
Promoting Academic Competence and Literacy in School

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Borkowski and Muthukrishna conclude the section with a theoretical discussion of teacher understandings that probably change as a result of becoming a strategies teacher. This chapter provides a fitting conclusion to the book, reiterating the nature of good information processing and discussing how teachers can come to understand such thinking, as well as why they must understand it if they are to succeed as cognitive strategies teachers. The strategic, knowledge, metacognitive, and motivational components highlighted throughout the book are present in this chapter, as is consideration of the explicit collaborative instructional models that are featured in this volume. Most importantly, however, for this section of the volume, Borkowski and Muthukrishna demonstrate that it is critical to develop a particular type of model of mind in teachers, if they are to be successful teaching efficient processing to their students. They must be "thinking teachers," ones who think about their students and their instructional practices in terms of strategies, knowledge, metacognition, and motivation.

Thus, the volume ends with both good news and challenges with respect to teacher development. It is possible to develop teachers who encourage academic competence and literacy using the methods reviewed in this volume. This development is occurring in schools using the Kansas model, at Benchmark School, and in Michigan and Arizona schools, but the changes necessary are not easy. Developing strategies and cognitive process approaches will never be sufficient, without the development of teachers who can teach them.

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Implementing Learning Strategy Instruction in Class Settings: A Research Perspective

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THE LEARNING STRATEGIES INSTRUCTIONAL APPROACH

During the last decade, the learning strategies instructional approach has been emphasized as a means of increasing the academic performance of normally achieving students (e.g., Gagne, 1985; Jones, 1986; Mayer, 1987; Pressley, Borkowski, & Schneider, 1990) as well as of students who are at risk for academic failure (e.g., Deshler & Schumaker, 1988; Ellis & Lenz, 1987; Graham & Harris, 1987; Swanson, 1989). This instructional approach, in which the focus is teaching students "how to learn and how to solve problems," has strong validity because of its logical relationship to the increasing societal demands of teaching students how to think, how to solve problems, and how to process large and diverse bodies of information. Indeed, learning strategy instruction has been touted as an appropriate and potentially powerful response to these demands. The validity of this instructional approach is enhanced by the mounting empirical evidence that learning strategies can be taught to students who can, in turn, use these strategies to become more efficient and effective learners (e.g., Borkowski, Weyhing, & Turner, 1986; Duffy & Roehler, 1987; Graham &

Harris, 1989; Pressley, Johnson, & Symons, 1987; Schumaker & Deshler, 1992; Wong, 1985).

Although learning strategy instructional protocols have been developed by researchers and program developers in a variety of fields (e.g., general education, cognitive psychology), a number of common features characterize the instructional programs of many of these individuals. First, learning strategy instruction often includes (1) a description of the strategy and the covert processes involved in using the strategy; (2) a description of the conditions under which the strategy should be used (i.e., when, where, and why); (3) a model of the strategy that includes demonstration of the covert processes involved in using the strategy; (4) multiple practice opportunities (including guided and independent trials) to apply the strategy to academic tasks; (5) encouragement to use self-regulation processes during strategy application (e.g., self-instruction, self-assessment, self-reinforcement); (6) ample interactions between the teacher and the student for the purpose of providing feedback to students about their practice attempts; and (7) deliberately programmed opportunities for students to transfer and generalize the strategy to other situations and settings.

Second, the focus of the instruction is on teaching the student to use a new approach to the task of learning: a learning strategy. Learning strategies have been defined as "goal-directed cognitive operations employed to facilitate performance" (Pressley, Harris, & Marks, 1991b, p. 2). Although the structure of different learning strategies may vary, a learning strategy typically comprises a series of steps the student uses in a certain order to complete a learning task. Each of the steps might involve the use of cognitive, metacognitive, or other behaviors by the student (Ellis, Deshler, Lenz, Schumaker, & Clark, 1991).

Third, the instructional approach represents a new instructional paradigm for teachers and students because instructional control is shifted during the instructional process from the teacher to the student. Learning strategy instruction generally progresses from teacher-mediated instruction in the initial instructional phases to increased student-mediated instruction later in the learning process. This shift is operationalized in a variety of ways. In the early phases of instruction, students may have a major voice in choosing the strategies they will learn and in setting their own instructional goals. They may participate in teacher-led discussions and guided practice activities. Later in the instruction, they may assume responsibility for evaluating the quality of their performance on independent practice activities or for adapting and combining strategies for their own purposes. Involving students in such facets of the instructional process is seen as central to teaching students to take a proactive posture toward the learning process and, in turn, to become independent learners and performers.

Fourth, learning strategy instruction requires mastery on the part of students. That is, students must master a learning strategy if they are to be expected to apply it to academic tasks in a way that will improve their performance on such tasks. Thus, instruction in the strategy must provide students with an opportunity to achieve proficiency.

