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Contributions of Study Skills to Academic Competence

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Abstract. Study skills are fundamental to academic competence. Effective study skills are associated with positive outcomes across multiple academic content areas and for diverse learners. The purpose of this article is to describe an information-processing perspective on the contribution of study skills to academic competence, and to identify evidence-based strategies that are effective in helping students to improve their study skills. Using an information-processing framework, study skills are grouped into four clusters: repetition-based skills, procedural study skills, cognitive-based study skills, and metacognitive skills. Key elements of effective study-strategy training are delineated.

Academic competence is associated with the knowledge and application of effective study skills. Capable students at all grade levels may experience difficulty in school, not because they lack ability, but because they lack good study skills. Although some students develop study skills independently, even normally achieving students may go through school without having acquired effective approaches for studying (Nicaise & Gettinger, 1995). Implementing study-skills instruction relies on an understanding of the theoretical foundation for teaching and using study skills, as well as knowledge of current research on the effectiveness of study strategies. The purpose of this article is to articulate a theoretical perspective on the contribution of study skills to academic competence, and to identify evidence-based strategies that are effective in helping students study.

Consistent with the model of academic competence for this miniseries, study skills are viewed as academic enablers; they function as

critical tools for learning. Study skills encompass a range of coordinated cognitive skills and processes that enhance the effectiveness and efficiency of students' learning (Devine, 1987). According to Hoover and Patton (1995), study skills include the competencies associated with acquiring, recording, organizing, synthesizing, remembering, and using information. These competencies contribute to success in both nonacademic (e.g., employment) and academic settings. Studying, or the application of study skills, can be distinguished from other forms of school learning that occur under more proscribed conditions, such as teacher-led classroom instruction (Novak & Gowin, 1984; Rohwer, 1984). First, studying is skillful; it requires training and practice with specific techniques that help a learner acquire, organize, retain, and use information. Although students are expected to apply study skills in completing homework or preparing for tests, teachers typically devote little time to providing explicit instruction in such skills (Zimmerman,

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1998). Second, studying is intentional. Effective studying requires not only the knowledge and application of skills, but volition as well. Studying differs from incidental learning in that it is purposeful and requires a deliberate and conscious effort on the part of the student. Third, studying is highly personal and individualized. Whereas classroom learning occurs within a social context through interaction and guidance from others (e.g., peers, teachers), studying is often an individual activity. Even when learning is fostered through a process of social communication, individual study behaviors still play a critical role in academic competence (Damon, 1991; Kucan & Beck, 1997). Finally, studying involves a self-regulatory dimension. According to Rohwer (1984), "studying is the principal means of self-education throughout life" (p. 1). Self-regulation (e.g., initiative, persistence, goal setting) is an important aspect of studying, not only during the initial development of study skills, but also during application of skills outside of formal learning contexts (Zimmerman, Bonner, & Kovach, 1996).

A useful distinction has emerged in recent years to differentiate between a study tactic and study strategy (Lenz, Ellis, & Scanlon, 1996). A study tactic is a sequence of steps or a specific procedure, such as underlining or summarizing. A study tactic may be taught through explicit instruction wherein the skill is operationalized and presented as a sequence of observable, isolated behaviors. It is often assumed that good studying is synonymous with using study tactics correctly. Routine or rote application of a study tactic, however, does not ensure effective studying. Merely implementing a sequence of behaviors does not necessarily encourage students to plan, think about, or monitor their studying (Paris & Winograd, 1990). The application and effectiveness of a tactic may be improved through the use of a study strategy. A strategy is an individual's comprehensive approach to a task; it includes how a person thinks and acts when planning and evaluating his or her study behavior. A strategy consists of guidelines and rules related to selecting the best tactics and making decisions about their use. The goal of study-strategy instruction is to teach a strat-

egy in a manner that is both effective (the strategy is learned) and efficient (it is learned to an optimal level with minimal effort). Although a strategy requires knowledge of study tactics, the primary focus in strategy instruction is knowing how to study, making decisions about the use of study tactics, and taking responsibility for one's own learning. In effect, good studiers are good strategy users; they know how to use a variety of goal-specific tactics, to execute them in a planned sequence, and to monitor their use. In sum, study skills encompass a variety of tactics that are used flexibly and purposefully by students, depending on the learning situation. For purposes of the following discussion, the terms study skills and study strategies are used interchangeably.

