when 8-year-olds are given training and practice in using mental imagery, consistently reading first then visualizing second, they showed improvements in their memory of a concrete and easy-to-understand story.
Another early seminal study was conducted by Singer and Donlan (1982) who tested whether high-school students could be trained in generating specific types of questions about complex short stories, and whether this training increased their comprehension scores. Singer and Donlan’s study was one of the first, if not the first, to determine if students could generate their own questions, instead of answering questions the teacher had generated. Twenty-seven 11th-grade students were divided into an experimental treatment group and a traditional instruction group, with both groups using the same six stories during the experiment and taking the same daily 10-point comprehension test. Instruction in the traditional group involved teacher-posed questions about the stories and student essay writing. The experimental group received instruction in five basic story elements (a problem-solving schema), one each day. Results indicated that knowing a problem-solution schema along with use of general and story-specific questions during reading helped students improve in their comprehension of short stories. The authors concluded that reading complex stories required training in these problem-solution strategies, and that high-school students were able to acquire this knowledge.

In a series of related studies, Brown and Day (1983) measured developmental growth in children’s and adults’ ability to use five basic “macrorules” of summarizing expository texts. The rules, some of which are taken from Kintsh & van Dijk (1978), are, a) deletion of unnecessary material, b) deletion of redundant information, c) superordination (i.e., substituting a superordinate term for instances of that term), c) selection of topic sentences, and d) invention, or creation of topic sentences that describe an implicit main idea.
Participants in study one were 18 fifth graders, 16 seventh graders, 13 tenth graders, and 20 four-year college students. They were instructed to read a text three times, then write what they considered to be a good summary, followed by a constrained, 60-word summary. Findings revealed that even young children were able to perform certain rules of summarization. The probability of effectively using the superordination and selection rules increased with age. Use of the invention rule was infrequent by all groups, and use increased with age.

Next, two experts, who were college rhetoric teachers, performed a think aloud while generating a summary. The experts performed perfectly on the deletion rules, and far superior to college students on the superordination and invention rules, and no differences between groups was found in the selection rules. Further, unlike the younger students, the experts combined ideas across paragraphs and wrote their summaries around topic sentences.

The final experiment was a repetition of the procedure from the first experiment; however, participants were 20 junior college students, a group considered less successful at using basic reading skills, and therefore, considered novice summarizers. Results showed that these students utilized the deletion rules at the same level as the four-year college students. However, they performed at a level similar to seventh- and tenth-grade students on the remaining three rules.

In sum, the researchers found a clear developmental pattern for emergence of rule use: deletion emerges first, followed by superordination, then selection, and, much later, invention. The authors explained that, “we believe that the five rules differ in their ease
of application because they demand different degrees of text manipulation on the part of the learner” (Brown and Day, 1983, p. 12).

Brown, Day, and Jones (1983) also looked developmentally at students’ ability to summarize lengthy, complex stories. This time, participants were fifth-, seventh-, and eleventh-grade and first-year college students. Students were given stories to read and instructed to remember as much as possible all of the ideas in the story. A week later, they summarized the texts using unlimited words, a 40-word limit, and a 20-word limit.

Results again indicated developmental trends in students’ ability to write summaries. College and eleventh-grade students were more likely than younger students to, a) plan ahead for efficiency and effectiveness of writing summaries, b) recognize the importance of higher-level words in writing summaries and, c) “condens[e] more idea units into the same number of words” (p. 977). The authors concluded that this process of using judgment, intention, knowledge and skill in succinctly summarizing lengthy texts was a “late-developing skill that continues to be refined throughout the school years” (p. 977).

Taylor and Beach (1984) studied the effects of training students to use a text structure strategy on their ability to comprehend and remember texts and to write essays. Participants were 114 seventh-grade students, who were divided into three groups: experimental instruction, conventional instruction, and no instruction. Students in the experimental condition received seven weeks of “instruction and practice in how to produce and study a hierarchical summary of social studies material that they read” (p. 139). This included making outlines that identified key passage ideas, generating main idea statements, and listing important supporting details. The conventional group
received instruction in completing practice questions on main ideas and details from the text.

Results from this study indicated that the experimental group had significantly higher recall than other groups on an unfamiliar passage. However, on the recall of familiar texts, the experimental and conventional groups showed similar scores, which were significantly higher than the group that received no instruction. Results from the short answer and writing tests revealed no significant differences between the experimental and conventional groups, with both of these groups doing significantly better than the group that received no instruction. In sum, the hierarchical text structure training had the greatest effect on enhancing students’ recall of unfamiliar, as opposed to familiar, text, which indicated that students were able to transfer the strategy to a new reading context.

Another pair of landmark studies was conducted by Idol and Croll (1987) and Idol (1987) who examined story mapping as a strategy in aiding reading comprehension. Students with learning disabilities and a heterogenous group of 3rd- and 4th-grade students participated in two separate studies. A basic assumption in these studies was that all texts shared a basic organizational structure and that a link between students’ knowledge structures (schemata) and text structure would facilitate comprehension. In the first study, results from responses to the reading comprehension questions indicated that all students improved through the intervention, a finding that suggests “mapping of story components is an effective way to build structural schemata” (p. 225). Additionally, the four students who completed all phases of instruction maintained, on a significant level, the improved reading comprehension after the instruction was discontinued.
In the Idol (1987) study, twenty-two students were randomly assigned to one of two intervention groups, and five students were in a control group. A multiple-baseline design was used, where groups received the same intervention, begun on different days. The primary measure of comprehension was responses to the comprehension questions. Results showed a significant increase in the average scores of both intervention groups with story map use. Further, the low-achieving and learning disabled students showed a general and maintained improvement in comprehension scores. The author concluded that explicitly stating and explaining expectations in using the story mapping strategy created comprehension improvements in heterogeneous students’ comprehension scores. Further, being grouped with mixed-ability students did not hinder high-achievers’ performance, suggesting that grouping students by ability level may not be necessary.

