



ISSUE
PAPER

TEACHER PREPARATION AND PROFESSIONAL DEVELOPMENT IN
**EFFECTIVE LEARNING STRATEGY
INSTRUCTION**



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Improving Student Outcomes in
General and Special Education**

Teacher Preparation and Professional Development in Effective Learning Strategy Instruction

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Introduction

The Achievement Problem

Policymakers, educational practitioners, researchers, and employers have decried the deplorable state of academic achievement in the United States. Low achievement and failure to address this growing problem are gaining increased attention in the media, research literature, and a variety of political venues (e.g., Grigg, Daane, Jin, & Campbell, 2003; Hock & Deshler, 2003; Thernstrom & Thernstrom, 2003). The most recent National Assessment of Educational Progress (NAEP) results underscore the achievement problems of a significant number of students. These findings indicate that a large percentage of students in Grade 8 cannot read material essential for daily living, such as road signs, newspapers, or bus schedules. Overall, 69 percent of students in Grade 8 scored below the proficient level (National Center for Education Statistics, 2007b). More than 8 million adolescents have not mastered the reading skills needed to respond to demanding secondary school requirements or compete for fulfilling jobs in the workplace (Kamil, 2003).

Adolescents representing minority groups, those who live in poverty, and those with disabilities are even more disadvantaged in terms of achievement outcomes. For example, 2005 data indicate that more than half of students with disabilities and minority students (i.e., black, Hispanic, and American Indian students) in Grade 12 perform below the basic level (National Center for Education Statistics, 2007a). Nearly 60 percent of struggling adolescent readers in poor urban settings fall between the 5th and the 30th percentile in reading performance. Such readers have some basic reading skills but have not reached the skill level necessary to enable them to sufficiently meet subject-matter reading demands and comprehension expectations (Curtis, 2002; Snow, 2002; Snow & Biancarosa, 2003). Some of these same students are proficient readers in early elementary school but are unable to make the Grade 4 shift from learning to read to reading to learn (Cutting & Scarborough, 2006).

Students with disabilities also tend to have a large number of academic skill deficits that persist throughout secondary school. Students with learning disabilities, for example, enter Grade 7 reading and writing, on average, at the fourth- and fifth-grade levels, respectively, and continue to read and write at those levels throughout their high school years (Warner, Schumaker, Alley, & Deshler, 1980). Such students may be able to decode some words; however, they have difficulty decoding the multisyllabic words in their textbooks, and their reading comprehension is poor (Lenz & Hughes, 1990). On average, fewer than half of the sentences they write are complete sentences (Kline, Schumaker, & Deshler, 1991), and those complete sentences tend to be simple sentences. Moreover, they do not know how to organize their writing, write several paragraphs, or correct their writing errors (Schmidt, Deshler, Schumaker, & Alley, 1989). Because of these severe deficits, students with disabilities have difficulty responding to the demands of their educational programs (Schumaker & Deshler, 1984).

Not surprisingly, the national dropout rate for students with disabilities is more than twice that for the general population (Lehr, 2003). Of those who do stay in school, the high school graduation rate for students with disabilities is significantly lower than the rate for their peers (Wagner, Newman, Cameto, Levine, & Garza, 2006). The connection between dropping out of

school and employment is well known and contributes to a high unemployment rate for people with disabilities (Thompson & Thurlow, 1999; Thurlow, Sinclair, & Johnson, 2002). Although the national unemployment rate hovers at approximately 5 percent, the rate for people with disabilities is more than 50 percent, depending on the category of disability. The major outcomes associated with this high unemployment rate are that many people with disabilities work in part-time jobs (if they are employed), live in poverty, and are unable to attend college or access other postsecondary learning opportunities (Wagner et al., 2006).

The Demanding Educational Environment

The necessity for transforming ineffective learners into effective learners has become increasingly critical as the emphasis on excellence has intensified within the education field. The reauthorization of the Individuals with Disabilities Education Act (IDEA) in 1997 mandated that students with disabilities not only participate in the general education curriculum but that they have true access to participation in the curriculum (Goertz, McLaughlin, Roach, & Raber, 2000; Schumaker et al., 2005). IDEA also required that students with disabilities be included in district and statewide assessments (e.g., writing assessments) and accountability programs (Kearns, Kleinert, Clayton, Burdge, & Williams, 1998; Kleinert, Kennedy, Kearns, 1999). In 1989, at the historic governors' meeting in Williamsburg, Virginia, the 50 state governors agreed that, by the year 2000, several national goals for the education of *all* students in the United States would be addressed, including the following (National Education Goals Panel, 1989):

- “The high-school graduation rate will increase to at least 90 percent.”
- “All students will leave Grades 4, 8, and 12 having demonstrated competency over challenging subject matter, including English, mathematics, science, foreign languages, civics and government, economics, arts, history, and geography.”
- “Every school in America will ensure that all students learn to use their minds well, so they may be prepared for responsible citizenship, further learning, and productive employment in our nation’s modern economy.”
- “Every adult American will be literate and will possess the knowledge and skills necessary to compete in a global economy and exercise their rights and responsibilities of citizenship.”

Subsequently, in 2001, the No Child Left Behind (NCLB) Act was passed, which requires annual testing for *all* students (Grades 3–8) as well as annual statewide progress objectives aimed at ensuring that *all groups* of students (e.g., Asians, Pacific Islanders, blacks, Hispanics, Caucasians, students who are eligible for free or reduced-price lunch, students with individual education plans, and students with limited English proficiency) reach or exceed proficiency levels by 2013–14 in accordance with state standards (Missouri Department of Elementary and Secondary Education, 2005). All 50 states now assess students’ mathematics and reading skills; 44 states assess writing skills (Council of Chief State School Officers, 2001). Also, numerous states require students to pass a proficiency test in order to graduate from high school (Council of Chief State School Officers, 2001). Naturally, teachers are being required to teach students the information and skills needed to do well on those tests. For example, in the state of Louisiana, students learn content aligned to the standards that are assessed with the LEAP 21 tests at the Grade 4 and Grade 8 levels in the areas of English, mathematics, science, and social studies in

order to pass into Grades 5 and 9, respectively. As a graduation requirement, students are also assessed in Grades 10 and 11 in the areas of written composition, English language arts, mathematics, science, and social studies (Louisiana Department of Education, 2008). In addition, NCLB requires educators to use “scientifically based instructional practices” as the means of ensuring that students meet high levels of progress. Furthermore, plans now call for *all* students in Grades 8 and 12 across the nation to take the NAEP tests in 2011 (ACT, 2007). For example, for the NAEP writing test, students are required to complete two writing tasks (either a persuasive essay, an explanatory essay, and/or an essay that describes a personal experience).