Study Skills and Academic Competence

Characteristics of Effective Versus Ineffective Studiers

Several researchers have documented weak study skills among students who experience learning problems (Henley, Ramsey, & Algozzine, 1996; Hoover & Patton, 1995; Lenz et al., 1996; Strichart, Mangrum, & Iannuzzi, 1998; Waldron & McLeskey, 2000). According to Gersten (1998), many students with academic difficulties are not aware of "tricks of the trade" that are used by academically competent students when they study. A primary source of evidence concerning reading-related study strategies comes from an analysis of the verbal reports produced by individuals who express their thoughts while engaged in a learning activity, often referred to as "thinking aloud" (Kucan & Beck, 1997). Think-aloud methods have allowed researchers to explore the type of cognitive processing involved in studying, beyond a narrow focus on observable behaviors (Afflerbach & Johnston, 1984; Ericsson & Simon, 1993; Pressley & Afflerbach, 1995; Wyatt et al., 1993). As a method of inquiry, think-aloud protocols reveal much about the strategies that skilled students use to understand and retain text information, and that unskilled students need to learn in order to be more successful (Brown & Day, 1983; Collins, Brown, & Larkin, 1980).

Based on a review and detailed analysis of more than 40 verbal protocol studies, Pressley and Afflerbach (1995) compiled a comprehensive list of strategies and cognitive processes that individuals execute in order to understand and facilitate retention of information. Pressley and Afflerbach identified several key study strategies that were evident in the majority of verbal protocols they reviewed. These included: (a) overview before reading; (b) look for important information and pay greater attention to it (which often requires jumping forward or backward to process information); (c) relate important points to one another; (d) activate and use prior knowledge; (e) change strategies when understanding is not good; and (f) monitor understanding and take action to correct or "fix up" inaccuracies in comprehension.

Conversely, students with low academic achievement often demonstrate ineffective study skills. They tend to assume a passive role in learning and rely on others (e.g., teachers, parents) to regulate their studying. Several cognitive and behavioral characteristics reflect this passivity in learning. For example, low-achieving students often do not monitor their understanding of content; they may not be aware of the purpose of studying; and they show little evidence of looking back, or employing "fix-up" strategies to remedy comprehension problems. Students who struggle with learning new information seem to be unaware that they must extend effort beyond simply reading the content to understand and retain it. Children with mild disabilities, such as learning disabilities (LD), do not exhibit an executive level of thinking in which they plan and evaluate their studying (Wong, 1994). Their studying may be haphazard and disorganized. An assessment of students with academic problems, based on teacher and parent ratings and self-report, reveals challenges with personal organization as well. They often have difficulty keeping track of materials and assignments, following directions, and completing work on time. Unlike good studiers who employ a variety of study tactics in a flexible yet purposeful manner, low-achieving students use a restricted range of study skills; they cannot ex-

plain why good study strategies are important for learning; and they tend to utilize the same, often ineffective, study approach for all learning tasks, irrespective of task content, structure, or difficulty (Decker, Spector, & Shaw, 1992).

An assessment procedure developed by Zimmerman and Martinez-Pons (1986) has been used to evaluate self-regulatory processes related to effective studying. In this procedure, students are presented with common learning problems and asked how they would respond (e.g., "Most teachers give tests at the end of a semester to determine grades. Do you have any particular method to prepare for this type of test?"). Students' open-ended responses are coded into self-regulatory study strategies, such as goal-setting, time management, self-monitoring (85-90% intercoder agreement). Research using both verbal and written forms of the procedure has documented significant differences in both the quality and quantity of study strategies reported by high versus low achievers (Ley & Young, 1998; Purdie & Hattie, 1996; Purdie, Hattie, & Douglas, 1996; Zimmerman & Martinez-Pons, 1986, 1988, 1990). In one study, for example, high achievers reported significantly greater use of 13 of 14 study strategies, indicating they used them more than twice as often as low achievers (Zimmerman & Martinez-Pons, 1986). In addition, self-reported use of strategies was highly correlated with standardized achievement test performance ($r = .61$) and homework completion ($r = .70$), but was found to be factorially separate from verbal ability.

Although problems with study skills are evident among elementary school children, weak study skills are generally ascribed to adolescents and older students, largely because expectations for independent textbook study increase substantially in middle and high school (Deshler, Ellis, & Lenz, 1996). Most of what is known about study skills among secondary students is derived from self-report methods, such as interviews, student-completed checklists, or self-ratings. For example, a recent self-report measure, the Metacognitive Awareness of Reading Strategies Inventory (MARSI), is designed to assess student's

awareness and perceived use of strategies while studying school-related materials (Mokhtari & Reichard, 2002). On the MARSI, students rate how frequently they use 30 different study strategies (e.g., "I take notes while reading to help me understand what I'm reading"; "I ask myself questions I like to have answered in the text"). Measures similar to the MARSI, with diverse middle and high school samples, reveal a consistent pattern of limited study skill usage among students who struggle academically. They experience significant difficulty acquiring new information, and report feeling overwhelmed with the amount of material they are expected to learn (Wood, Woloshyn, & Willoughby, 1995). When queried about how they study, students report that they rely heavily on passive strategies such as rote memorization. They tend to memorize details to the exclusion of main ideas, fail to establish goals or priorities when studying, and typically equate the purpose of studying with remembering material just long enough to take a test (Scheid, 1993). When they engage in studying, they do so in long, infrequent sessions. A common test-preparation strategy, for example, is to study all material the night before an exam (Jones, Slate, Blake, & Holifield, 1992). Finally, students with weak study skills do not allocate sufficient time to study. When time is devoted to studying, it is often interrupted by friends, daydreaming, music, or poor concentration (Nicaise & Gettinger, 1995).