The single strategy studies we have reviewed are exemplary of dozens of cognitive strategy instructional studies conducted during the 1980s. They each demonstrated that teaching students to use a single strategy—like using imagery (Pressley, 1976), self-questioning (Singer & Donlan, 1982), summarizing (Brown & Day, 1983), using text structure (Taylor & Beach, 1984) and using story maps (Idol, 1987)—can lead to significant improvement in reading comprehension. We now review multiple strategy studies in which researchers have taught several strategies in an effort to improve reading comprehension.

*Multiple strategy studies.* Arguably the single most important work on cognitive strategy instruction designed to improve reading comprehension was a set of landmark studies conducted and summarized by Palincsar and Brown (1984). These researchers developed an instructional intervention called reciprocal teaching. Reciprocal teaching
involved instruction of a set of four cognitive and metacognitive strategies: summarizing, questioning, clarifying difficult parts of text, and predicting. The essential elements of reciprocal teaching included the initial modeling of the use of each the four strategies, small groups of students practicing the strategies with a peer acting as teacher, and the scaffolding of instruction toward independent use of the strategies by students.

In one study, seventh-grade struggling readers were divided into four groups in a laboratory setting: reciprocal teaching, another intervention, and two non-intervention groups. In the reciprocal teaching condition, the instructor assigned a passage of text and engaged students in a discussion of the four cognitive and metacognitive strategies. After reading the passage either the student or teacher lead the dialogue with peers utilizing the four strategies to assist in comprehending the passage. Students worked in peer teaching groups practicing the use of the strategies until they could use the strategies independently. Throughout, instructors provided students with support as they learned the strategies and told students explicitly that these strategies were beneficial for understanding what they were reading. The measures of learning included dialogic changes, transfer tests, generalization tests, daily comprehension tests, and standardized reading tests. The second study was essentially a replication of the first except for one important difference. It was conducted in a naturalistic setting with classroom teachers and students in their regular reading groups. The results from both studies were similar, revealing that students in the reciprocal teaching groups outperformed the other groups. Palincsar and Brown’s work led to a series of studies on reciprocal teaching in various settings (see Rosenshine & Meister, 1994 for a review of this work).

A second landmark study on cognitive strategy instruction was conducted by
Paris, Cross, and Lipson (1984). Their study was, at the time, “one of the few experimental manipulations of metacognition and perhaps the only one to provide longitudinal, cross-sectional data from a classroom curriculum and intervention” (p. 1250). This study was key, in other words, in adding to the relatively new research base on training studies and to the overall understanding of strategy use and metacognition in reading. The researchers described metacognition as having two main components, a) declarative, procedural, and conditional knowledge about what strategies are, how to use them, and when and why various strategies should be used, and b) knowing how to “evaluate, plan, and regulate [one’s] own comprehension in strategic ways” (p. 1241).

Participants were 87 third graders and 83 fifth graders from eight classrooms. Two classrooms from each grade were in the treatment group that received four months of the strategy curriculum, and two from each grade were control classrooms. In the ISL training a researcher explained the strategies and their appropriate application to students, modeled strategy use, and providing guided and independent practice with feedback from the instructor and peers. Results showed that groups receiving the ISL training significantly outperformed control groups on the cloze and error detection tasks, which the authors concluded showed that the students were using the instructed strategies. The multiple-choice test results (of relative knowledge) indicated that almost all of the students from the treatment groups learned the strategies from the ISL training rather than from a different source. However, no significant differences were found between the two groups on two standardized test measures.

The authors explained that the value of the study is that it shows convincingly that through direct instruction, group work, and open discussion about strategies, students in
the classroom setting can be taught how, why and when to use reading strategies, and that they begin to use them on their own. Further, “we can infer from their increased performance on strategic tasks that they also learned how to evaluate, plan, and regulate their reading” (p. 1250). In sum, the study demonstrated that metacognition in reading can be taught to students.

Two studies conducted by Duffy and his colleagues (Duffy, Roehler, Meloth, Vavrus, Book, Putnam, & Wesselman, 1986; Duffy, Roehler, Sivan, Rackliffe, Book, Meloth, Vavrus, Wesselman, Putnam, & Bassiri, 1987) were also pivotal in demonstrating the possibility and value of teaching cognitive strategies to students. The purpose of the studies was to examine whether teachers could be successfully taught to provide explicit instructions to students, whether these explanations improved students' awareness of the need to use strategies and how to apply them, and whether these explanations improved student achievement. Twenty-two fifth-grade teachers and their low reading group students participated in the first study and 20 third-grade teachers and their low reading group students participated in the second study. Trained teachers were compared to control group teachers who received no training.

In the first study, researchers taught teachers how to transform typical basal skills instruction into cognitive strategy instruction. Classroom teachers were instructed in how to explicitly discuss the mental processes and cognitive strategies involved in comprehension, focusing on the "reasoning" and problem-solving nature of strategy use instead of skill-based procedures. Specifically, teachers were trained to discuss openly with students the strategy (skill) they were learning, why they were learning it, why it was important, and how and when they could use it as they read.
The researchers found that, a) treatment group teachers were more explicit in their instruction than control group teachers and, b) this explicit instruction improved students’ awareness of the need for strategy use and their metacognitive awareness of strategies. Additionally, results from the second study showed that treatment group students scored higher than controls on most parts of the nontraditional measures of reading achievement. Treatment students also scored higher on a maintenance test that was administered five months after the conclusion of the study.

Advances in Cognitive Strategy Instruction

Thus far, we have reviewed several landmark studies in cognitive strategy instruction. These included seminal works that laid the groundwork for understanding what strategies are and how to effectively teach them to students. We have not completed an exhaustive review, and we have limited our review mainly to studies that have influenced the field of reading. These studies were completed before 1990, and these and other studies have been reviewed extensively in several sets of research syntheses (Dole, Duffy, Roehler, & Pearson, 1991; Paris, Wasik, & Turner, 1991; Pearson & Fielding, 1991; Pressley, Johnson, Symons, McGoldrick, & Kurita, 1989; Pressley, Symons, Snyder, & Cariglia-Bull, 1989; Rosenshine & Meister, 1994).