Fifth, learning strategy instruction appears to be an intensive as well as a long-term endeavor (Pressley, Goodchild, Fleet, Zajchowski, & Evans, 1989). In other words, for students to become "good information processors" (Pressley *et al.*, 1990), they must be immersed in strategy instruction for relatively long periods of time (see Chapter 14). Learning strategy instruction is not seen as something that can take place every Friday for half an hour; the instruction for one strategy must take place daily over an extended period of time (Slavin, 1990). Additionally, students must learn several strategies so they have a "menu" of strategies from which to choose each time they face a new learning task.

Finally, the developers of learning strategy instructional protocols usually emphasize the importance of not teaching students in a "cookbook" fashion. Instead, they encourage teachers to reflect on the dynamic characteristics of a given instructional situation and to fashion their instruction accordingly. Thus, teaching students to be strategic learners is seen as being largely dependent on the teacher's ability to understand and integrate a host of variables into the instructional setting (e.g., the demands of the mainstream curriculum, the motivational level of the student, the student's willingness to take risks in a learning situation, the complexity of the strategy being taught) and to respond accordingly by tailoring learning strategy instruction to meet the unique requirements of the situation.

Thus, learning strategy instruction represents a new approach to instruction that is significantly different from the instruction that has traditionally taken place in our nation's schools. It includes a sequence of instructional methods different from what teachers typically use. It focuses on a type of content that has rarely been taught. It is based on constructs that are abstract in nature. It requires the student to master the strategy if benefits are to be achieved. It must be intensive as well as extensive. It requires the student to assume control as instruction proceeds. Finally, it requires the teacher to be reflective, inventive, and flexible while conducting the instruction.

To the credit of a number of researchers, a significant amount of research on this new and distinctly different instructional approach has been completed in recent years. Indeed, a great deal has been learned about powerful methods of teaching strategies, optimal design of learning strategies, and motivational elements that increase student participation in strategy instruction. However, most of this work has been conducted in single classrooms or in laboratories. Although this work has been both essential and

productive, it has left unanswered a very pressing question: Can strategy instruction be incorporated into educational practices in thousands of schools throughout the nation?

Although demonstrating the effectiveness of instruction in a given learning strategy in a specific classroom with one teacher is important, whether or not instruction in that same learning strategy and other learning strategies can be implemented in a broad array of classrooms across multiple schools, teachers, and districts over a sustained period of time is more important. In short, the robustness of learning strategy instruction relative to broad-scale implementation has not been addressed in the literature. Can teachers and administrators readily adapt and adjust to this new type of instruction?

In response to these concerns, the staff of the University of Kansas Institute for Research in Learning Disabilities (KU-IRLD) has recently conducted research to (1) identify barriers that prevent the broad-scale implementation of learning strategy instruction and (2) evaluate the effects of various interventions designed to overcome these barriers. This chapter describes that research. First, as an introduction, background information is presented on how the KU-IRLD staff operationalizes learning strategies, the instructional methodology used to teach learning strategies, and the dissemination process that has been followed. Second, descriptive information common to many of the studies presented in this chapter will be reviewed. Third, the studies conducted to identify the major barriers to broad-scale implementation will be described and the identified barriers will be specified. Fourth, intervention studies that have been conducted to evaluate methods of reducing barriers will be presented. Finally, a set of conclusions will be presented about the actions required of school personnel if the broad-scale implementation of learning strategy instruction is to be successful.

THE KU-IRLD APPROACH TO LEARNING STRATEGY INSTRUCTION

The Strategies Intervention Model

Since the institute's inception in 1977, the KU-IRLD staff's major research agenda has been the design and validation of an intervention model for improving the academic success and life adjustment of adolescents and young adults who are experiencing problems associated with low achievement, for example, learning disabilities (LD). Emerging out of this work has been a comprehensive intervention model called the Strategies Intervention

Model (SIM) (Deshler & Schumaker, 1988). The SIM has been developed to respond to the broad array of academic, social, and motivational needs of students who are at risk for school failure. The major goal of the model is to teach students to be strategic in their approach to curriculum and other setting demands. Instruction, therefore, is focused on teaching students how to learn and how to perform. Students are taught strategies for meeting the demands of various school and out-of-school settings. For the purposes of this instructional model, a strategy has been defined as "an individual's approach to a task; it includes how a person thinks and acts when planning, executing, and evaluating performance on a task and its outcomes" (Lenz, Clark, Deshler, Schumaker, & Rademacher, 1990). Since students face a variety of academic, social, and motivational tasks in secondary and postsecondary settings, strategies that help students respond to these kinds of tasks are the main content taught in the SIM.

The Learning Strategies Curriculum

A major component of the SIM, the *Learning Strategies Curriculum*, was designed to help students respond to academic task demands (cf. Deshler & Schumaker, 1988). This curriculum consists of strategy interventions designed and field-tested for use in public school settings (Schumaker & Deshler, 1992). Each unit of the curriculum includes instructional procedures to facilitate students' acquisition and generalization of a given learning strategy. The *Learning Strategies Curriculum* is organized into three major strands corresponding to three major academic demands: acquisition, storage, and expression of information.