In sum, research has established that use of cognitive and self-regulatory study processes can be reliably measured through self-report, and that qualitative and quantitative differences exist between high and low achievers. Students at all grade levels who possess good study skills are likely to achieve academic competence. They understand task demands, and are able to implement flexible, effective strategies to succeed academically. In addition to knowing the steps of specific study tactics, good students understand why, how, and when to use them. Active learning is the essence of effective studying. Good students are active learners, not passive recipients of facts and details. Not surprisingly, successful students have been described as "directors" of their own

learning, able to determine what content is important and how to learn and retain information.

Interface With Other Academic Enablers

Study skills are related to other academic enablers. Studying involves both cognitive activities, to facilitate acquisition and retention of information, as well as self-management activities, to maintain attention, effort, and time devoted to studying. Failure to engage in effective study behaviors may be due to insufficient motivation, low engagement, or lack of home support. For study skills to be effective in promoting academic competence, students must be willing and motivated to study. A National Assessment of Educational Progress Report (National Center for Education Statistics, 1990) indicated that 71% of 12th graders studied no more than 60 minutes each day, and 25% did not study at all. Thus, low motivation contributes to weak studying. Motivational beliefs can also influence studying and, in turn, may be influenced by the results of effective studying. The correlation between study strategy use and self-efficacy beliefs ranges from .40 to .46 (Zimmerman, 1998). Good students see themselves as able to control their academic performance and, therefore, are motivated to devote effort and attention to studying. Less successful students, on the other hand, may hold negative perceptions of their abilities and lack motivation to do well or implement strategies to make their studying more effective (Schunk & Zimmerman, 1994).

Engagement contributes to effective studying as well. Successful students are willing to engage in study behavior and persevere until they have adequately studied assigned content. Good students are able to shield their studying from competing behaviors or distractions, and maintain high levels of engagement (Gersten, 1998). Some researchers have suggested that the benefit of study skills is linked to higher levels of engagement that result from applying study strategies, rather than the use of a specific strategy per se (Chi, de Leeuw, Chiu, & LaVancher, 1994; Loxterman, Beck, &

McKeown, 1994; Pearson & Fielding, 1991; Rosenshine & Meister, 1994). That is, the effects attributed to the application of study strategies may be due simply to the increased amount of time students spend studying and thinking about material. In their review of Reciprocal Teaching (RT), for example, Rosenshine and Meister (1994) proposed that the positive effects of RT and similar approaches may not be due to the strategies that are learned and used by students, but rather to the fact that strategies "enabled and required the students to engage in deeper processing of what they read" (p. 510). In sum, although the direction of the influence between engagement and study skills remains unclear, it is evident that study skills and engagement are highly interrelated, and that academic competence is integrally linked to both enablers.

Finally, because studying is not an explicit requirement in school settings, students must acknowledge for themselves when studying is needed; they must also know where it is best to carry out study activities and how much time studying will require. Environmental influences, especially guidance and support from families, can facilitate this decision making (Hoover, 1993). For some children, low engagement in studying results from understimulating home environments (i.e., environments in which study resources do not exist, and parental encouragement and support for studying are limited). There is also evidence that parents' goals and expectations for their children's achievement are predictive of students' academic goal setting ($r = .36$) (Zimmerman, Bandura, & Martinez-Pons, 1992). In sum, motivation, engagement, and supportive home environments are all factors that influence the relationship between study skills and academic competence.

Evidence-Based Approaches to Enhance Study Skills

In light of research demonstrating the importance of studying for success in school, efforts have focused on teaching study skills in experimental training studies. Over the last 20 years, both laboratory- and classroom-based research has provided evidence supporting the

effectiveness of study skills to promote academic competence among students. Through study-skills instruction, students become more efficient, thoughtful, and independent learners (Scheid, 1993) and perform better in school (Deshler & Schumaker, 1993). Even students who develop study skills on their own can learn to study more effectively and efficiently through explicit instruction (Wood et al., 1995). Overall, study-skills instruction has been shown to improve academic performance, strategic knowledge, and affective responses among students with learning problems across multiple academic domains (Harvey & Goudvis, 2000). Research indicates that students, indeed, require explicit instruction in study skills; individuals assigned randomly to control conditions tend not to acquire or use study strategies on their own without training (Schunk & Zimmerman, 1994, 1998).