To some in the educational research field, it would appear that all the major work on cognitive strategy instruction was conducted before 1990. Within the last 18 years, however, there has been additional research on cognitive strategy instruction. In particular, the next section of this chapter focuses in detail on four programs of research using cognitive strategy instruction. This research is significant because it demonstrates a focus on 1) ongoing, programmatic research where studies build on one another, 2)
teaching cognitive and metacognitive strategies to groups of students in ecologically valid settings, and 3) embedding cognitive strategy instruction within texts students read.

**Key Cognitive Strategy Interventions**

*Collaborative Strategic Reading (CSR).* Vaughn, Klingner and their colleagues conducted a series of studies to examine the impact of a comprehension intervention program that teaches students to become strategic readers (Anderson & Roit, 1993; Kim, Vaughn, Klingner, Woodruff, Reutebuch, & Kouzakanani, 2006; Klingner & Vaughn, 1996; 1998; 1999; Klingner, Vaughn, Arguelles, Hughes, & Leftwich, 2004; Klingner, Vaughn, & Schumm, 1998; Vaughn, Chard, Bryant, Coleman, Tyler, Linan-Thompson, & Kouzakanani, 2000; Vaughn, Klingner, & Bryant, 2001). Collaborative Strategic Reading (CSR) was designed to meet three primary goals, a) to provide cognitive strategy instruction to help students comprehend texts in the content areas, 2) to assist students especially students with learning disabilities and English language learners, and c) to provide opportunities for students to work in collaborative, peer-mediated environments.

In CSR, students learn four cognitive and metacognitive strategies as they read texts, with the purpose of internalizing and routinizing the strategies so that the strategies could be applied to every text students read (Klingner & Vaughn, 1998). At the outset, teachers spend time teaching students to use the four strategies. Once the strategies have been taught, students work in small mixed-ability groups as they apply the strategies to their texts. A central feature of CSR is student collaboration in these groups. Each member of the team is assigned a different role. Each student takes a turn at one of the strategies, and over time, each student has an opportunity to use and practice each one.
In the Klingner, Vaughn, & Schumm (1998) study, researchers taught CSR in mixed-achievement level fourth-grade classrooms using a social studies text. They compared these students’ achievement to students in two control classrooms that used researcher-led traditional instruction with the same text. Findings indicated that scores in the CSR classrooms showed improved gains in reading comprehension over the control classrooms, but that the two conditions showed equal gains in content knowledge.

In a year-long, quasi-experimental study in 10 heterogeneous fourth-grade classrooms, Klingner, Vaughn, Arguelles, Hughes, & Leftwich (2004) trained teachers to implement CSR in their classrooms, stressing how to implement the intervention along with why, to foster understanding of its theoretical basis. They found that CSR classrooms showed gains over control classrooms in reading comprehension tests, although only gains made by high- and average-achieving students were different at a statistically significant level. Results from case studies of the teachers also revealed that teachers with higher levels of CSR implementation showed greater gains in student comprehension achievement than teachers with lower levels of implementation.

Finally, Kim, Vaughn, Klingner, Woodruff, Reutebuch, & Kouzekanani (2006) investigated the efficacy of a computer intervention model, Computer-Assisted Collaborative Strategic Reading (CACSR), on reading comprehension of middle school students with learning disabilities. Results showed that students improved their reading comprehension with CACSR more than did peers who used CSR. The researchers noted several advantages of CACSR over CSR, such as reduced teaching loads for teachers and enabling teachers to electronically track student performance.
Peer-Assisted Learning Strategies (PALS). Another set of studies from the field of special education used Peer-Assisted Learning Strategies (PALS) to improve the reading fluency and comprehension of all students, but especially of low-achieving students with and without disabilities. PALS uses a peer-tutoring model to teach students to systematically apply a set of strategies, including summarizing, retelling, monitoring, elaborating, and predicting, to a variety of texts. (Fuchs, Fuchs, & Burish, 2000; McMaster, Fuchs, & Fuchs, 2006). Initial teacher effort in teaching the strategies is extensive. This is followed by scaffolding and the gradual release of responsibility (Pearson & Gallagher, 1983) until students can work independently without teacher assistance.

The PALS intervention requires students to work in dyads of high- and low-achieving readers who alternate roles as “coach” and “reader.” As these groups read passages using text appropriate to the lower reader, they follow a sequence of specific cognitive strategy activities that include prompting, correcting, and giving feedback to the reader when necessary (Mathes, Fuchs, Fuchs, Henley, & Sanders, 1994; Fuchs et al., 2000; Liang & Dole, 2006; McMaster et al., 2006).

In an early study during the developmental phase of PALS, Simmons, Fuchs, Fuchs, Hodge, and Mathes (1994) found that students in grades two through five who participated in a peer-tutoring program, Classwide Peer Tutoring (CWPT), improved over control students in comprehension. In a large-scale experimental study of general education classrooms in 12 schools, Fuchs, Fuchs, Mathes, & Simmons (1997) implemented PALS in classrooms during regularly scheduled reading instruction. Results
showed that growth in comprehension, fluency, and accuracy in PALS classrooms was significantly higher than in non-PALS classrooms.

With the success of PALS, the program was modified and extended to kindergarten, first grade, and high school (Fuchs, Fuchs, Thompson, Svenson, Yen, Al Otaiba, Yang, McMaster, Prentice, Kazdan, & Saenz, 2001; Mathes, Howard, Allen, & Fuchs, 1998). Only first grade and high school PALS will be discussed here because they include comprehension measures.