In addition to passing these testing requirements, research (e.g., Putnam, 1992; Putnam, Deshler, & Schumaker, 1992; Schumaker & Deshler, 1984) has shown that in order to do well at the secondary level, students must be able to do the following:

- Read their textbooks and other materials written between the Grade 9 and Grade 17 levels.
- Participate in discussions and take notes from lectures, the predominant teaching method.
- Study for tests requiring their knowledge of approximately 60 to 80 pieces of information.
- Write multipage papers requiring critical analysis and other higher order thinking processes.

Academic demands like these are also present at the postsecondary level if students intend to gain additional training for a career. Thus, students must become effective learners if they are to succeed in relation to the national emphasis on standards-based education and within educational environments in which these demands are present.

Toward a Solution

One way of helping students with learning disabilities and other struggling learners become independent life-long learners is to teach them how to use learning strategies in effective and efficient ways. Learning strategy instruction is instruction in how to learn and perform in academic environments such that positive outcomes result. Teachers must know how to teach students to use learning strategies so that students have the opportunity to succeed in today’s schools and meet rigorous standards. The objectives of this issue paper are as follows:

- Describe learning strategies and provide a brief review of some of the literature that demonstrates that learning strategy instruction can effectively transform ineffective learners into effective learners.
- Explain the kinds of knowledge and skills teachers must acquire to be competent learning strategy instructors.
- Make recommendations related to teacher training programs that specifically address learning strategy instruction.

Learning Strategies

The Essence of Learning Strategies

Learning strategies are sequences of behaviors that learners use as they complete a learning task (Deshler & Schumaker, 1986). The behaviors can be overt physical actions (e.g., writing words on a study card in a certain location on the card) or covert cognitive behaviors (e.g., mentally rehearsing a definition of a word). An effective learner uses strategies efficiently while tackling learning tasks. When effective learners receive a homework assignment, for example, they create a plan, complete that plan, and check the product to ensure that it meets the criteria specified by the teacher for the assignment. Thus, a strategic approach to learning involves planning the steps to be followed, executing those steps, and evaluating the quality of the product and how well the process worked.

For example, an effective learner who has received an assignment to answer a list of questions about a textbook chapter might take the following steps:

- Develop a plan by determining how much time she has to do the task and then thinking about what strategies she has used in the past that would help her complete the assignment in the time allotted.
- Use a sequence of behaviors to answer each question in the list of questions that includes the following:
 - Read the question.
 - Skim through the headings of the chapter to find the heading that contains similar words to words in the question.
 - Skim through the selected section of the chapter to determine whether information related to the question is truly included in the section.
 - Carefully read and reread that portion of the section that is related.
 - Mentally paraphrase the key information in her own words.
 - Write the information in a way that answers the question.
- Read and edit her answers.
- Hand in the assignment to the teacher.
- Consider the teacher's feedback and her grade on the assignment, and think about how she will adjust her strategic approach the next time she gets a similar assignment.

One effective learner's strategy for answering questions related to textbook chapters may be different from another effective learner's strategy for the same task. Regardless, each learner has probably refined his or her strategy over time through trial and error, and its use helps the learner to acquire knowledge and complete assignments efficiently. Effective learners invent strategies that help them perform well in learning situations, refine these strategies over time, and adapt each strategy as necessary to fit new twists on old assignments. Moreover, they build a repertoire of effective learning strategies to use in a variety of situations, such as learning new vocabulary,

completing a worksheet, studying for a multiple-choice test, studying for an essay test, writing a paper, or reading a short story. They work with their strategies over time to polish them and make them more effective to achieve better outcomes. Eventually, they not only complete their assignments, they also earn high grades.

As effective learners invent and work with their learning strategies, they acquire knowledge related to those strategies. They learn what cognitive and overt behaviors to use and the sequence in which they must use them in order to do well (i.e., procedural knowledge). They acquire certain knowledge that relates specifically to the task at hand (i.e., semantic knowledge). For example, if a teacher requires students to use a variety of sentence structures when answering questions about a textbook chapter, they need to know that a compound sentence has two or more independent clauses joined with either a comma and a coordinating conjunction or by a semicolon as well as the definitions for other sentence types. Effective learners also understand the conditions under which a certain strategy should be used and how the strategy might be adapted for particular circumstances (i.e., conditional knowledge). For example, to answer questions about a novel, which has no headings, they need to know how to adapt their “question answering” strategy to be able to find information within nonstructured text. Finally, they also learn about the metacognitive processes that help them use strategies, such as instructing oneself through the strategy, problem solving when issues arise, and self-monitoring and self-evaluation to ensure that the product is correct and of high quality (i.e., process knowledge). Thus, although effective learners might learn some strategies from each other or other expert learners, for the most part, they seem to independently invent strategies and gain knowledge about their use. In addition, their use of learning strategies is a complex endeavor involving a variety of knowledge and applications.

In contrast to effective learners, unsuccessful learners may use some strategies, but their use of strategies is ineffective and inefficient (Torgesen, 1977). For example, when they encounter an unfamiliar task, they do not invent strategies on their own (Warner et al., 1989). As a result, they do not know how to approach learning tasks in ways that result in positive outcomes for them. For example, they might approach an assignment to answer questions related to a textbook chapter by opening the textbook, turning to the first page of the chapter, and trying to read the chapter from beginning to end. Sooner or later, because of their poor reading skills, they get discouraged, do not answer any of the questions, and do not hand in the assignment. They are not capable of completing such learning tasks effectively and efficiently, and, overall, they perform poorly on assignments and tests and earn low grades.