A number of different theoretical perspectives support the benefit of equipping students with study skills to enhance their learning and academic competence. The most comprehensive approach to study skills stems from an information-processing model (Adams & Hamm, 1994; Gettinger & Nicaise, 1997; Harvey & Goudvis, 2000; Schunk, 2000). In brief, an information-processing model assumes that information to be learned is manipulated by the student to enhance acquisition and retention. The level of processing, or manipulation, is affected by the type of study strategy the learner uses. The more elaborate the strategy, the deeper the level of processing. Within an information-processing framework, the development of study skills is conceptualized as strengthening cognitive processes across many information-processing systems (Schunk, 2000). An information-processing perspective provides the theoretical framework for two broad areas of investigation related to study skills: (a) research evaluating the effects of four clusters of study skills on academic outcomes, and (b) research identifying critical components of effective study-skills instruction, irrespective of the specific skill taught. Key studies in both areas are reviewed next.

Four Clusters of Study Skills

During the 1980s and 1990s, several study-strategy investigations were carried out in which researchers hypothesized that students who received strategy training would outperform no-training control students on a number of important outcomes, most notably, the level and quality of learning information from text and performance on standardized achievement tests (Bereiter & Bird, 1985; Gersten, Fuchs, Williams, & Baker, 2001). Strategy-training research is predicated on the belief that students, low achieving as well as normally achieving, can improve their performance on learning tasks if they are taught how to engage in cognitive processing and study skills similar to those used by successful students. Studies have been aimed at either validating single study strategies, such as prediction, content mapping, and mental imagery, or evaluating the coordinated use of multiple study strategies, such as Reciprocal Teaching (Palincsar & Brown, 1984).

Overall, there is research support for the effectiveness of study strategies that enable students to learn and retain information from both teacher-guided instruction and self-guided or independent study. Evidence-based study strategies range from simple tactics for rehearsal to more complex procedures designed to help with monitoring comprehension. Weinstein and Mayer (1985) offered a useful framework for classifying study strategies within an information-processing framework. Specifically, study strategies are grouped on the basis of the degree of manipulation or the level of processing of the information to be learned. Using this framework, four clusters of study skills are addressed: (a) repetition- or rehearsal-based strategies; (b) procedural or organization-based strategies; (c) cognitive-based strategies; and (d) metacognitive-based strategies.

Repetition- or rehearsal-based study strategies. The most basic study strategies involve repetition, rereading, or rehearsal of information. Rehearsal strategies are most useful when storing small bits of information for the short term, or when the content being stud-

ied is used frequently. For example, repetition strategies are facilitative when students are required to study 15 words for a weekly spelling test, or learn multiplication facts that are used daily in the classroom. Rehearsal strategies are easy to learn and use, and therefore, are among the first study skills taught to young children. In the early grades, teachers may rely on repetition strategies for helping children acquire basic reading and math skills. For example, flash card sets are frequently used to help children learn spelling, vocabulary, sight words, and math facts (Decker et al., 1992).

From an information-processing perspective, repetition-based study strategies, although easy to learn and apply, afford minimal processing of content. As such, when used in isolation, rehearsal is generally ineffective as a study strategy, especially as students move beyond the elementary grades (Jones et al., 1992). There are ways, however, that repetition-based study strategies can be enhanced to promote greater elaboration and deeper processing of information during rehearsal. One strategy for which there is an extensive evidence base is the creation and use of mnemonic devices, especially those involving mental imagery (Gambrell & Bales, 1986; Levin & Levin, 1990; Scruggs & Mastropieri, 1990, 1992). Using random-group assignment combined with pre- and post-training assessment, research has shown that academic performance is significantly better when students receive training in creating mental imagery devices, such as keywords, than when they learn a simple rehearsal technique (Bulgren, Hock, Schumaker, & Deshler, 1995; Bulgren, Schumaker, & Deshler, 1994; Ferro & Pressley, 1991; Fulk, Mastropieri, & Scruggs, 1992; Mastropieri & Fulk, 1990; Scruggs & Mastropieri, 1992). Specifically, students trained in the use of mnemonic strategies have been shown to outperform noninstructed control students in terms of recall of information as well as comprehension of text. In general, the evidence supports three conclusions concerning mnemonic approaches: (a) Control students do not spontaneously use mental-imagery strategies on their own; (b) students can be taught to do so; and (c) implementation of

mnemonic strategies has positive effects on performance (Levin, 1993).

Procedural or organization-based study skills. Lack of organization is common among students with poor study skills (Gersten, 1998). Although students may demonstrate an understanding of organizational skills, many low-achieving students fail to use them consistently and effectively (Wong, 1994). Procedural study skills encompass the behaviors or habits that allow students to maximize the benefits of their study time. Several competencies underlie the development of procedural study skills, including time management, material organization, and development of schedules or consistent study routines (Gettinger & Nicaise, 1997). A typical problem for students with organizational deficits is the inability to structure their study time and, when necessary, adapt their schedules to provide sufficient time for studying and work completion (Zimmerman, Greenberg, & Weinstein, 1994). Even students in elementary grades, however, can be helped by teachers or parents to organize their study time (Hoover, 1993). According to Archambeault (1992), organizational routines and schedules for studying are most effective when they are personalized by having students construct their own plans for monthly, weekly, and daily study. The professional literature offers several best-practice guidelines for converting study schedules into actual studying, including: (a) complete difficult work at times when you are most alert and least distracted; (b) divide long assignments into shorter, manageable units; (c) vary the type of study tasks (e.g., intersperse reading with writing activities); and (d) be flexible in scheduling breaks and rescheduling study time if conflicts arise (Gettinger & Nicaise, 1997). Although research has failed to document significant benefits for any single study routine over another, what does contribute to positive outcomes is the consistency with which a study routine is implemented and the extent to which it is personalized or adapted for individual learners (Archambeault, 1992).