First-grade PALS teaches decoding, word recognition, and fluency strategies. During the two main activities, *Sounds and Words* and *Partner Reading*, students work in dyads to make predictions about books, partner read, and summarize (Fuchs et al., 2001; Mathes et al., 1998). A 1998 study compared students receiving PALS reading instruction with those receiving their typical instruction. Results showed that all learner types in the PALS group showed improvement in measures such as word identification, oral reading rate, and phonological segmentation, but comprehension scores showed no significant increases. In another study, Mathes, Torgeson, and Allor (2001) found that low-achieving students in the PALS condition showed higher scores than students in the control condition in measures that included comprehension. Average- and high-achieving PALS students, however, did not show a significant difference from the control group, although the authors attribute this to a low sample size.

High-school PALS instruction is slightly modified from the original intervention, in that partner switching occurs more frequently and it almost exclusively uses expository texts. A 1999 study looked at reading comprehension and fluency of the students of 18
special education and remedial reading high school teachers. The PALS classrooms outperformed controls on comprehension scores (Fuchs, Fuchs, & Kazdan, 1999).

Transaction Strategies Instruction (TSI). Unlike the CSR and PALS classroom interventions, which involve sequential sets of steps in strategy instruction, transactional strategies instruction (TSI) fosters the learning of how to appropriately select, coordinate, and apply cognitive strategies across content areas and across different texts. Pressley and colleagues (1992) coined the name to describe the combination of cognitive strategies that past research had shown to be effective individually, into a “wide repertoire” of strategies (Pressley, El-Dinary, Gaskins, Schuder, Bergman, Almasi, & Brown, 1992; Brown, Pressley, Van Meter, & Schuder, 1996; Schuder, 1993). Some of the strategies taught included making connections to prior knowledge, making and verifying predictions, summarizing, visualizing, using context clues, and rereading.

Several key principles underlie TSI instruction. These include that, a) readers link text with prior knowledge to construct meaning, b) meaning construction comes from transactions between group members, and c) students’ reactions and interpretations during discussions about the text influences the teacher’s instruction. (Pressley et al., 1992; Brown, El-Dinary, Pressley, & Coy-Ogan, 1995). The small reading group and whole-class discussion format fosters cooperation and collaboration between peers and between teachers and students.

Results from several studies have shown TSI to be successful in improving comprehension in young readers. One program, Students Achieving Independent Learning (SAIL), considered to be a prototype of TSI, was developed to address the needs of at-risk students (Schuder, 1993). In a quasi-experimental mixed-method study,
Brown et al. (1996) compared students receiving SAIL instruction to students receiving conventional reading instruction on a variety of measures. The 60 second graders participating in this yearlong study were reading below grade level at the start of the school year. Findings revealed that SAIL students’ comprehension scores were significantly higher, and they showed greater strategy awareness and use than control groups.

In a recent, mixed-method study, Reutzel, Smith & Fawson (2005) compared seven- and eight-year-old students receiving TSI instruction with students receiving instruction in individual comprehension strategies, taught one-at-a-time. Findings indicated no differences between the two groups on standardized tests of reading comprehension, in recall of main ideas, or in survey results on motivation and strategy use. TSI students, however, significantly outperformed SSI students on criterion or curriculum-based reading comprehension test scores, elaborated knowledge acquisition from science books, and retention of science content knowledge. Based on these results, the authors concluded that the considerably heavy time investment required for teachers to learn TSI is justified for its benefits.

*Concept-Oriented Reading Instruction (CORI).* Concept-Oriented Reading Instruction (CORI) was designed to create “engaged” readers who are intrinsically motivated to build knowledge through a variety of texts and who are proficient in applying cognitive strategies for reading comprehension (Guthrie, Anderson, Alao, & Rinehart, 1999; Guthrie, Van Meter, McCann, Wigfield, Bennett, Poundstone, Rice, Faibisch, Hunt, Mitchell, 1996). The most important difference between this intervention and others reviewed here is that CORI combines strategy instruction with motivational
features to teach students to learn from texts. The motivational features include providing hands-on activities, giving students choice and accountability, using interesting texts in multiple genres, and providing opportunities for collaboration and for using content goals during reading instruction. The strategy instruction includes teaching students to: activate background knowledge, question, search for information in multiple texts, summarize, and organize information graphically (Guthrie et al., 1999; Guthrie, Van Meter, Hancock, Alao, Anderson, & McCann, 1998; Guthrie et al., 1996; Guthrie, Wigfield, Barbosa, Perencevich, Taboada, Davis, Scafiddi, & Tonks, 2004; Swan, 2003).

Empirical evidence for CORI in improving students’ reading comprehension, use of comprehension strategies, and motivation for reading is substantial. In a key, quasi-experimental yearlong study, Guthrie et al. (1998) compared four third- and fifth-grade classrooms receiving CORI instruction with peers receiving traditional basal and science instruction. Participants were from three schools with culturally diverse, and predominantly low-income and low-achieving populations. The major findings showed that, when adjusted for prior knowledge, CORI students were more likely than students in a control group to a) learn and use strategies for text comprehension, b) increase their ability to use a variety of strategies, c) increase their conceptual learning, and d) transfer conceptual knowledge.

In two connected studies, Guthrie et al. (2004) implemented two intervention conditions, standard CORI and CORI without the motivational component (Strategy Instruction alone) and compared these conditions to one another and to a control group that used traditional instruction. Results showed that standard CORI students scored higher than SI students on measures of reading comprehension, cognitive strategies, and
motivation. These results indicate that the standard CORI model is most effective for producing motivated readers who use comprehension strategies.

*Cognitive Strategy Instruction in Content Areas*

In this section we consider cognitive strategy instruction in secondary content areas. Research in cognitive strategy instruction within secondary content areas is very limited and lags several years behind research on strategy instruction in general. Part of the reason for this is that there are several challenges of teaching discipline specific cognitive strategies to students and of researching such instruction. One challenge is that literacy researchers and language arts teachers are often unaware of the strategies that experts use within specialized disciplines. Because experts generally use cognitive strategies without conscious effort, it is sometimes difficult to understand the processes they engage in as they read within their disciplines. Language arts teachers may be unfamiliar with the types of texts and the cognitive strategies that are useful within these disciplines. Hence, they often teach general cognitive strategies that improve comprehension across disciplines rather than content-specific strategies.