To determine which learning strategy(ies) to teach to a student from the *Learning Strategies Curriculum*, teachers analyze the setting demands that the student is expected to meet. This differs from traditional remedial interventions, which emphasize understanding the attributes of the learner as the primary basis for designing an instructional program. The *Learning Strategies Curriculum* is founded on the notion that the strategies taught must be sufficiently powerful to improve performance markedly in the mainstream environment. Therefore, the *Learning Strategies Curriculum* focuses on "strategy systems" used to approach the complex learning tasks encountered in mainstream settings. Each strategy system is a collection of cognitive and metacognitive strategies as well as other behaviors integrated into a routine used by a student to meet a given curriculum demand (Deshler & Lenz, 1989).

Throughout this chapter, several strategies from the *Learning Strategies Curriculum* will be mentioned. From the acquisition strand of the curriculum, the Word Identification Strategy (Lenz, Schumaker, Deshler, & Beals,

1984) is designed to enable students to decode multisyllabic words, whereas the Paraphrasing Strategy (Schumaker, Denton, & Deshler, 1984) is designed to assist students in the transformation of main ideas and important details into their own words. From the storage strand, the FIRST-Letter Mnemonic Strategy (Nagel, Schumaker, & Deshler, 1986) enables students to organize, memorize, and use stored information to answer test questions. Finally, from the expression strand, the Sentence Writing Strategy (Schumaker & Sheldon, 1985) provides students with a means of writing a broad array of well-structured sentences. These strategies are representative of the types of strategies needed by at-risk students to cope successfully with the demands of secondary school settings.

The Instructional Methodology

Each of the task-specific strategies in the *Learning Strategies Curriculum* is taught to students using an eight-stage instructional methodology that has been the focus of KU-IRLD research efforts for over a decade (Ellis et al., 1991). This instructional methodology is characterized as a "working model" because ideas regarding the instruction of learning strategies continue to evolve. This working model includes a set of procedures for promoting the acquisition and generalization of a learning strategy. In general, the instructional process involves systematic and intensive instruction in which the teaching emphasis gradually shifts from teacher-mediated to student-mediated instruction as students pass through the instructional stages of acquisition to those of generalization.

Briefly, the instructional methodology consists of seven acquisition stages and one generalization stage. In the Pretest and Make Commitments stage, students are tested to determine their current learning habits regarding a particular setting demand. If the pretest shows a need to learn the strategy, students are asked to make a personal commitment, in the form of a written goal, to learn that strategy. In the second stage, the Describe stage, a description of the strategy is provided by the teacher, including where, when, how, and why the strategy should be used. In the Model stage, the teacher demonstrates all aspects of the strategy for the students by thinking aloud. As the Model stage progresses, the teacher prompts student involvement in the demonstration, checks understanding of the underlying strategic processes, shapes and corrects student responses, and engineers student success. The purpose of the fourth stage, Verbal Practice, is to enhance student understanding and mastery of the processes underlying the strategy and the memory system used to facilitate memory of the strategy steps. During this stage, students progress to a level of proficiency at which they can fluently name and explain each of the steps of the

strategy and the underlying cognitive processes. Then, in the Controlled Practice and Feedback stage of instruction, students practice applying the new strategy to materials in which the complexity, length, and difficulty levels have been controlled until the students reach a predetermined mastery level. During the sixth instructional phase, Advanced Practice and Feedback, students are given a variety of opportunities to practice using the strategy with materials and in situations that closely approximate the demands placed on them in mainstream educational and out-of-school settings. The provision of feedback after each practice attempt in the practice stages is an important opportunity to individualize the instruction so students make rapid progress toward mastery (Kline, Schumaker, & Deshler, 1991). During the seventh stage of the instructional process, the Post test and Make Commitments stage, students are tested to determine if they have mastered the strategy. The teacher and student take time in this stage to reflect on progress and to celebrate the achievement of the original goal. Also during this stage, students are asked to make a commitment to generalize their use of the strategy to other settings and situations.

During the final stage of the instructional methodology, the Generalization stage, teachers focus their energies on engineering situations that will afford students with multiple opportunities to generalize the strategy across tasks, situations, and settings. Although this stage explicitly targets generalization, instruction for generalization is emphasized throughout the entire instructional sequence by (1) enlisting student commitment in the Pretest and Posttest stages; (2) incorporating multiple examples in the Describe and Model stages; and (3) emphasizing generalization as students apply the strategy in the practice stages (Ellis, Lenz, & Sabornie, 1987a,b).

Although generalization can be emphasized throughout strategy acquisition, the Generalization stage itself has been shown to be critical for insuring that all students actually generalize the strategy (Schmidt, Deshler, Schumaker, & Alley, 1989). During the first phase of the Generalization stage, Orientation, teachers make students aware of the various contexts in which the learning strategy can be applied. During the second phase, Activation, students are given opportunities to practice the strategy with new materials and in a variety of settings. In the Adaptation phase, the teacher prompts students to modify and combine the strategy with other strategies to meet different setting demands. The final generalization phase, Maintenance, involves the use of periodic probes to determine whether the student is continuing to use the strategy. These probes enable the teacher to determine whether additional instruction in the strategy is needed.