Cognitive-based study skills. The goal of cognitive-based study strategies is to guide

students to engage in appropriate thinking about information they are required to learn. According to information-processing theory, the greater knowledge students have about content, the more likely they are to think about, understand, and remember it (Schunk, 2000). Thus, studying is enhanced when new material is meaningful to learners, and integrated with their existing knowledge. In addition, information that is stored as a network of connected facts and concepts, called schemata, is more easily learned and retained. It follows that good studying requires students to (a) activate and assemble background knowledge prior to studying a topic; (b) connect new ideas, information, or concepts to what they already know; and (c) develop new schemata, when necessary, to integrate content to be learned (Bos & Anders, 1990; Collins, 1991). Cognitive-based study skills are designed to achieve these goals.

Cognitive organizers are effective tools to assist students in activating prior knowledge about a topic, organizing information during learning, and using schemata to establish connections among key concepts (e.g., Baumann & Bergeron, 1993; Scanlon, Duran, Reyes, & Gallego, 1991). Cognitive organizers, also referred to as cognitive or semantic maps, are visual representations of the interrelatedness of ideas. Cognitive maps allow students to arrange the component ideas and details from text visually so that implicit relationships among ideas and details are made explicit. Typically, a map contains a hierarchical diagram or arrangement of concepts, ideas, and facts about a topic to be studied (often written on individual cards), which enables students to manipulate information cards and describe the relationship among or between content.

Despite substantial evidence supporting the effectiveness of cognitive organizers across multiple content domains (e.g., science, history, literature) and for elementary- through college-level students (Baumann & Bergeron, 1993; Wood et al., 1995), widespread application in classrooms is limited for many reasons. First, a substantial amount of instructional time and practice are required before students become proficient at constructing maps independently (typically 6 weeks); insufficient instruc-

tional time in the use of concept maps minimizes gains from implementing this study strategy (Stensvold & Wilson, 1990). Second, effective use of semantic mapping may be difficult unless it is part of a comprehensive and multidimensional cognitive strategy approach. For example, Vidal-Abarca and Gilabert (1995) found that training in semantic mapping improved performance only when there had been previous training in summarization and question generation. Finally, research suggests that semantic maps may not be equally beneficial for all students or for performance on all types of academic tasks. Low-ability students, for example, gain the most from map instruction because they are less likely to spontaneously activate prior knowledge and connect new concepts (Scanlon et al., 1991). In addition, map instruction leads to significantly higher performance on test questions requiring inferencing and application of content, but not on factual recall (Schmid & Telaro, 1990; Spires, Gallini, & Riggsbee, 1992; Stensvold & Wilson, 1990).

Other evidence-based, cognitive study strategies that assist students in activating and making connections with prior knowledge are question generation (Davey & McBride, 1986; Dreher & Gambrell, 1985; King, 1994; Rosenshine, Meister, & Chapman, 1996) and summarization (Gajria & Salvia, 1992; Malone & Mastropieri, 1992). Wittrock's research (1990) has shown that cognitive strategies, such as summarization and question generation, are most effective when they are generative in nature. For a summary to be generative, the learner's own words and experiences are used to construct novel sentences that make connections among concepts and relate new information to prior knowledge. According to Wittrock (1990), when learners use their own words to formulate questions or summarize, connections between new material and existing knowledge are automatically constructed because those words are associated with information already stored in the learner's memory. Generative summarization has been used successfully as a study strategy for learning material from both written text and oral presentations (King, 1992).