On the other hand, teachers who have expertise in content areas may not have an understanding of common methods of providing strategy instruction. They may be familiar with the texts and strategies that are valued within the discipline, but they may not be familiar with cognitive strategy instruction. As a result of these challenges, there is a paucity of research on the teaching of domain-specific reading strategies.

However there is a small, but growing, body of research and an emerging research agenda in the disciplines of science and history. In this section we will contrast the research on cognitive strategy instruction in science with the research on cognitive
strategy instruction in history. The purpose of doing so is to present two very different
approaches to conducting research in cognitive strategy instruction within secondary
content areas. The research agendas within the disciplines of science and history provide
alternative models for those secondary content areas with little published research on the
teaching of cognitive strategies.

Cognitive Strategies in Science

Since the mid-1990s many science educators have focused their attention on the
concept of “science literacy” (Glynn & Muth, 1994, Kyle, 1995; Mayer, 1997, Norris &
with concerns about the challenges associated with reading difficult science texts,
typically the textbook. Spence, Yore and Williams (1995) suggested that,

“science reading appears… to involve much greater conceptual demands than
most narrative text. Readers must have knowledge about the scientific enterprise,
the concept under consideration, the scientific language, the patterns of
argumentation, the canons of evidence, the science reading process, the science
text, and the science reading strategies” (p. 5, italics added).

Once the challenges of reading were identified, science teachers and/or
researchers adapted or devised cognitive strategies that they hypothesized would help
students deal with the complexities of scientific texts. There has been little research
conducted on some of these strategies. For example, Spence, Yore, and Williams (1995)
considered the effects of embedding multiple strategy instruction in a 7th grade science
classroom. Throughout one school year, explicit instruction was used to teach students
strategies such as using the text structure, accessing prior knowledge, setting a purpose
for reading, monitoring comprehension, using context to interpret the meaning of difficult
vocabulary, identifying the main ideas, and summarizing. In addition, they promoted a
general metacognitive awareness through open dialog about strategies with students. At
the end of the school year students’ posttest scores showed a significant improvement in
metacognitive awareness, self-management, and reading comprehension over their pretest
scores. It is interesting to note that what these researchers label as “science reading
strategies” are very similar to the cognitive strategies that have been shown to help
students comprehend across disciplines.

Most of the cognitive comprehension strategies that have been specifically
developed to help students comprehend science texts have not been investigated in
published research. Fang (2006) proposed that middle school students should be taught
to a) consider Greek and Latin roots of prefixes and suffixes in order to understand
scientific words, b) recognize and deal with lengthy noun phrases, c) translate science
language into ordinary language and d) use an author’s signposts to follow the author’s
logic and argumentation. Hofstein, Navon, Kipnis and Mamlok-Naaman (2005) and
Avraamidou and Zembal-Saul (2005) suggested that students would comprehend texts
better if they applied elements of the scientific method to their reading. The former
suggested that generating questions would improve comprehension. The latter suggested
that learning to recognize the value of evidence was a key to comprehension. Like the
science specific cognitive strategies suggested by Fang (2006), there is no published
research that demonstrates that these cognitive strategies indeed improve comprehension
of scientific texts. Much research remains to be completed in this area.

_Cognitive Strategies in History_
Researchers and history teachers have approached cognitive strategy instruction in history classes in a different and somewhat more systematic way. Early researchers attempted to identify reading strategies that historians used to construct meaning from the multiple, fragmentary, and contradictory texts that they read. Once these strategies had been identified, researchers observed students to see if and when they used the cognitive strategies that historians used. Recently researchers and teachers have investigated different ways of providing cognitive strategy instruction to students. The research on cognitive strategies in history is beginning to provide practical suggestions that history teachers can use in their classrooms.

Much of what we know about the strategies historians use to read multiple historical texts comes from a pioneering study conducted by Wineburg (1991). Using think-aloud protocols he compared the reading strategies used by historians with those used by above average high school students. The historians and students were given eight documents and three pictures related to the Battle of Lexington from the American Revolutionary War. These documents included primary, secondary, tertiary and fictional accounts of the battle. The documents included both the American and British points of view. Wineburg (1991) reported that historians employed three strategies to construct meaning from multiple texts, which he labeled sourcing, corroboration, and contextualization. Historians used sourcing when they looked at the document’s source before reading it and used source information to make inferences about its content. Historians used corroboration when they made connections between information found in different texts, noticing both contradictions and similarities. Before accepting an important detail found in one text as plausible, it was checked against the information
found in other texts. Historians used contextualization when they imagined the particular geographic, political, historical and cultural context of the event and tried to comprehend documents with that context in mind.

In addition to exploring expert strategies in history, Wineburg (1991) also considered students’ use of cognitive strategies. Eight academically gifted high school students thought aloud as they read the same documents the historians read. Without exception, these students read the documents in linear fashion, took the information at face value, made more effort to remember the facts than to understand the event, and became frustrated when the documents included contradictions. Texts represented information rather than evidence to them. Wineburg’s pioneering study raised doubts about students’ ability to use the cognitive comprehension strategies that historians used.

Stahl, Hynd, Britton, McNish, and Bosquet (1996) also found that high school students had a difficult time analyzing documents. They observed high school students’ use of strategies while engaged in a writing activity after reading multiple historical texts. They found that most above-average 10th grade students were able to learn the basic historical content while reading multiple texts. However, students did not employ sophisticated strategies as they read. Students did not use sourcing, contextualization, or corroboration. They failed to notice contradictions between sources. Other studies have also found that high school students do not regularly use expert strategies for reading multiple historical documents (Britt & Aglinskas, 2002), nor do undergraduate students employ sophisticated strategies like those used by historians (Perfetti, Britt, & Georgi, 1995).