This eight-stage instructional methodology has been empirically validated through a series of research studies showing that students who are at risk for school failure can (1) learn to use these strategies; (2) apply them

to tasks resembling those assigned in mainstream classrooms; and (3) generalize the strategies across materials and settings (Schumaker & Deshler, 1992).

The KU-IRLD Dissemination Process

Once the instructional methodology for teaching learning strategies was validated, the attention of the KU-IRLD staff turned to the challenge of disseminating strategy instruction to school settings throughout the nation. Initially, a traditional model of inservice was used, that is, the training¹ typically consisted of a single session in which a trainer visited a district for at most a day. Teachers were required by administrators to attend the session. The information was presented, the trainer departed, and the teachers were left without incentives or support for implementing the new instruction. The administrators did not require teachers to implement the new instruction, nor did they check to determine whether the new instruction had been implemented. Implementation activities within and across schools in a district were typically not coordinated.

Not surprisingly, this traditional inservice model resulted in a very low rate of implementation. The KU-IRLD staff realized that several significant changes in the dissemination process were needed to increase the implementation of strategy instruction. The first step in improving the dissemination process was to translate the field-test versions of the units in the *Learning Strategies Curriculum* into a set of instructional materials that were "teacher friendly." Teachers provided suggestions about how the materials could be revised and formatted. Following their recommendations, several of the learning strategies packets have been transformed into commercially produced manuals. Each manual includes the necessary teaching instructions, worksheet masters, scoring instructions, and teaching scripts for implementing instruction in one strategy (e.g., Hughes, Schumaker, Deshler, & Mercer, 1988; Lenz *et al.*, 1984; Nagel *et al.*, 1986; Schumaker & Lyerla, 1991; Schumaker *et al.*, 1984; Schumaker & Sheldon, 1985; Schumaker, Nolan, & Deshler, 1985).

Although teachers reported a high level of satisfaction with the newly produced instructional packets, a relatively low rate of strategy implementation was still observed when the traditional inservice training model was used (Deshler, Schumaker, & Clark, 1985). Thus, the KU-IRLD staff realized that significant additional steps beyond merely translating the materials into "cleaned-up" versions had to be taken in order to affect a higher rate of

¹When referencing *student* learning, the terms, "instruction" and "instructor," are used in this chapter. When referencing *teacher* learning, the terms, "training" and "trainer," are used. The purpose for using different terms is merely to avoid confusion when the teacher becomes the learner. No disrespect toward teachers is intended.

implementation for a complex educational innovation such as strategy instruction.

Simultaneous with the publication of the first set of instructional materials was the formation of a national network of qualified inservice trainers to be associated with the KU-IRLD. The purpose of this network is to provide training of a consistently high quality about instructional innovations developed at the KU-IRLD to educators across the nation. Over the past 6 years, this network has grown from about 15 founding members to more than 600 professionals in 40 states, in four provinces in Canada, and in Germany. Preparation for these trainers has been available at the KU-IRLD, through several state-sponsored projects associated with state departments of education, and through other smaller local efforts in several states. In all cases, however, each of the trainers has been required to meet an extensive list of qualifications, including demonstrated competence in teaching various learning strategies to students and in providing inservice training for teachers.

In an attempt to improve traditional inservice practice, the KU-IRLD staff has developed a system of "best practices" relative to staff development and system change. This system is based on those practices that have been reported as successful in the literature, as well as on practices recommended and followed by network trainers. The system includes a flexible training sequence that can be adjusted to meet the needs of different schools or educational agencies. The sequence consists of four major phases: Needs Assessment, Initial Training, Program Integration, and Institutionalization (Schumaker & Clark, 1990).

The Needs Assessment phase is initiated in response to a request for training from an educational site. During this phase, a trainer presents information in the form of an overview of SIM, filmstrips (Deshler & Schumaker, 1984; Schumaker & Deshler, 1985), or videotapes (e.g., Clark, Deshler, Schumaker, & Rademacher, 1988) to enable school personnel to make an informed choice about committing to learning strategy training. As a result, school personnel understand the trade-offs necessary to implement the instruction and support the program long term. Before formal training begins, written commitments are made by teachers and administrators regarding a long-term training sequence that spans several years. This phase also produces an articulation of the perceived needs of the school or agency that can be used as a basis for designing the training sequence.

The Initial Training phase begins after the Needs Assessment phase has been completed. During this phase, teachers are presented with information that helps them understand how strategies instruction is different from other instruction, the instructional principles that underlie the teaching process, the educational outcomes expected for students, and the way in

which strategies should be taught to insure effective and generalized use of the strategy. This initial training session (3–6 hr) also includes training in one task-specific strategy. Such training consists of suggestions on how to teach and manage instruction of the specific strategy in a classroom.