Although teacher-led, cognitive-based strategy training has been the focus of most experimental studies, there is a growing interest in students' interactions with other students. For example, in Reciprocal Teaching, there has been a gradual movement from teacher-led discussion to peer-led discussion (Palincsar & Klenk, 1992, 1994). Student-led discussions have been the primary focus of work by Raphael and her colleagues (Goatley, Brock, & Raphael, 1995; McMahan, Raphael, & Goatley, 1995) and Almasi (1995; Almasi, McKeown, & Beck, 1996). These researchers found that peers can successfully assume the role of teacher in modeling effective cognitive-study strategies (such as summarization), and that the amount and quality of verbalizations about study strategies are actually higher in peer-led than teacher-led discussions (Almasi, 1995). Peer-assisted learning approaches, including tutoring, mentoring, and cooperative learning, have assumed a critical role in the development of study skills. The work of Fuchs, Fuchs, Mathes, and Simmons (1997) has demonstrated the effectiveness of Peer-Assisted Learning Strategies (PALS). PALS is a classwide peer-tutoring program involving partner reading, summarization, prediction, and other study strategies that enhance academic performance. Systematic evaluation of PALS has shown that, when compared to the performance of students in control classrooms, students in PALS classrooms demonstrate greater progress on measures of achievement. Klingner, Vaughn, and Schumm (1998) also found positive effects for peer-mediated strategy training on tests of social studies content covered during implementation, as well as standardized tests of reading comprehension. In sum, peer models who demonstrate strategies and verbalize their thought processes as they perform tasks contribute to better studying.

Metacognitive-based study skills.

The extent to which students apply study skills when the need arises depends largely on their metacognitive capabilities (i.e., their ability to assess the need for studying, and to plan, implement, monitor, and evaluate their study approaches). Whereas cognitive-based study strategies relate to how learners process infor-

mation, metacognitive strategies relate to how students select, monitor, and use strategies in their repertoire. The importance of metacognitive skills for academic competence is well-documented in the literature (Mastropieri & Scruggs, 1997; Montague, 1998). Being metacognitive is essential for effective studying. Metacognitive ability enables learners to adjust their studying according to varying task demands. Students with well-developed metacognitive skills know how to study effectively; they understand which study strategies to deploy, monitor their studying, and allocate study time wisely. They are familiar with the cognitive strategies that help them study and regulate their use of such strategies (Winne & Hadwon, 1997). In contrast, students with learning difficulties lack metacognitive skills necessary to become successful, independent learners (Case, Mamlin, Harris, & Graham, 1995). They are disorganized and lack an understanding of what to do or how to proceed with studying.

Research has demonstrated that training can significantly improve students' metacognitive abilities (Deshler et al., 1996; Montague, 1992). Whereas all students benefit from training, students with learning problems appear to make the greatest gains when they are taught to use metacognitive-based study strategies (Lucangeli, Coi, & Bosco, 1998; Montague, 1998). In controlled studies, students (with and without disabilities) who received training in metacognitive strategies outperformed students who did not (e.g., Lucangeli et al., 1998; Lucangeli, Galderisi, & Cornoldi, 1995; Montague, 1992; Wong & Jones, 1982). Research by Montague (1992, 1998) demonstrated that a combination of both cognitive and metacognitive strategies in math problem solving was more effective than either cognitive or metacognitive strategies taught in isolation. In typical metacognitive skill training, students are given explicit instruction in self-questioning strategies. For example, in a study by Wong and Jones (1982) on reading comprehension, students were taught to ask themselves questions such as "Why am I studying this passage?" "Do I understand the material I am studying?" and

"Should I reread or revise my study strategy?" Similarly, in a study by Lucangeli et al. (1998) on metacognitive instruction in math, students were trained to ask themselves questions during problem solving (e.g., "What strategies are necessary for solving this problem?" or "Have I solved the problem correctly?"). Training in metacognitive skills has been shown to result in improved performance on both measures of metacognitive ability and academic achievement (Groteluschen, Borkowski, & Hales, 1990).

Effective Study-Skills Instruction

In recent years, there has been a shift in the focus of study-skills research from identifying and teaching discrete study strategies toward developing and evaluating teaching models that emphasize the flexible use of interrelated strategies (Pressley, Hogan, Wharton-McDonald, Mistretta, & Ettenberger, 1996). The research reviewed in the previous section provided initial evidence that the manner in which strategies are taught may be as important as the strategies themselves. Findings from these studies provided direction for how teachers can structure their strategy instruction to increase the probability of its effectiveness with diverse learners. Building on this research, instructional approaches have been developed, implemented, and evaluated to serve as models for educators (Deshler & Schumaker, 1988; Lenz et al., 1996; Pressley, Woloshyn, & Associates, 1995; Wood et al., 1995). Controlled evaluations of two approaches, in particular, have provided evidence for the positive effects of strategy training on learning and achievement, especially for low-achieving students. These approaches are the Strategies Intervention Model (SIM), developed by researchers at the Kansas Institute for Research in Learning Disabilities and Center for Research on Learning (Deshler & Schumaker, 1988; Ellis, Deshler, Lenz, Schumaker, & Clark, 1991), and the Good Information Processing Approach, stemming from the work of Pressley and his colleagues (Pressley & El-Dinary, 1993; Pressley, El-Dinary, Gaskins et al., 1992; Pressley, El-Dinary, Stein, Marks, & Brown, 1992; Pressley, Woloshyn et al., 1995).