Recently, several studies have investigated the effects of various types of cognitive strategy instruction on students’ ability to analyze documents. Britt and Aglinskas (2002)
investigated the use of a computer application called Sourcer’s Apprentice to teach high school and undergraduate students the strategies of sourcing, corroboration and contextualization. Sourcer’s Apprentice was designed to provide students with scaffolded learning experiences with multiple historical texts. Working on computers, students received training in the strategies followed by opportunities for guided practice. The computer program gradually removed support and many students began to use expert strategies on their own. Students who had interacted with Sourcer’s Apprentice for two days wrote essays that integrated and cited more information from primary and secondary sources than students who had not had exposure to Sourcer’s Apprentice. Britt and Aglinskas (2002) concluded that the strategy of sourcing could be taught to students and that Sourcer’s Apprentice was an effective tool for providing such instruction.

De La Paz (2005) was curious about combining instruction in historical reasoning with instruction in persuasive writing. She provided eighth-grade students with 12 days of explicit instruction in historical reasoning strategies followed by 10 days of explicit instruction on the composition of argumentative essays. Instruction included several opportunities to interact with multiple documents on controversial topics. Students were given mini-lessons on the target strategies that included detecting bias and corroboration. She found that students began to demonstrate an understanding of how historians reasoned with evidence. The students wrote longer, more persuasive argumentative essays with more specific arguments after having gone through the instruction.

Hynd-Shanahan, Holschuh and Hubbard (2004) found that explicit cognitive strategy instruction yielded positive results with older students. They gave undergraduate students explicit instruction in the form of an essay on sourcing, context, and corroboration. They
found that simply prompting these older students to think about the way historians analyzed documents helped the students discover historians’ strategies. In addition, by talking about the work of historians, students began to develop a more mature understanding of historical inquiry. They seemed to become more aware of bias in historians’ writings. The researchers believed that the reflective interviews that were intended to assess students’ level of understanding may have influenced the students’ understanding of historical reasoning as much as or more than the instructional intervention. The researchers concluded that the role of explicit instruction, combined with opportunities for reflection, were critical in the development of mature understanding of the discipline of history.

Much of the research on the teaching of strategies in history involve undergraduate students or above average high school students. However, in one recent study Nokes, Dole, and Hacker (in press) compared the use of different types of texts and different types of instruction on mainstream 11th-grade students’ development of content knowledge and use of historians’ strategies. Students engaged in ten one-hour reading lessons as part of a history unit. Eight classrooms of students participated in one of four treatment conditions using a) textbook accounts to study historical content, b) multiple texts to study historical content, c) textbook accounts to study cognitive strategies (i.e. sourcing, corroboration, and contextualization), or d) multiple texts to study cognitive strategies. Written and multiple choice posttest results indicated that both groups that used multiple texts learned historical content significantly better than their peers who studied with the textbook. However, only the group that used multiple texts to study cognitive strategies showed a significant increase in the use of sourcing and corroboration from pretest to posttest. Students in this study had a difficult time engaging in contextualization, even after explicit instruction.
Ferretti, MacArthur and Okolo (2001) found that even younger students could begin to reason like historians. They provided fifth-graders with mini-lessons on the processes historians use to analyze and interpret historical evidence, including ways to evaluate bias in evidence, corroboration, and dealing with contradictions. There was no explicit instruction on sourcing or contextualization. Unlike all of the other studies on the reading of multiple texts, the students in this study produced a multi-media presentation that was shown to parents and peers at an after school open house. In addition, students took a multiple choice test to measure their content knowledge, and they were interviewed to assess their content knowledge and their understanding of the strategies associated with historical inquiry. The results of this study indicated that students with and without learning disabilities were able to learn the historical content and showed a more mature understanding of historical inquiry than their peers who had not been involved in such a unit. However, there was evidence that students’ did not spontaneously use the strategies of sourcing or contextualization when they had not been taught to do so explicitly.

*History vs. Science Studies*

Research on cognitive strategies that are specific to the domain of history is starting to provide practical suggestions for history teachers. Students need to have many opportunities to engage with multiple historical documents. Explicit cognitive strategy instruction helps students start to develop the strategies of sourcing and corroboration. Students have a difficult time engaging in contextualization. Future research should focus on how history students can be taught to use historians’ strategies, including contextualization in a more sophisticated manner and, more importantly, how strategy use can lead to sophisticated historical inquiry like that conducted by historians.
Research on cognitive strategies that are specific to the domain of science is still in its infancy. Several strategies have been proposed, but little empirical research has been published about the results of instruction in these strategies. Moreover, little has been published on the cognitive strategies that scientists use as they read. Future research should seek to identify those strategies that experts use, and explore the effects of instructing secondary science students in those strategies.

Little research on cognitive strategies used in comprehension of other secondary content textbooks has been published. Discipline related cognitive comprehension strategies might exist in math, health, music, or other subject areas that would help secondary students become better readers in those fields. Future research should investigate whether those strategies indeed exist, and what can be done to teach those strategies to secondary students in their content area classes.

*Conceptual Distinctions Between Cognitive Strategies and Related Constructs: Understanding the Domain*

Thus far, we have highlighted several key studies in cognitive strategy instruction, all conducted during the 1970s and 1980s. We also presented intervention programs of research conducted during the last two decades and discussed key studies in strategy instruction in content areas. During the last two decades, though, alongside the empirical research on cognitive strategy instruction, information about strategies has made its way into practice. In the translation from research to practice, cognitive strategy instruction has morphed into a number of different meanings.

In practice, the more general terms *comprehension strategies* or just *strategies* are used much more than the term *cognitive strategies*. We believe that the terms *strategies*,
cognitive strategies and comprehension strategies have become confused in the educational field today. This confusion may well result in educators and researchers moving away from the use of the terms and the important ideas behind them. Such a movement would be unfortunate if the result is to ignore the significant body of research behind strategy use. In this section, we try to untangle some of the confusion around strategy instruction. This untangling can lead to a clarification in the field about what cognitive strategy instruction is and is not.