Research on Learning Strategies and Learning Strategy Instruction

Fortunately, research in the last three decades has shown that ineffective learners can learn how to use learning strategies independently if the strategies are taught to them in a particular way. Indeed, numerous empirical studies have been completed on learning strategy instruction with ineffective learners, and several reviews of the research have been written (e.g., Alexander, Graham, & Harris, 1998, 2003; Faggella-Luby & Deshler, 2008; Fisher, Schumaker, & Deshler, 2001; Graham & Perin, 2007b; Harris & Graham, 2007; Rogers & Graham, in press; Schumaker & Deshler, 1992, 2003, 2006; Swanson, 1999; Swanson & Deshler, 2003; Swanson, Hoskyn, & Lee, 1999). As a result of this research, many learning strategies have been developed, and

methods have been designed and validated for effectively teaching strategies to unsuccessful learners. For example, throughout the last 30 years, researchers associated with the University of Kansas Center for Research on Learning have developed the *Learning Strategies Curriculum*, procedures and materials for teaching a series of learning strategies designed for student use in meeting demands associated with three academic areas: acquiring information (i.e., reading), storing information (e.g., studying for tests), and expressing knowledge (e.g., participating in discussions, completing assignments, writing papers, and taking tests) (Schumaker & Deshler, 2006). Examples of learning strategies in the acquisition strand include the following: the Word Mapping Strategy (Harris, Schumaker, & Deshler, 2008), a strategy for predicting the meaning of words; the Word Identification Strategy (Lenz, Schumaker, Deshler, & Beals, 1984), a strategy for decoding complex words; and the Paraphrasing Strategy (Schumaker, Denton, & Deshler, 1984), a strategy for translating the main ideas and details of a passage into one's own words. Each strategy has a set of cognitive and overt behavioral steps associated with it as well as a mnemonic device for remembering the steps. For example, for the Paraphrasing Strategy, the steps include the following: **Read** a paragraph, **Ask** yourself what are the main idea and details for the paragraph, and **Put** the information in your own words. The mnemonic device students use to remember the steps is "**RAP**" (Schumaker et al., 1984).

Other researchers have developed similar types of learning strategies and have tested associated instructional methods for teaching those strategies as in the following examples:

- Harris and Graham (1996b) designed a strategy called PLAN that students can use to plan a writing assignment and a strategy called WRITE for them to use while writing.
- Harris, Graham, and colleagues also have designed a strategy called POW that students can use to write in several genres within their self-regulated strategy development writing program (Harris, Graham, & Mason, 2003; Lane et al., 2008).
- King-Sears, Mercer, and Sindelar (1992) designed a strategy called IT FITS that students can use to create keyword memory devices to help them remember information.
- Miller and Mercer (1991) have designed a strategy called DRAW that students can use to solve mathematics problems.

Many of the studies that have been conducted on learning strategies have focused on students with learning disabilities. This group of students has been shown to represent the lowest of the low achievers, typically performing around the 10th percentile on standardized tests of basic skills like reading and mathematics. When this group enters Grade 7, they are reading and doing mathematics, on average, at the Grade 4 level, and they are writing at the Grade 5 level. Their achievement stays at these levels throughout high school. Other low achievers (i.e., those who earn grades of D and F but who have not been diagnosed with a learning disability) earn scores about one grade level higher than students with learning disabilities, and their achievement also plateaus at this slightly higher level (Warner et al., 1980). Students with learning disabilities and other low-achieving students have been the primary targets for studies on learning strategy instruction because they represent the most ineffective learners in today's schools, and they allow researchers to determine whether ineffective learners can be transformed into effective learners. Two research questions have often been addressed: (1) Can students be taught to use a given learning strategy at a specified mastery level? and (2) Does their use of this strategy result in improved performance on academic tasks?

In general, the studies conducted on learning strategies with students with disabilities have several characteristics in common. They are either studies using multiple-baseline designs, or they are control-group or comparison-group studies comparing the effects of learning strategy instruction with the effects of some other educational program. For the most part, the studies have been conducted in schools, with qualified teachers presenting the instruction using a standard written protocol. Two types of student performance measures were gathered in many of the studies: a measure of the student's performance of the strategy and a measure of the effects of the student's use of the strategy with regard to academic performance variables. In some of the studies, only the students' performance of the strategy was measured, and in other studies, only the students' academic performance was measured. The latter case is problematic because if the researchers have not shown that the students learned the strategy, then the cause of the study outcomes remains unknown. For example, if a standardized reading test is administered before and after teaching a reading strategy, but the researchers do not measure students' actual mastery of the reading strategy, any change in reading achievement cannot be attributed necessarily to the learning strategy instruction because the researchers have not shown that the students actually learned the strategy. The additional reading practice in which the students have engaged may have caused the change.

To summarize the results of this body of research, numerous studies using both types of experimental designs show that students who are at-risk for failure can master learning strategies (e.g., Bulgren, Hock, Schumaker, & Deshler, 1995; Lenz & Hughes, 1990; Schumaker, Deshler, Alley, Warner, & Denton, 1982). In other words, they can perform the steps of a given strategy at a mastery level (e.g., above an 80 percent performance level). In addition, the studies indicate that students' use of the strategies they have learned is related to improved performance in mainstream classes and on standardized tests. For example, their grades on tests in required courses can improve from F's to C's after they learn a test-taking strategy (e.g., Hughes, Deshler, Ruhl, & Schumaker, 1993; Hughes & Schumaker, 1991a, 1991b); their scores on standardized achievement tests can improve after receiving reading strategy instruction (e.g., Fritschmann, Deshler, & Schumaker, 2007; Woodruff, Schumaker, & Deshler, 2002); and their scores on district and state writing competency tests can be at the passing level after receiving writing strategy instruction (Bui, Schumaker, & Deshler, 2006; Schmidt et al., 1989). Thus, according to the research, ineffective learners can become successful learners and performers in real-world educational environments. Moreover, evidence shows that a *variety* of at-risk students, including students with learning disabilities, students with emotional disturbance, students in urban schools, students with low achievement scores, and students enrolled in upper elementary through secondary levels can master a strategy, and their performance in related areas can significantly benefit from learning strategy instruction.

In addition, many of the studies indicate that these students can generalize their use of strategies across tasks (e.g., different types of passages, tests, and assignments), across settings (e.g., special education settings, general education settings, testing settings), and over time (i.e., maintenance of strategy use). In many of the studies, students were asked to apply the strategy they had learned to novel tasks that they had not previously encountered during instruction. Each time they applied the strategy, they applied it to a new task. Thus, for each study, a pool of similar tasks was developed, and each time a test probe was given, a new task was used. For

example, when the initial study on the Test-Taking Strategy (Hughes, Schumaker, Deshler, & Mercer, 1988) was conducted (Hughes & Schumaker, 1991a), a pool of tests was designed. Each test had the same number and types of test items as the other tests in the pool. The order of the types of items varied across the tests, and the items on each test were different from all other items on all other tests. The tests were similar in form to the kinds of tests students would encounter in secondary mainstream classrooms. Each time a student received a probe test, a test that the student had not previously encountered was randomly selected from the pool and then administered.