From these and other approaches, a model of effective strategy instruction has evolved that incorporates a sequence of standard instructional phases that proceed from social modeling to gradually increasing levels of self-directed functioning (Pressley, 1994; Pressley, Borkowski, & Schneider, 1989; Pressley, Woloshyn et al., 1995; Pressley et al., 1990). Such a model is consistent with a social-cognitive perspective of self-regulation and academic competence (Schunk & Zimmerman, 1994), which posits that academic competence develops initially from social sources (teachers, peers) and eventually shifts to internal sources (self). Within a social-cognitive perspective, four phases of development are theorized; these phases map directly onto four standard elements of effective study-strategy instruction (Zimmerman & Kitsantas, 1997), as described below.

According to a social-cognitive perspective, during the first phase, called modeling, students acquire study strategies through social modeling, task structuring, and social praise. A model of effective strategy instruction, therefore, begins with simplifying the strategy by breaking it down into basic steps, followed by explicit instruction and frequent modeling of strategy use by the teacher. Research underscores the importance of showing students, not just telling them, how to use a study strategy (Harris & Pressley, 1991). Strategy explanations include a rationale for using the strategy, including when it can be used and why it is likely to be effective. This type of strategy presentation occurs through a process called *cognitive modeling* (Pogrow, 1992). In cognitive modeling, the teacher demonstrates the use of a strategy while also "thinking aloud" to show the reasoning that accompanies its use. Cognitive modeling allows students to observe the strategy in action, as well as the thinking that is involved in selecting and applying it (Scheid, 1993). Students who understand the potential benefit of a study skill are more likely to transfer the use of the strategy to multiple situations. In fact, studies have documented a marked increase in strategy use simply by informing students about the utility of a particular study approach (Meltzer, 1993).

For some learners, this observational level of training and development is sufficient for them to apply the strategy on their own. Most students, however, require actual performance of the strategy before it is fully incorporated into their study routine. Similar to learning academic content, practice is necessary to develop competence in the use of study skills. Thus, the second stage of development, called the imitative level, occurs when the learner applies the strategy in a way that approximates the model's performance. In terms of strategy training, this requires teachers to provide multiple and varied opportunities for students to practice strategies and to receive feedback and support in the form of scaffolding. Scaffolding involves providing help to students on an as-needed basis, such that the student continues to make progress in applying a strategy (Pressley et al., 1996). As part of the scaffolding process, teacher guidance is gradually reduced over practice trials, and students assume increasing responsibility for strategy use. This type of strategy practice occurs through a process called *cognitive coaching* (Pogrow, 1992). Cognitive coaching incorporates collaborative practice within a scaffolded context; it entails a shift in strategy execution from the teacher to students themselves. In other words, during the process of cognitive coaching, responsibility for effective use of a study strategy is gradually released by the teacher and assumed by the students. During this shift in responsibility, the teacher continues to provide assistance in the form of scaffolding (e.g., cues, prompts, guiding questions). As students become more proficient with the strategy, the teacher gradually withdraws supporting scaffolds until students are able to use the strategy on their own (Pressley et al., 1996). The transition from teacher-guidance to self-regulation is necessary to enable students to apply strategies in appropriate situations, on their own and without external prompting (Schunk & Zimmerman, 1994).

Whereas the source of learning and reinforcement for the first two phases of strategy acquisition is primarily social, the locus gradually shifts to the individual student in the latter two phases. Specifically, in the third

phase of development, called self-control, learners use the strategy independently while performing transfer tasks; in theory, a student's use of a strategy becomes internalized during this phase. During training, students are prompted to look for authentic situations to apply the strategies they have learned. The best context for continued application of the strategy is the student's actual classroom instruction and curriculum. Therefore, opportunities are provided for students to practice the use of study skills in daily assignments, while teachers continue to cue students' awareness of opportunities that warrant the use of a particular strategy.

The fourth phase of development, self-regulation, is evident when students are able to systematically adapt their learning strategies to different situations. At this level, the learner initiates the use of a study strategy on his or her own, and makes adjustments in the strategy based on the specific learning situation. In training, the most apparent manifestation of this phase occurs through a gradual movement from teacher-guidance to self-dependence in determining a strategy's utility and implementing it (Zimmerman & Kitsantas, 1997). Generalization and maintenance may be severely limited during this final phase if students believe they must rigorously adhere to a narrow, scripted use of a strategy in all situations (Brown, Pressley, VanMeter, & Schuder, 1996; Deshler & Shumaker, 1993; Ellis, 1993; Meltzer, 1993; National Information Center for Children and Youth with Disabilities, 1997; Wong, 1993, 1994). Thus, study-skills instruction must make clear to learners that strategies can and should be used flexibly. One particular strategy may not be appropriate for all students, and, most often, strategies must be tailored to individual students.