Cognitive Strategies vs. Comprehension Strategies

Throughout this chapter we have used the term cognitive strategy instruction to delimit the strategies readers use to accomplish the goal of comprehension. However, researchers sometimes use the term comprehension strategies for these same strategies. There are many related constructs to untangle here. First, there is a distinction between cognitive strategies and comprehension strategies. Cognitive strategies can be any mental procedure used to reach a goal, such as solving a math or science problem. Using the term comprehension strategies, therefore, helps differentiate between any mental procedure to accomplish a goal and specific comprehension procedures to solve the specific goal of comprehension.

Second, some people differentiate cognitive strategies from comprehension strategies in a different way. Weinstein and Mayer (1986) differentiate between a cognitive strategy in the control of readers and a comprehension strategy that teachers use to accomplish the goal of assisting students in understanding texts they read. Comprehension strategies, then, are sometimes referred to as procedures teachers use to assist students in comprehension. Cognitive strategies, on the other hand, are procedures
that *readers* use to help them comprehend better.

The distinction that Tierney and Cunningham (1984) made between instruction that helps students understand a given text and instruction that transfers to many texts is an important one. They argued that teachers instruct with comprehension strategies (also known as reading strategies), while students use cognitive strategies when they read. Further, comprehension strategies that teachers use help students understand a specific text they are reading, whereas cognitive strategies can be transferred across texts. For example, the reading strategies in Tierney and Readence’s popular book, *Reading Strategies and Practices* (2005), are all instructional practices that teachers use to improve their students’ reading (the text includes decoding as well as comprehension practices). These include well-worn comprehension practices like the Directed Reading Thinking Activity (Stauffer, 1969) as well as newer practices like the Anticipation Guide (Readence, Bean, & Baldwin, 1989). These practices are meant to be used by teachers, not students. There is no assumption that these practices are to be used by students when they read texts on their own. There is no assumption that the practices transfer from one text to another. Tierney and Readence refer to them as “reading strategies.”

Finally, the educational literature can use the term *comprehension strategies* as a superordinate term that includes strategies that readers use and strategies that teachers use. For example, the National Reading Panel (NRP) (2000) identifies cognitive strategies that readers use, like predicting and summarizing, and comprehension strategies that teachers use, like cooperative learning and graphic organizers, and uses the superordinate concept of comprehension strategies to define them both. Thus, the term comprehension strategies can be a superordinate term that includes cognitive strategies,
but goes beyond what readers do to include what teachers do as well.

*Learning Strategies vs. Teaching Strategies*

An understanding of the difference between cognitive and comprehension strategies leads to an understanding of the difference between learning strategies and teaching strategies. Basically, learning strategies is synonymous with cognitive strategies under the control of readers or learners. On the other hand, teaching strategies are strategies under the control of the teacher. The term *teaching strategies*, or comprehension strategies that teachers use, has become so commonplace that it has lost its meaning in the field. Often teaching strategies have included anything that teachers do to improve students’ comprehension. Thus, *teaching strategies have become nothing more than activities and practices that teachers do with their students.*

*Skills vs. Strategies*

Another set of constructs that have become confused in the educational literature and among teachers throughout the country is the difference between skills and strategies. During the 1980s when so much research was being conducted on cognitive strategies, teachers taught reading comprehension as a sequence of separate *skills* that were identified in the basal reading programs that dominated American reading instruction during that time (Austin & Morrison, 1978). Paris et al. (1991) defined skills as automatic procedures that readers used but of which they were unaware. Comprehension skills were traditionally “taught” by having students complete workbook pages in which they chose “the main idea” of a paragraph from one of four alternatives, or they reorganized sentences in the correct “sequence” of a paragraph they just read. It was expected or assumed that through repeated practice, students would learn these skills and apply them
to the new texts they read. It was believed that with repeated practice of using the skills, students would internalize them, and the skills would become a part of students’ reading repertoire.

However, the classic study by Durkin (1978-79) demonstrated convincingly that practice using comprehension skills was not the same as actually teaching the skills. In fact, Durkin argued that teachers did no teaching; instead, students practiced the skills and teachers “tested” whether students could use them. In other words, when teachers directed students to “find the main idea” and to “create a summary of a story,” there was no help or assistance for students who could not find the main idea or create a summary. Durkin found that teachers simply moved on to another student who was able to find the main idea or create a summary. Further, even if students did get the right answer to a main idea or summary question, it was often through unconscious awareness or luck rather than through conscious and deliberate planning and implementation of the skills. There was nothing intentional in either the teacher’s instructions or the students’ behaviors.

Durkin (1978-79) concluded that one of the big problems with the teaching of skills at the time was that there was no instruction in how to perform or use the skills. The how to was the missing element of the instruction, according to Durkin. Her work convinced a generation of reading researchers that many students were unlikely to learn comprehension skills well enough to apply them to their daily reading. Durkin concluded that the “mentioning” rather than teaching of skills was a major problem in comprehension instruction in American schools at that time.

One reason Durkin’s study was so important was that the conclusions drawn from
the study supported and led to the teaching of specific cognitive strategies with a focus on how to use the strategy when reading a text. In fact, two of the important landmark studies in cognitive strategies conducted by Duffy, Roehler and their colleagues (Duffy et al., 1986; 1987) used Durkin’s conclusions to transform the teaching of skills into the teaching of strategies for low readers. The hope was that by learning how to become strategic readers, students would learn how to use and apply the skills that heretofore had remained a mystery to them.

*The Curriculum of Cognitive Strategies vs. the Instructional Delivery System*

A final distinction within the cognitive strategies research is the distinction between the curriculum of cognitive strategies and the instructional delivery system that researchers and teachers use to teach the strategies. Cognitive strategies themselves refer to the strategies that readers use—predicting, summarizing, visualizing, and so forth. Often, though, these strategies become entwined with the way they are taught. In the cognitive research literature, cognitive strategies have often been taught using a direct or explicit instructional delivery system. For example, in the work reviewed by Dole et al. (1991) and Pressley et al. (1989), much of the research on cognitive strategies used explicit instructional techniques to teach them. These include modeling of the strategy, guided practice with teacher feedback using the strategy, and independent practice using the strategy. There is a robust body of research to demonstrate the value of this explicit model of cognitive strategy instruction (see Rosenshine, 1997 for a review).