Furthermore, research suggests that students can learn to apply a strategy to tasks that are similar to those they encounter at their current grade level. The measure of the effects of the use of the learning strategy in these studies has typically been a measure of the student's performance on a task that closely approximates tasks that students might face in their required general education classes. For example, when students were taught a textbook-chapter-attack strategy called Multipass (Schumaker et al., 1982), they applied the strategy to a textbook used in a general education content course in their school. Similarly, when they were taught a strategy for organizing and memorizing facts, they were given a passage from a textbook used at their schooling level in general education classes to study for a test (Bulgren et al., 1995).

Interestingly, strategy instruction appears to be robust enough that it can occur through the use of computerized instructional programs. Several studies have shown that students with disabilities can master a strategy through computerized programs at comparable levels to the levels achieved by students who have received live instruction from a teacher (e.g., Lancaster, Lancaster, Schumaker, & Deshler, 2006; Lancaster, Schumaker, & Deshler, 2002).

Most important, all of the studies that have shown that students can successfully master a strategy have utilized a multistage instructional methodology (Ellis, Deshler, Lenz, Schumaker, & Clark, 1991; Graham & Harris, 2003; Graham & Perin, 2007a; Schumaker & Deshler, 2006; Swanson & Deshler, 2003). This methodology includes describing the strategy to students, modeling the strategy to students while thinking aloud, and having students engage in a variety of types of explicit practice activities. Such practice activities can include rapid-fire practice with naming the steps of the strategy, application of the strategy to easy tasks, application of the strategy to increasingly difficult tasks, use of the strategy in other settings and under other conditions, and adaptation of the strategy to a variety of tasks. Throughout all of the practice activities, students must receive elaborated feedback that describes what they have done well and what they need to improve (Kline et al., 1991). Also, continuous progress monitoring needs to be employed so that meaningful feedback can be provided.

In addition to evidence that this multistage instructional methodology works with regard to producing student mastery of a strategy, research also has shown that when the instruction has been abbreviated and students have not been required to reach mastery (e.g., Bui et al., 2006), the results are not as impressive as when the instruction has included all the instructional stages (e.g., Schmidt et al., 1989). Thus, the use of the multistage methodology combined with the requirement of mastery is critical in terms of producing learning in ineffective learners.

Impressively, in the studies on learning strategy instruction with ineffective learners, the effect sizes have been large, and the effects have been socially significant. In other words, the instruction has resulted in students making gains in a way that can positively affect their lives. For example, they can read materials written at their current grade level instead of being several grade levels behind; they can earn passing grades in general education classes; and they can pass minimal competency tests. Swanson (1999) concluded that learning strategy instruction was one of two effective instructional methods for students with learning disabilities (the other was direct instruction). He reported that the effect size across the reviewed studies for strategy instruction was .72, a large effect size. Such results support the notion that learning strategy instruction should be a part of the education of any teacher who will teach students with disabilities and other low-achieving students to prepare them for participation in required courses, state competency examinations, and high-stakes assessments.

Required Knowledge and Skills for Teachers of Learning Strategies

Given the necessity to teach students to be life-long learners in today's world, the positive effects that can accrue following learning strategy instruction, and the large numbers of students who are failing in school and on competency tests, teachers need to be prepared to provide this type of instruction (Hughes & Archer, in press; Lenz & Deshler, 1990). Effective teachers of learning strategies possess conceptual knowledge, knowledge of instructional methods, and knowledge of materials and programs. They also possess critical skills needed for teaching learning strategies.

Appendix A provides an innovation configuration that depicts the knowledge and skills necessary to teach learning strategies. Innovation configurations are used to define critical components and levels of implementation of an education program or instructional approach. In the innovation configuration in Appendix A, degrees of implementation are defined in the top row, and critical knowledge and skill components are listed in the left-hand column. The innovation configuration should be applied to an overall program rather than a specific course. Appendix B provides resources for those who are interested in designing courses.

General Conceptual Knowledge

Fundamental Principles of Learning Theory

Teachers should be familiar with fundamental principles of learning theory (e.g., behavioral analysis, reinforcement, imitation, scaffolding, zone of proximal development) and how they apply to learning strategy instruction. In addition, a basic understanding of different theories of learning (e.g., constructivism, behaviorism, cognitivism) and how learning strategy instruction relates to all of these theories is helpful so that teachers can explain why they are using a particular teaching method and make sound instructional decisions (e.g., Harris & Graham, 1996a; Poplin, 1988; Poplin & Rogers, 2005; Pressley & Harris, 2006; Pressley & Hilden, 2006). Teachers also must understand the concepts of “growth of mind” and “self-regulated learning” versus the concept of “fixed intelligence” (e.g., Schunk, 2001), the effects of low and high expectations for students on their learning (Cotton, 1989; Good, 1987), and the importance of creating a supportive learning community in which learning can occur (e.g., Vernon, Deshler, & Schumaker, 2000).

Characteristics of Ineffective Learners

Successful teachers of learning strategies know the characteristics of ineffective learners. They must understand, for example, that ineffective learners do not invent effective and efficient learning strategies and that their skill levels are low compared to those of their peers. They must understand that ineffective learners learn only when certain types of instructional methods are used.

Setting Demands

Learning strategy teachers also must understand the demands of academic settings that ineffective learners will encounter as they progress through school (Deshler et al., 2004; Putnam, 1992; Putnam et al., 1992; Schumaker & Deshler, 1984; Schumaker, Deshler, Bui, & Vernon, 2006).

For example, they need to know how the demands change as students progress from elementary to secondary school and the realities of the kinds of assignments that students must complete in courses required for graduation from high school.

The Performance Gap

Effective teachers of learning strategies also must understand the phenomenon of the performance gap between what at-risk learners are expected to do in educational settings and what their skills enable them to do as well as the results that can be expected as the performance gap grows larger as students age (Deshler & Schumaker, 2006). They must understand the critical importance of teaching strategies quickly and effectively to mastery levels before students get to the point of dropping out of school.