Classroom Applications of Study Skills Research

Over the past two decades, much has been learned about the process of effective studying. Research has demonstrated that success in all academic content areas is often associated with good study skills. Whereas some students develop effective ways to study on

their own, the majority of students will not become proficient at studying without systematic instruction and repeated practice. In response to research on the importance of study strategies, comprehensive models have been developed and evaluated for implementing strategy training, including the SIM by Deshler and his colleagues (Deshler & Shumaker, 1988) and Pressley's Good Information Processing Approach (Pressley, Woloshyn et al., 1995). Such models have played a vital role in helping to promote the translation of research on study skills into effective classroom practice. A critical role for school psychologists is to maximize the success of efforts to enhance study skills through an understanding of the nature of study skills and knowledge of evidence-based approaches that facilitate the acquisition of effective study skills.

Despite the potential benefits of study skills, instructional challenges exist that may limit the widespread application of study-skills training. For strategy instruction to be implemented in classroom contexts, adaptations for group situations may be necessary (Palincsar & Brown, 1988; Pressley, Brown, El-Dinary, & Afflerbach, 1995). Strategy instruction that requires lengthy one-to-one interaction between the teacher and student is not feasible in most classrooms. Scanlon, Deshler, and Schumaker (1994) found that many teachers were not willing to sacrifice coverage of curriculum content in order to teach study skills to students who need them. One way to address this concern is for teachers to merge their teaching of specific content with the teaching of study strategies that aid students in learning the content. That is, teachers can teach and prompt the application of strategies that are effective for their particular course content.

Research that has attempted to incorporate strategy training with content teaching has yielded mixed results. In a study by Scanlon, Deshler, and Schumaker (1996), for example, teachers were taught to incorporate intensive and explicit study strategy instruction (e.g., providing detailed explanations of how the strategy should be used and multiple opportunities for practice with teacher scaffolding) within the context of their social studies teach-

ing. In this study, teachers exhibited relatively low levels of implementation of strategy teaching (less than half of the targeted teaching behaviors), raising questions about the extent to which teachers are able to successfully merge content instruction with strategy training. In another study, however, detailed and explicit strategy instruction was removed as part of the classroom strategy-instruction routine in an effort to minimize the time requirements (Bulgren, Schumaker, & Deshler, 1997). Instead, teachers only modeled appropriate study strategies as they presented them within the context of classroom instruction. Bulgren et al. (1997) were interested in evaluating the extent to which teachers could use strategy-based instruction (i.e., presenting mnemonic devices) as an ongoing part of the curriculum, and whether students would be able to create their own mnemonic strategies by observing teachers. In this instance, teachers had high levels of implementation of the strategy training (more than 90% of targeted behaviors), and the majority of students, although not all, were able to apply the strategy. Thus, for strategy instruction to be implemented with integrity in the context of classrooms, it is necessary to adapt the training to teachers' available time and teaching style. Future research should attempt to identify other instructional challenges that may restrict implementation (e.g., type of study strategy, characteristics of learners).

Additional key principles derived from research on improving study skills are important to keep in mind when designing study-skills training. First, students must recognize the need for varied approaches to studying. Not all strategies are appropriate for all study tasks. For example, the most effective strategy for studying spelling words is likely to be different from an effective approach for studying for a history test. Furthermore, any single study tactic will likely require some modification and personalization on the part of students themselves. In developing an awareness of different strategies, students should be encouraged to explain the appropriateness of a particular study strategy for different tasks.

Second, the key to effective study-strategy training is to help students guide their own

thinking, organizing, and study behaviors. The most effective study-strategy instruction helps children to develop strategies that work for them. Unlike the focus of commercially available study-skills curricula, students should be actively involved in developing their own, personalized study strategies, instead of being taught a scripted set of steps. Including students in developing their own strategies enhances maintenance and generalization to other study situations.

Future research is needed to identify instructional conditions that are most conducive to the successful integration of study-strategy instruction with classroom learning. For example, it is unclear whether strategies are more readily learned if strategy training is embedded within content instruction (in which students witness first-hand the immediate application and benefit of strategies for learning and remembering content), or if learned in isolation. Research should also identify characteristics of students who do not benefit from strategy instruction in general education classes. For some students, it may be necessary to receive more intensive instruction provided in a resource room or other support setting. Finally, further research is needed to identify factors that contribute to maintenance and generalization of study skills to other similar tasks. For example, given the relationship between study skills and other academic enablers, effective strategy training should include some means of motivating students to engage in study strategy usage, to reinforce engagement in studying, and to increase parental encouragement and support of studying.

Conclusion

Study skills are fundamental to academic competence. Good study skills minimize failure and enable students to take advantage of learning opportunities. To be effective learners, students must (a) have a wide array of study strategies at their disposal, and (b) know where, when, and how to use these strategies. Research has documented that effective study skills can be taught. The importance of study skills in terms of academic competence underscores the need for a strong emphasis on the development

and maintenance of effective study skills across the curriculum and for all grade levels. Many students pass through our educational system without having achieved a level of academic competence necessary for success in and out of school. Although study skills are just one reason for educational failure, research on classroom implementation of strategy instruction and how to promote effective studying among all students should remain a high priority.

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