The explicit instructional delivery system, though, is only one way to teach cognitive strategies. A related, but distinct, instructional model is the direct or explicit explanation model (Duffy, 2002; Duffy & Roehler, 1987). Winograd and Hare (1988)
identified five critical components of this instructional model. In the direct explanation model, instruction must help students, 1) understand the strategies in a meaningful way, 2) understand why they are learning the strategies and how the strategies can help them, 3) learn how to use the strategies step-by-step, 4) understand when and where the strategies can be used, and 5) evaluate their use of the strategies so they can monitor and improve their comprehension. In the Duffy et al. (1986, 1987) studies, teachers provided students with detailed explanations of reading strategies that included the declarative, procedural and conditional knowledge (Paris et al., 1983) identified as being critical to strategy use.

A third instructional delivery model for cognitive strategies is the cognitive apprenticeship model (Collins, Brown, & Newman, 1989; Stahl, 1997). In the reciprocal teaching studies (Palincsar & Brown, 1984), the primary delivery system used to teach the four strategies of predicting, summarizing, asking questions and clarifying was one in which a master-apprentice relationship was set up between teacher and student. The teacher taught the four strategies and how to use them through a scaffold system where the teacher modeled using the strategies and then scaffolded the instruction so that students gradually could take over responsibility for using the strategies on their own. Through peer collaboration, students help each other learn the strategies, and over time, students learn to use them independently. Thus, even though teachers taught four cognitive strategies to students, the instructional method for teaching them was different from the other cognitive strategy instructional studies.

A final instructional delivery system that is often used to teach strategies is has been labeled implicit or invisible strategy instruction. (Dole, 2000; Vacca & Vacca,
In the implicit strategy instruction model, teachers develop activities that require students to use cognitive strategies without making the students consciously aware of the strategy itself. So, for example, teachers may want their students to learn how to use a summarizing strategy. They may teach the strategy without any modeling, explanation or even discussion of the strategy itself. Another example of implicit strategy instruction would be when teachers ask students to use their background knowledge to think about what they might know about the topic of an upcoming text. In this case, teachers only ask students to use the strategy without any explanation of it. Durkin (1978-79) criticized this method of instruction because it did not show students how to use the strategy, but just asked students to use it. We would refer to this type of strategy instruction as implicit or invisible strategy instruction.

In sum, as studies of cognitive strategy instruction are examined, it is important to know not only what specific cognitive strategy or strategies were taught, but also the instructional model used to teach them. How strategies are taught can have as much of an impact on comprehension results as what was taught.

Conclusion

At the close of the first decade of the 21st century, where are we now in terms of our understanding of cognitive strategy instruction and its relationship and contribution to reading comprehension instruction? First, it seems as though cognitive strategy instruction has moved from its research origins into classroom practice. That move has been a rather bumpy one, and we believe that much of the fidelity of cognitive strategy implementation has been lost in the translation from research to practice. While there are a multitude of books, articles and pamphlets about strategy instruction, we are not sure
that those efforts have resulted in effective strategy instruction in current classrooms today (see also, Pressley, 2002).

Second, many researchers have worried that learning how to teach cognitive strategies effectively to students is a complex process, time intensive and fraught with difficulties (Pressley, et al., 1989; Pressley & Woloshyn, 1995). The original landmark studies attest to many of the difficulties teachers face (see, particularly, Duffy et al., 1987; Pressley, Goodchild, Zajchowski, Fleet, & Evans, 1989), like the explicitness of the instruction, the difficulty of finding appropriate texts, and the balance between teaching the content of the text and teaching the strategies themselves. Professional development in cognitive strategy instruction is critical to its success.

Third, it is difficult for many teachers to understand the necessity of keeping the content of the text at the forefront while teaching strategies. Sometimes, in the rush to teach cognitive strategies, teachers work on the strategies without regard to the content of the text. This occurs, for example, when teachers only ask students questions about which strategies they used and why, instead of asking questions about the content of the selection. These teachers may forget that the goal of strategy instruction is improved understanding of a given text, and improving the ability to comprehend across texts, not learning the strategies.

Fourth, and finally, it is unclear what part cognitive strategy instruction plays in the total reading comprehension curriculum and how that plays out at different age and grade levels. No researcher we have ever read has proposed that the comprehension curriculum should only consist of cognitive strategies. But just what else should be taught
and how it should be taught is another matter entirely. The answers to these questions remain for another generation of reading researchers.
References


Fuchs, D., Fuchs, L.S., Thompson, A., Svenson, E., Yen, L., Al Otaiba, S., Yang, N.
Strategies in reading: Extensions for kindergarten, first grade, and high school. Remedial
and Special Education, 22, 15-21.
Berliner, & R. C. Calfee (Eds.), Handbook of educational psychology (pp15-46). New
York: Macmillan.
Oriented Reading Instruction on strategy use and conceptual learning from text. The
Guthrie, J.T., Van Meter, P.V., Hancock, G.R., Alao, S., Anderson, E., & McCann, A.
(1998). Does Concept-Oriented Reading Instruction increase strategy use and conceptual
learning from text? Journal of Educational Psychology, 90, 261-278.
Guthrie, J.T., Van Meter, P., McCann, A.D., Wigfield, A., Bennett, L., Poundstone, C.C.,
engagement: Changes in motivations and strategies during Concept-Oriented Reading
Guthrie, J.T., Wigfield, A., Barbosa, P., Perencevich, K.C., Taboada, A., Davis, M.H.,
Scafiddi, N.T., & Tonks, S. (2004). Increasing reading comprehension and engagement
through Concept-Oriented Reading Instruction. *Journal of Educational Psychology, 96*, 403-423.


disabilities through computer-assisted Collaborative Strategic Reading. *Remedial and Special Education, 27*, 235-249.


*Contemporary Educational Psychology, 8*, 317-344.