Building Blocks Within Academic Skill Areas

In addition, teachers need to understand the “building blocks” within academic skill areas (Carnine, Silbert, Kame’enui, & Tarver, 2004; Graham & Perin, 2007a; National Institute of Child Health and Human Development, 2000; RAND Reading Study Group, 2002). For example, learners need to acquire skills in the areas of phonemic awareness, phonics, decoding, vocabulary, and comprehension in order to become successful readers. By understanding these building blocks, teachers will be able to analyze areas in which student skill deficits are present and then create and teach strategies for these skill deficits.

Cognitive Apprenticeship

Moreover, teachers need to understand the concept of “cognitive apprenticeship” within which the teacher serves as the expert learner and the student serves as the novice learner. Teachers should know their role and the student’s role within that apprenticeship and how instructional mediation is transferred from the teacher to the student over time (Hock, Deshler, & Schumaker, 1993; Hock, Schumaker, & Deshler, 1999; Pressley & McCormick, 1995; Rogoff, 1990).

Learning Community

Teachers of learning strategies need to understand what a learning community is and how to create it in their classrooms. In productive learning communities, all students’ attempts at learning are supported and fostered. Students feel safe and protected as they practice new skills, and they feel a sense of responsibility for the growth and learning of others in the class. They also feel valued and appreciated for their contributions in class (Vernon et al., 2000).

Learning Strategies and Their Key Characteristics

Finally, teachers should be familiar with learning strategies, see examples of learning strategies, and understand the key characteristics or features associated with well-constructed learning strategies (Ellis & Lenz, 1996; Lenz, Ellis, & Scanlon, 1996). They need to be able to evaluate a strategy according to these key features so that they can make informed decisions about what strategies to teach their students and evaluate the strategies they create for students.

Knowledge and Skills Related to Learning Strategy Instruction

The second type of knowledge that teachers need is knowledge of specific instructional methods that have been shown to be effective in teaching learning strategies. Teachers need to master skills associated with the key methods that can be used while teaching learning strategies as well as understand what the methods are and why they should use them. Specifically, the methods are described in this section.

Creating a Strategy

Teachers need to know how to analyze the ways in which an expert learner would approach a given academic task. They also need to be able to break that approach down into cognitive and behavioral steps, word the steps in a simple way so that students can use them to self-instruct, and create a memory device to help students remember the steps of the strategy.

Describing the Strategy

Teachers of learning strategies need to be able to describe a strategy and its associated cognitive and behavioral steps in a clear and explicit way, along with the benefits associated with learning the strategy and the conditions under which the strategy should be used. In addition, teachers need to be able to do this in an interactive way so that all students are participating in the learning activity.

Modeling the Strategy

Teachers of learning strategies need to be able to model a strategy, thinking aloud so that all the cognitive processes can be witnessed while the strategy is being performed. They also need to be able to involve students in the demonstration by prompting them to model parts of the strategy.

Leading Scaffolded Practice Activities

Furthermore, teachers must be prepared to set up and supervise scaffolded practice activities at several levels so that students can practice the strategy with easy tasks, eventually with increasingly difficult tasks, and finally with tasks that are actually assigned in courses at their grade level.

Students have been shown to benefit from several types of practice activities, and therefore teachers must be able to lead these types of activities skillfully:

- **Verbal Practice.** In this type of practice activity, students orally say the steps of the strategy in sequence in order to learn how to instruct themselves through the steps (i.e., perform self-instruction). Students explain information associated with the strategy so that they can monitor their own performance of the strategy (i.e., self-regulation) and evaluate their own products (i.e., self-evaluation). The teacher leads oral practice activities so that the pace is lively and so that *all* students have an opportunity to participate.

- **Guided Practice.** Students may participate in guided practice activities before independently practicing the strategy. In these guided practice activities, all students and the teacher work together to complete the same task. The teacher calls on different students to perform different parts of the strategy. The teacher leads these guided practice activities in such a way that, again, the pace is lively, all students participate, students receive brief feedback about their performance, and the teacher gets an initial idea of which students might need additional help.
- **Controlled Practice.** In this type of practice activity, students practice the strategy on materials or tasks that are relatively easy for them so that they can concentrate on learning how to use the strategy steps. (This type of practice is sometimes referred to as *controlled practice* because the difficulty of the task is controlled by the teacher.) For example, if students are learning a reading strategy, the teacher might choose materials that are easy to read (i.e., those that do not have many difficult words). Thus, teachers need to be able to choose appropriate materials, give clear instructions, and supervise practice activities.
- **Grade-Appropriate Practice.** In this type of activity, students practice using the strategy in increasingly difficult materials until they can use it effectively and efficiently at the level required by the setting demands in their school at their grade level and, possibly, at a level required by demands they expect to face in the future. The teacher analyzes setting demands and tailors practice activities to match these demands as well as supervises these types of practice activities.

Providing Feedback

Students need to receive different types of feedback as they learn the strategy. Thus, teachers need to be skilled at giving all types of feedback, and they must know when it is appropriate to use each of the following:

- **Group Feedback.** If students are receiving instruction in a group, there might be instances in which group feedback would be appropriate.
- **Brief Feedback.** During discussions, brief positive or corrective feedback targeted at an individual is appropriate.
- **Elaborated Feedback.** To promote mastery, students require individualized and elaborated feedback on each practice attempt (Kline et al., 1991). Such feedback includes specifying a category of errors, explaining the error category and what the student needs to do in the future, modeling what to do in the future, having the student practice the new skill, providing help and feedback, and having the student summarize what he or she will do in future practice attempts.

Promoting Generalization

Students need to be capable of applying strategies in a generalized way. They should be aware of the cues that will signal to them that a given strategy is appropriate for a certain situation. They need to actually use the strategy in a variety of situations and circumstances, adapt the strategy

flexibly to different types of similar tasks, and use the strategy over time. Thus, teachers should be capable of leading a variety of generalization activities to ensure that students master use of the strategy at this level (Ellis, Lenz, & Sabornie, 1987a, 1987b).

Progress Monitoring

Teachers need to understand how to measure student use of strategies so that they can continuously monitor student progress. This usually entails giving a pretest, monitoring progress during student practice of the strategy, and then giving a posttest. Teachers must become familiar with different ways of measuring student strategy use and how to use examples of these different approaches. They need to be able to create their own measures for strategies that they invent.