After the initial training session, teachers are expected to begin implementing the strategy immediately. They are encouraged to begin implementation on a small scale (with 2 to 5 students) to build up their familiarity and confidence with the strategy. As problems are encountered, they are encouraged to call their trainer. Formal meetings may also be held for the purpose of problem solving and sharing information among teachers. After a period of time has elapsed and teachers have had an opportunity to teach the first strategy, the trainer returns and provides training in a new strategy. During the course of one academic year, teachers may be trained in the use of one to three task-specific learning strategies. The rate of introducing new strategies is tied to the successful implementation of previously taught strategies.

The third phase, Program Integration, is designed to help teachers integrate strategies that they have learned separately into a cohesive program. Issues such as scope and sequence of instruction, cooperative planning with other teachers, implementing an evaluation system, insuring generalization across settings, and integrating strategies instruction with other ongoing instructional efforts are addressed. During the final phase, Institutionalization, the emphasis is on making the district self-sufficient. In this phase, policies and procedures are formalized within and across schools. An on-site trainer is prepared and provisions are made for staff turnover, so the longevity of strategy instruction can be insured.

The sequence of training activities outlined here is founded on a set of principles that has been specified in the literature on staff development and the change process (Schumaker & Clark, 1990). The first principle, obtaining broad-based support and commitment, is based on the notion that all stakeholders must understand the nature of the innovation, the costs of implementation, and the necessity of long-term training and support for teachers. Prior to beginning any formal training, participants are asked to make a group decision to adopt SIM and to make individual commitments to participate in the training.

The second principle is to view training broadly. This principle underscores the fact that effective training must be conceptualized on several levels that include awareness, practice, and application experiences. Traditional inservice efforts focus solely on awareness-level experiences for teachers. Thus, this principle is based on the notion that, in order for teachers to become strategic instructors, they must have ample opportunities to practice using their newly learned skills and they must receive

feedback on their performance (Joyce & Showers, 1980, 1981, 1982). As a result, KU-IRLD training activities encourage such procedures as peer coaching and the use of meetings in which teachers are given an opportunity to share their successes and generate ideas for solving common problems.

The third principle, requiring active and continued participation by key participants, underscores the fact that representatives of all stakeholders must be involved in both decision making and actual training. For example, the development of policies and procedures to support the instructional program and the attendance of key administrators at training sessions can do much to communicate its importance to other staff members.

The final principle, adopting a change perspective, is founded on the notion that the adoption of an innovation usually involves a significant amount of change at both a personal and a system level. Trade-offs are often required, and priorities may need to be altered. Under such circumstances, sacrificing the innovation is sometimes easier than working through the necessary changes. Nevertheless, if participants are aware that change can be an uncomfortable process, they will be more likely to stay the course.

In summary, the work of the KU-IRLD staff and associates not only has focused on the specification and validation of a set of learning strategy interventions but has involved significant efforts to translate these interventions into packages that can be readily used by teachers. In addition, it has focused on the establishment of a dissemination system based on known principles of change. As new elements of the dissemination process have been added, increased rates of implementation have been noted. However, these actions alone appeared to be insufficient to overcome several barriers that seemed to be impeding the progress of broad-scale institutionalization of strategy instruction. Thus, the need to understand these barriers and to take the necessary steps to circumvent them became the thrust of a programmatic line of research.

AN OVERVIEW OF A MAJORITY OF THE STUDIES

Except where otherwise noted, most of the KU-IRLD work on barriers was conducted in a school district located in southern Kansas. The district serves 47,500 students in 7 comprehensive high school, 14 middle schools, and 65 elementary schools. There are about 3000 teachers employed in the district; 100 of these teachers are responsible for serving students with learning disabilities. During the 3 years in which this research was conducted, there was no formal district policy regarding the implementation of

strategy instruction for mildly handicapped students or any other students.²

All the teachers involved in the studies were certified special education teachers who were responsible for serving students formally identified as learning disabled in their resource classrooms. All teachers, except one, were female. Some of the teachers served elementary students in Grades 4–6 and others served secondary students in Grades 6–8 or Grades 9–12. The elementary teachers provided instruction for their students in language arts and math. The secondary teachers were responsible for providing instruction in English, social studies, and science. All these teachers held master's degrees or were working toward master's degrees; most who held master's degrees had been involved in additional graduate training past their master's degree work.

The training the teachers received followed the recommended sequence described earlier. The training experience was described to all the teachers as a long-term endeavor in which they could participate if they wished to volunteer. All committed to at least 1 year's participation in the training sequence. They received training about strategy instruction from a member of the KU-IRLD training network. All the teachers received a 3-hr overview of strategy instruction and SIM before receiving instruction on a particular strategy. The teachers received instruction on a minimum of two strategies per school year. Each strategy training session included descriptions of the strategy and how to teach it, demonstrations, scoring practice, and individual planning for implementation. About 20 teachers per year volunteered to initiate the training sequence. The training took place during school hours; substitute teachers covered for participating teachers.