Sequencing Instruction

Once teachers learn these instructional methods, they need to understand that these methods can be combined in different sequences (e.g., Ellis et al., 1991; Harris et al., 2003; Swanson & Deshler, 2003). They might be shown several sequences and asked to compare them, or they might be asked to create their own sequences.

Creating Variations

In addition, teachers need to understand how instructional methods can be adapted to meet the needs of different populations of students, instructional groupings, and settings. For example, they need to know methods that have been successful with younger students versus older students, with larger groups of students versus smaller groups, in general education versus special education settings, and in subject-area courses (e.g., science, social studies) versus skills courses (e.g., study skills). Teachers should be prepared to adjust instruction for students who do not have prerequisite skills for learning the strategies and how to adjust the instruction for heterogeneous classes of students in which students with a wide variety of abilities are enrolled versus homogeneous populations. Finally, they should understand how learning strategy instruction might be implemented as a schoolwide initiative because they might someday be associated with such an initiative (e.g., Lenz, Ehren, & Deshler, 2005).

Knowledge of Strategic Programs

Knowledge of Materials

Knowledge of pertinent materials and programs is essential for teachers of learning strategies. In order to gain this knowledge, teachers need to review a variety of curriculum materials that have been developed for teaching learning strategies and the prerequisites for those strategies. For example, teachers might compare written materials designed for live instruction of a strategy with computerized programs that can be used to teach the same strategy. Teachers should understand their role with regard to each type of program. They need to evaluate the materials with regard to the quality of the learning strategy being taught and the quality of the instructional methods that have been recommended within the materials. Teachers should be prepared to actually use selected materials so that they can become familiar with following a sequence of

instruction while simultaneously monitoring student progress, and they need to learn how to differentiate and adapt the instruction for the students they are actually teaching.

Knowledge of Research

In addition, teachers need to evaluate the quality of the research and the magnitude of the effects achieved in the research studies that were conducted on the different materials. Thus, they need to be able to read and analyze research reports and make judgments about the effects of given strategy programs so that they will be able to decide which programs to use in the future.

General Recommendations

In general, the conceptual knowledge related to learning strategies can be taught through lecture/discussion, assigned readings, and written assignments in which future teachers have to apply the concepts. For example, they might be asked to read an article about the key features of learning strategies, then to evaluate the features of one strategy (or several strategies) using a checklist of the key features, and finally to explain their evaluation to others. They might be asked to read an article about cognitive apprenticeship and then to describe in writing the features of a cognitive apprenticeship focused on teaching students to complete a certain type of task.

With regard to teaching future teachers to implement the instructional methods, two types of activities are pertinent, once a given method has been explained:

- Simulated teaching situations might be created for them in which they are asked to use a given instructional method with a small group of their peers (i.e., other future teachers). For example, they might be asked to demonstrate the cognitive and overt behaviors involved in using a given strategy. Peers might be asked to give feedback to the person providing the model based on a set of written criteria.
- Actual teaching situations might be created for the future teachers by requiring them to teach a strategy to students in a school. This might be a course assignment in a learning strategies course, part of a practicum experience, or both.

Recommendations for Instructing Preservice Special Education Teachers

Future or current special education teachers and other teachers who will be assigned to teach learning strategies in special course settings (e.g., in a study skills class, in a reading class, in an afterschool program, in a summer-school class) need to be prepared to teach learning strategies in an intensive way because they will be focusing on the low-achieving students, students who need extra practice opportunities and special feedback. When preparing these future teachers, the most intensive instructional methods and sequences for teaching learning strategies should be covered. In addition, future special education teachers should practice teaching learning strategies using instructional methods that have been specifically designed for at-risk students, and they will need to practice with that type of student.

Recommendations for Instructing Preservice General Education Teachers

Future or current general education teachers who will be assigned to teach subject-area classes should be prepared to create and teach learning strategies aligned with their subject areas. For example, an algebra teacher could be prepared to create and teach strategies related to algebra algorithms. A biology teacher could be prepared to create and teach strategies related to dissecting specimens and conducting experiments. Thus, when preparing these teachers, there should be less emphasis on exposing the teachers to intensive learning strategies instruction using commercially available materials and more emphasis on constructing and teaching learning strategies related to the subject-area curricula and objectives.

Recommendations for Instructing Inservice Teachers

Teachers who are employed within educational settings need to be first introduced to learning strategies and learning strategy instruction, and then they need to practice teaching learning strategies to their own students. Research and experience have shown that inservice teachers successfully learn to teach strategies if they have an opportunity to focus on one learning strategy at a time and if the instruction in that strategy is spaced out over a sequence of sessions. For example, they might be introduced to the strategy and how to assess strategy use and then given an assignment to administer the pretest to their students. At the next session, they might score the pretests and discuss what they found. They might next learn how to describe and model the strategy and then be given an assignment to describe and model the strategy to their students. At the next session, they might learn how to lead verbal rehearsal activities and other practice activities on the strategy and be given an assignment to conduct those activities with their students, and so forth. At each session, they will need to debrief on what they have accomplished and what they learned. Research has shown that inservice teachers implement learning strategy instruction with more fidelity if they are provided with an opportunity to share their findings and problem solve with other teachers. They also implement with more fidelity if they are provided with all the materials that they need to provide the instruction and if a coach visits their classrooms and provides assistance and feedback (Kline, Deshler, & Schumaker, 1992; Knight, 2007).

Conclusion

Learning strategy instruction has been shown to be effective as a means of helping at-risk students become better learners and performers. Teacher preparation programs that serve teachers who will be teaching these kinds of students need to include instruction in learning strategies as a part of the curriculum. The curriculum should include opportunities to learn about the concepts and skills associated with learning strategy instruction plus opportunities to practice the skills in simulated and real classroom conditions, with feedback provided to them by peers, the instructor, or other coaches.

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Appendix A. Innovation Configuration for Learning Strategy Instruction

	Code = 0	Code = 1	Code = 2	Code = 3	Code = 4	
<p>Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria specified from 0–4. Score and rate each item separately.</p> <p>Descriptors and/or examples are bulleted below each of the components.</p>	No evidence that the concept is included in the class syllabus or any activities	Concept mentioned in class syllabus	Concept mentioned in class syllabus and in required readings and tests and/or quizzes	Concept mentioned in class syllabus, in readings, tests, assignments, and projects for application <ul style="list-style-type: none"> • Observations • Lesson Plans • Classroom Demonstration • Journal Response 	Concept mentioned concept in class syllabus, required reading, tests, projects, assignments, and teaching activities involving application and feedback <ul style="list-style-type: none"> • Field Work (practicum) • Tutoring 	Rating: Rate each item as the number of the highest level of implementation receiving an “X” under it.
<p>General Conceptual Knowledge</p> <ul style="list-style-type: none"> • Fundamental Principles of Learning Theory • Characteristics of Ineffective Learners • Setting Demands • The Performance Gap • Building Blocks Within Academic Skill Areas • Cognitive Apprenticeship • Learning Community • Learning Strategies and Their Key Characteristics 						Rating:
Column Subtotals:						

	Code = 0	Code = 1	Code = 2	Code = 3	Code = 4	
<p>Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria specified from 0–4. Score and rate each item separately.</p> <p>Descriptors and/or examples are bulleted below each of the components.</p>	No evidence that the concept is included in the class syllabus or any activities	Concept mentioned in class syllabus	Concept mentioned in class syllabus and in required readings and tests and/or quizzes	Concept mentioned in class syllabus, in readings, tests, assignments, and projects for application <ul style="list-style-type: none"> • Observations • Lesson Plans • Classroom Demonstration • Journal Response 	Concept mentioned concept in class syllabus, required reading, tests, projects, assignments, and teaching activities involving application and feedback <ul style="list-style-type: none"> • Field Work (practicum) • Tutoring 	Rating: Rate each item as the number of the highest level of implementation receiving an “X” under it.
<p>Knowledge and Skills Related to Learning Strategy Instruction</p> <ul style="list-style-type: none"> • Creating a Strategy • Describing the Strategy • Modeling the Strategy • Leading Scaffolded Practice Activities <ul style="list-style-type: none"> ▪ Verbal ▪ Guided ▪ Controlled ▪ Grade-Appropriate • Providing Feedback <ul style="list-style-type: none"> ▪ Group ▪ Brief ▪ Elaborated • Promoting Generalization • Progress Monitoring • Sequencing Instruction • Creating Variations 						Rating:
Column Subtotals:						

	Code = 0	Code = 1	Code = 2	Code = 3	Code = 4	
<p>Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria specified from 0–4. Score and rate each item separately.</p> <p>Descriptors and/or examples are bulleted below each of the components.</p>	No evidence that the concept is included in the class syllabus or any activities	Concept mentioned in class syllabus	Concept mentioned in class syllabus and in required readings and tests and/or quizzes	Concept mentioned in class syllabus, in readings, tests, assignments, and projects for application <ul style="list-style-type: none"> • Observations • Lesson Plans • Classroom Demonstration • Journal Response 	Concept mentioned concept in class syllabus, required reading, tests, projects, assignments, and teaching activities involving application and feedback <ul style="list-style-type: none"> • Field Work (practicum) • Tutoring 	Rating: Rate each item as the number of the highest level of implementation receiving an “X” under it.
<p>Knowledge of Strategic Programs</p> <ul style="list-style-type: none"> • Knowledge of Materials • Knowledge of Research 						Rating:
Column Subtotals From Page 27:						
Column Subtotals From Page 28:						
Column Subtotals From Page 29:						
Column Totals:						

Appendix B. Additional Resources for Professors, Professional Developers, and Coaches

Possible Textbooks

- Deshler, D. D., Ellis, E. S., & Lenz, B. K. (1996). *Teaching adolescents with learning disabilities: Strategies and methods*. Denver: Love Publishing.
- Deshler, D. D., & Schumaker, J. B. (2006). *High school students with disabilities: Strategies for accessing the curriculum*. Thousand Oaks, CA: Corwin Press.
- Graham, S. (2006). Strategy instruction and the teaching of writing. In C. MacArthur, S. Graham, & J. Fitzgerald (Eds.), *Handbook of writing research* (pp. 187–207). New York: Guilford.
- Graham, S., & Harris, K. R. (2005). *Writing better: Effective strategies for teaching students with learning difficulties*. Baltimore, MD: Brookes.
- Harris, K. R., & Graham, S. (1996). *Making the writing process work: Strategies for composition and self-regulation* (2nd ed.). Cambridge, MA: Brookline Books.
- Harris, K. R., Graham, S., Mason, L., & Friedlander, B. (2008). *Powerful writing strategies for all students*. Baltimore, MD: Brookes.
- Hughes, C. A., & Archer, A. (in press). *Teaching students with learning difficulties: Making instruction effective and explicit*. New York: Guilford.
- Mastropieri, M. A., Emerick, K., & Scruggs, T. E. (1988). Mnemonic instruction of science concepts. *Behavioral Disorders, 14*, 48–56.
- Mastropieri, M. A., & Scruggs, T. E. (1989). Mnemonic social studies instruction: Classroom applications. *Remedial and Special Education, 1*(3), 40–46.
- Mastropieri, M. A., & Scruggs, T. E. (1991). *Teaching students ways to remember: Strategies for learning mnemonically*. Cambridge, MA: Brookline Books.
- Mastropieri, M. A., & Scruggs, T. E. (2000). *Attention and memory in the inclusive classroom: Strategies for effective instruction*. Columbus, OH: Prentice Hall/Merrill.

Resources on the Overall Concept of Cognitive Strategies

- Graham, S., Harris, K. R., & Mason, L. (2005). Improving the writing performance, knowledge, and motivation of struggling young writers: The effects of self-regulated strategy development. *Contemporary Educational Psychology, 30*, 207–241.
- Harris, K. R., Graham, S., Brindle, M., & Sandmel, K. (in press). Metacognition and children's writing. In D. Hacker, J. Dunlosky, & A. Graesser (Eds.), *Handbook of metacognition in education*. Mahwah, NJ: Erlbaum.