After each workshop session on a given strategy, the teachers were required to complete a Weekly Report Form (Kline, 1988) for each group of students they instructed. On the form, they communicated the name of the strategy being taught, the names of students being taught the strategy, the days of the week that strategy instruction took place, and a brief description of the instructional activities that took place during each hour of strategy instruction during the week. Thus, the Weekly Report Form served as a method of gathering self-report data on the teachers' implementation of strategy instruction. The reliability of the teachers' reports was established by randomly visiting the classrooms and comparing student products and progress to the reports. In all cases, teachers were found to be accurately reporting their implementation.

Finally, the students of each teacher had been formally identified as

²Since the completion of this research, the district has included a learning strategies course in the secondary curriculum and has added a half-time supervisory position over strategy instruction.

learning disabled according to Kansas guidelines. In general, strategy instruction was provided to students in their deficit areas (e.g., a student having a deficit in writing was included in instruction on the Sentence Writing Strategy). The students were selected for participation in instruction for a particular strategy by their teachers after the students had taken a pretest for the strategy and failed to meet the mastery criteria. All students participated in some mainstream educational experiences each day.

THE BARRIER IDENTIFICATION STUDIES

The barrier-identification process involved several independent efforts. First, individuals who had participated in strategy instruction and in training others to implement strategy instruction were asked to identify the barriers they had encountered or had observed others encountering as they tried to implement strategy instruction. Second, a study was conducted to analyze the teaching skills of special education teachers after participating in a strategy workshop (Kea, 1987). Third, a study of the fidelity with which teachers implemented the instructional sequence was conducted to identify points in the instructional sequence where barriers appeared to be present. Fourth, a study of the time teachers spent providing strategy instruction was conducted. Finally, a study of teacher use of instructor's manuals was completed to identify problems with the manuals that might impede instruction.

Barrier Survey

To obtain a national perspective on the problem, qualified strategy trainers who attended a national meeting of the Network of Strategy Trainers sponsored by the KU-IRLD were asked to identify barriers to the implementation of strategy instruction. The participants at the meeting were asked to volunteer to complete a survey and were offered a 5-dollar incentive for participation in the survey. The questionnaire was open-ended in format. The respondents were asked to list the two or three most critical barriers they had witnessed that impeded the implementation of learning strategies instruction. Twenty-eight trainers responded to the survey. These individuals all had experience teaching learning strategies to students and had experience training teachers to teach learning strategies. About half the group (15) was currently teaching in classrooms whereas the remainder was serving in supervisory or training capacities.

The respondents' perceptions of critical barriers are summarized in Table 1. Their responses were related to seven major categories. By far the most frequently mentioned barrier was related to the teacher's "mind set."

Table 1
Barrier Categories and Responses from the Barrier Survey

Barrier	Number of responses
Mind set	21
Overall plan	16
Support	11
Start-up costs	10
Management problems	9
Student problems	4
Poor teaching skills	2

The trainers noted that critical barriers were present when teachers were struggling with releasing old beliefs, were unwilling to make a commitment to something new, were hesitant, lacked confidence, held low expectations for their students, were concerned that this might be just another "fad," and were uncomfortable with accepting a new way of thinking about instruction.

The next most frequently mentioned barrier related to the lack of an overall plan for strategy instruction. The trainers noted that teachers often lacked a common vision or a coherent philosophy, were unsure about how to integrate strategy instruction into their ongoing curriculum, often allowed their instruction to be interrupted, and had no idea how to prioritize the kinds of instruction they could deliver. Another relatively frequently mentioned barrier related to the support teachers were getting for their efforts in strategy instruction. The trainers noted that teachers often did not receive any support, that their administrators did not become involved, that administrators did not require accountability with regard to strategy instruction, that administrators did not have an understanding of the change process required while someone was in the process of becoming a strategic teacher, and that administrators did not communicate a clear vision of what kind of instruction should be taking place.

Another barrier related to start-up costs. The trainers reported that obtaining the required materials, copying handouts or worksheets for students, and finding the necessary equipment (e.g., tape recorders) were all time-consuming tasks and that teachers often delayed starting instruction because of the preparation time involved in getting ready.

Another barrier frequently reported by the trainers was management trouble. They reported that teachers had difficulty scheduling groups of students, grouping students, managing their time, coordinating their efforts with other teachers, and setting up their physical environments for strategy instruction.

Two barriers that were mentioned less frequently by the trainers were

student problems and poor teaching skills. They reported that student resistance to strategy instruction and failure of students to progress were barriers to strategy instruction. These student problems seemed highly related to the skills of teachers. One might surmise that teachers who were skilled in instructional techniques would be able to "sell" their students on strategy instruction and insure that their students reach mastery. Two of the trainers felt that poor teaching skills were often detrimental to the implementation of strategy instruction.

An Analysis of Teachers' Skills

Since the KU-IRLD staff suspected that poor teaching skills might be a major barrier to strategy instruction, although only a few trainers mentioned this barrier, a study was conducted to analyze special education teachers' skills in detail after they participated in a strategy workshop. For the study, Kea (1987) asked special education teachers participating in a series of strategy workshops in a southwestern state to volunteer to have an observer visit their classrooms. She also asked another group of special education teachers residing in a midwestern state who were not participating in the workshops to volunteer to be observed. Fifteen workshop participants constituted the experimental group, and fifteen nonparticipants constituted the comparison group.