- Harris, K. R., Graham, S., & Mason, L. (2006). Improving the writing, knowledge, and motivation of struggling young writers: Effects of self-regulated strategy development with and without peer support. *American Educational Research Journal*, 43, 295–340.
- Lenz, B. K. (1992). In the spirit of strategies instruction: Cognitive and metacognitive aspects of the Strategies Intervention Model. In S. A. Vogel (Ed.), *Educational alternatives for students with learning disabilities* (pp. 142–158). New York: Springer-Verlag.
- Lenz, B.K., & Deshler, D.D. (2004). Adolescents with learning disabilities: Revisiting “The educator’s enigma.” In B.Y.L. Wong (Ed.), *Learning about learning disabilities* (3rd ed., pp. 535–564). New York: Academic Press.
- Pressley, M., & Harris, K. R. (2006). Cognitive strategies instruction: From basic research to classroom instruction. In P. A. Alexander & P. Winne (Eds.), *Handbook of educational psychology* (2nd ed., pp. 265–286). New York: Macmillan.
- Wong, B., Harris, K. R., Graham, S., & Butler, D. (2003). Cognitive strategies instruction research in learning disabilities. In L. Swanson, K. R. Harris, S. Graham (Eds.), *Handbook of research on learning disabilities* (pp. 323–344). New York: Guilford.

Resources for the Learning Strategies Curriculum

- Brewer, J. (2007). *The inference strategy: Student materials*. Lawrence, KS: Edge Enterprises, Inc.
- Bulgren, J. A., & Schumaker, J. B. (1996). *The paired-associates strategy: Instructor’s manual*. Lawrence: The University of Kansas Center for Research on Learning.
- Ellis, E. S. (1991). *SLANT: A starter strategy for class participation*. Lawrence, KS: Edge Enterprises, Inc.
- Ellis, E. S. (1992). *The LINCS vocabulary strategy: Instructor’s manual*. Lawrence, KS: Edge Enterprises, Inc.
- Fritschmann, N., Schumaker, J. B., & Deshler, D. D. (2007). *The inference strategy: Instructor’s manual*. Lawrence, KS: Edge Enterprises, Inc.
- Hughes, C., Ruhl, K., Deshler, D. D., & Schumaker, J. B. (1995a). *The assignment completion strategy*. Lawrence, KS: Edge Enterprises, Inc.
- Hughes, C., Ruhl, K., Deshler, D. D., & Schumaker, J. B. (1995b). *The quality quest planner*. Lawrence, KS: Edge Enterprises, Inc.
- Hughes, C. A., Schumaker, J. B., & Deshler, D. D. (2005). *The essay test-taking strategy: Instructor’s manual*. Lawrence, KS: Edge Enterprises, Inc.

- Hughes, C. A., Schumaker, J. B., Deshler, D. D., & Mercer, C. O. (1988). *The test-taking strategy: Instructor's manual*. Lawrence, KS: Edge Enterprises, Inc.
- Knight, J., & Schumaker, J. B. (2007). *The fundamentals of paraphrasing and summarizing: Student materials*. Lawrence, KS: Edge Enterprises, Inc.
- Lancaster, P. E., Lancaster, S. J. C., Hughes, C. A., Schumaker, J. B., Deshler, D. D., & Mercer, C. O. (2007). *The test-taking strategy student instructional CD*. Lawrence, KS: Edge Enterprises, Inc.
- Lenz, B. K., Schumaker, J. B., Deshler, D. D., & Beals, V. L. (1984). *The word identification strategy: Instructor's manual*. Lawrence: University of Kansas Institute for Research in Learning Disabilities.
- Lyerla, K. D., & Schumaker, J. B. (1991). *The paragraph writing strategy: Student lessons*. Lawrence, KS: Edge Enterprises, Inc.
- McNaughton, D. B., & Hughes, C. A. (1999). *The InSPECT strategy: A strategy for finding and correcting spelling errors: Instructor's manual*. Lawrence, KS: Edge Enterprises, Inc.
- Miller, S. P., & Mercer, C. D. (1991). *The math strategies curriculum*. Lawrence, KS: Edge Enterprises, Inc. (Includes seven instructor's manuals.)
- Nagel, D. R., Schumaker, J. B., & Deshler, D. D. (1986). *The FIRST-letter mnemonic strategy: Instructor's manual*. Lawrence, KS: Edge Enterprises, Inc.
- Schumaker, J. B. (2003a). *The theme writing strategy: Instructor's manual*. Lawrence, KS: Edge Enterprises, Inc.
- Schumaker, J. B. (2003b). *The theme writing strategy: Student's manual*. Lawrence, KS: Edge Enterprises, Inc.
- Schumaker, J. B., Denton, P. H., & Deshler, D. D. (1984). *The paraphrasing strategy: Instructor's manual*. Lawrence: University of Kansas Institute for Research in Learning Disabilities.
- Schumaker, J. B., Deshler, D. D., Nolan, S. M., & Alley, G. R. (1994). *The self-questioning strategy: Instructor's manual*. Lawrence: The University of Kansas Center for Research on Learning.
- Schumaker, J. B., Deshler, D. D., Zemitich, A., & Warner, M. M. (1993). *The visual imagery strategy*. Lawrence: The University of Kansas Center for Research on Learning.
- Schumaker, J. B., Knight, J., & Deshler, D. D. (2007). *The fundamentals of paraphrasing and summarizing: Instructor's manual*. Lawrence, KS: Edge Enterprises, Inc.

- Schumaker, J. B., & Lyster, K. D. (1991). *The paragraph writing strategy: Instructor's manual*. Lawrence: University of Kansas Institute for Research in Learning Disabilities.
- Schumaker, J. B., Nolan, S. M., & Deshler, D. D. (1985). *The error monitoring strategy: Instructor's manual*. Lawrence: University of Kansas Institute for Research in Learning Disabilities.
- Schumaker, J. B., & Sheldon, J. A. (1998). *Fundamentals in the sentence writing strategy: Instructor's manual*. Lawrence: The University of Kansas Center for Research on Learning.
- Schumaker, J. B., & Sheldon, J. A. (1999). *Proficiency in the sentence writing strategy: Instructor's manual*. Lawrence: The University of Kansas Center for Research on Learning.
- Sheldon, J. A., & Schumaker, J. B. (1999). *Proficiency in the sentence writing strategy: Student lessons*. Lawrence, KS: Edge Enterprises, Inc.
- Sheldon, J. A., Schumaker, J. B., Sheldon-Sherman, J., Schumaker, J., Sheldon-Sherman, B., & Schumaker, S. (1998). *Fundamentals in the sentence writing strategy: Student lessons*. Lawrence, KS: Edge Enterprises, Inc.