All the teachers taught students in Grades 6–12. Teachers in the experimental group ranged in age from 27 to 59 years ($M = 41$ years), whereas the comparison teachers ranged in age from 23 to 54 years ($M = 34$ years). With the exception of one male in the experimental group, all teachers were female. The teachers in the experimental group and in the comparison group had been special education teachers for a mean of 11 years (range = 4–19 yr) and 7 years (range = 1–15 yr), respectively. All the teachers in the experimental group held master's degrees; 31% of the teachers in the comparison group held master's degrees. None of the teachers in the experimental group had participated in courses about learning strategies prior to the study. Two teachers in the comparison group reported that they had had some exposure to learning strategies while in college. All the teachers received \$10 for participating in the study.

The experimental group teachers attended a training series that took place between March and May, 1985. All were enrolled in a college course for which they received credit hours at a local university. They met six times with the trainer, who was a qualified KU-IRLD trainer and held a Ph.D. in Special Education.

At the first meeting, the teachers received an overview on strategy instruction. In subsequent sessions, they received manuals and training on how to instruct two learning strategies: the Paraphrasing Strategy and the

Word Identification Strategy. Additionally, in the second session, nine critical teaching behaviors that had been identified through the literature on effective teaching (giving rationales, communicating expectations, using organizers, using reviews and checks, facilitating independence, insuring intensity of instruction, monitoring, providing feedback, requiring mastery) were defined. Examples of how each behavior should be used in strategy instruction were provided, and examples of the teaching behaviors that appear in the manual for the Paraphrasing Strategy were identified. The research that supported the use of the behaviors was described. The teachers also watched a videotape of strategy instruction and were asked to identify each of the critical teaching behaviors that they witnessed on the tape. At several points, the tape was stopped and the critical teaching behaviors were discussed.

In the fourth session, the critical teaching behaviors were reviewed with the group for about 30 min before training in the second learning strategy began. Thus, the experimental group teachers received a total of about 2 hr of training at the awareness level on the critical teaching behaviors.

All the participating teachers were required to teach each learning strategy to at least three students and to document each student's mastery of each strategy through the use of student progress charts in order to receive credit for the course. Teachers in the experimental group were observed before and after the training series for one 45-min class period. Teachers in the comparison group were observed once, after the training series had been terminated. All the teachers were asked to use direct instruction to teach a skill of their choice to a group of four or more students for 20 min and to facilitate their practice of the skill for the remainder of the class period. In each classroom, Kea observed whether or not strategy instruction was taking place and the extent to which each teacher engaged in each of the nine critical teaching behaviors. To collect data on the latter measure, Kea used a time-sample recording system through which the teachers were observed for 10-sec intervals and their behavior was recorded. She also used a checklist to record behaviors related to each of the nine critical teaching behaviors.

Kea found that seven experimental teachers engaged in strategy instruction when she visited their classrooms whereas none of the comparison teachers engaged in strategy instruction. Thus, following the workshop series, only 47% of the participants were engaging in strategy instruction although they knew that a person associated with the workshop series was coming to visit and observe in their classrooms. Kea found almost no differences between the two groups of teachers with regard to the percentage of intervals in which they engaged in the critical teaching behaviors. Most of the behaviors were engaged in very infrequently. For example, Kea found that the experimental teachers spent only 4% of the intervals provid-

ing feedback to students. Although all the teachers in Kea's study provided "brief feedback" (i.e., a simple acknowledgement regarding the correct or incorrect nature of a response, such as "Good!"), only 67% of the experimental teachers provided what she called "sustaining feedback" (e.g., probing for another answer, repeating the question, giving a clue, or allowing more time after an incorrect response) after training. Only 20% of the experimental teachers used specific descriptive corrective feedback in the case of incorrect responses, and none of the experimental teachers used specific descriptive positive feedback for correct responses or remodeled or retaught a skill as necessary after the strategy training. Requiring mastery (i.e., making statements that mastery is required and making statements regarding whether mastery was reached) was not observed at all. According to the checklist data, the comparison group teachers used more of the critical teaching behaviors than did the experimental group teachers after the strategy training.

When Kea reviewed the materials handed in at the end of the course by the experimental teachers, she found that 10 of the 15 teachers had taught a learning strategy to a total of 40 students. The time span between the training session and the onset of strategy instruction ranged from 2 to 6 weeks. Of the students in the study, 21 reached mastery at the Verbal Practice stage, 14 at the Controlled Practice stage, 3 at the Advanced Practice stage, and 2 at the Posttest stage. When Kea correlated the teachers' scores on the Checklist with the progress of their students using the Kendall Correlation Coefficient, she found that the correlation was .57 ($p < .038$). In summary, teachers can participate in strategy training and be provided with materials that carefully describe what they are to do (e.g., guidelines for providing specific feedback to students) and still not teach strategies, in spite of ample evidence that students can profit from them.

An Analysis of the Implementation of the Instructional Sequence

In light of Kea's results regarding the poor progress of students through the stages of strategy instruction, another study was conducted to gather data on more teachers and to look more closely at how teachers and students progress through the eight instructional stages of the instructional sequence. Twenty teachers volunteered to participate in the study. The mean age of the teachers was 36 years. They averaged 9.9 years of general education teaching experience and 8.8 years of experience teaching special education. They received an overview of strategy instruction and were trained to teach two learning strategies: the Word Identification Strategy and the Paraphrasing Strategy. The inservice sessions on the two strategies were held 3 months apart to give the teachers ample time to

complete the training in one strategy before being trained in the next strategy. All the teachers made a commitment to teach the strategies in which they had been trained to at least three students in at least one class period per day. As the teachers implemented strategy instruction in their classes, they completed a Weekly Report Form. On the form, they reported the stage of instruction and the instructional activity for each day of the week for each student.

At the end of the school year, the number of students mastering each step as reported on the Weekly Report Forms for the Word Identification Strategy instruction was analyzed. The results parallel Kea's outcomes. The number of students completing each stage of instruction decreased as instruction across the instructional stages progressed. The teachers began the instruction with an average of 4.8 (sd = 2.19) students. This number of students remained fairly stable through the Pretest, Describe, and Model stages of instruction. When the students reached the first stage of instruction at which mastery was required, the Verbal Practice stage, the number of students began to drop. An average of 3.65 (sd = 2.76) students completed instruction in this stage. The average number of students completing instruction in the Controlled Practice stage of instruction decreased dramatically to 1.8 (sd = 1.58) whereas an average of 1.25 (sd = 1.48) students completed the Advanced Practice stage. An average of only 0.9 (sd = 1.41) students completed the Posttest stage. Although data were not collected on the number of students completing the formal generalization activities in the Generalization stage, not more than an average of 0.9 students could have completed them.

These outcomes, in combination with Kea's results, indicate that students of first-time strategy teachers may not proceed through the instructional stages the way students did in the original validation studies. When the teachers were asked why the later stages of instruction were not implemented with the majority of the students, they indicated that the students were not reaching mastery on earlier stages and that they were hampered by student absences, interruptions, and other demands on their time. These results are cause for concern because the entire instructional sequence needs to be implemented if all students are to be expected to generalize the strategies to other learning situations (e.g., Schmidt *et al.*, 1989).

Analysis of Time Spent on Strategy Instruction

Since the teachers in the previous study and the strategy trainers had mentioned that strategy instruction is often interrupted (e.g., by other school activities, absenteeism of students) and the trainers had indicated that teachers had difficulty managing their instructional time, a study was

conducted to determine how teachers were spending their instructional time. Volunteers to participate in the study consisted of 57 special education teachers who had participated in an overview session on strategy instruction and at least one workshop session on how to teach a learning strategy. All the teachers were serving students with learning disabilities in their classrooms. All the teachers made a commitment to teach a given strategy to at least three students in at least one class period per day for a given length of time. (Each teacher was free to choose the length of time that strategy instruction would take place.) As the teachers implemented strategy instruction in their classes, they completed a Weekly Report Form. On the form, they reported the instructional activity for each day of the week. If they did not provide strategy instruction on a given day, they were asked to supply a reason for not giving the instruction. They also reported student absences on the form.

At the end of the school year, the Weekly Report Forms were reviewed, and five categories of interruptions were created: no school on that day, inservice activities, other curriculum demands that had to be met, other school activities (e.g., assemblies, spirit rallies), testing (e.g., administering and taking standardized tests), conferences, teacher absences, and miscellaneous interruptions (e.g., unreported reasons or reasons that did not fit the other categories). For each teacher, the number of days for which he or she planned strategy instruction was counted. In addition, the number of days on which strategy instruction actually occurred and the number of each type of interruption occurred were counted. Thus, for each teacher, the number of days planned for strategy instruction, the number of days actually spent on strategy instruction, and the number of days that each type of interruption occurred were available. In addition, the number of student absences was also counted.

According to the results gathered from the Weekly Report Forms, the 5070 periods allotted for strategy instruction by the teachers represented 49% of the total periods available for the year for the targeted classes. Of the 5070 class periods allotted by the 57 teachers for strategy instruction, 1754 (35%) were interrupted so severely that strategy instruction did not take place. Thus, 3316 periods (or 32% of the total periods available across the year) were actually spent on strategy instruction. Of the interrupted periods, 18% were spent on other curriculum demands, 3% on other school activities, 3% on testing, 6% on conferences, and 3% involved miscellaneous interruptions. On 3% of the days, there was no school. Across the 3316 periods of actual strategy instruction, there were 2139 student absences. Thus, the teachers were experiencing a total average of 65 absences per day or 1.2 absences per day per teacher in the targeted class. Since the teachers were teaching small groups of students, these results indicate that they were often missing a significant part of their class on a

daily basis. These data are cause for concern, since students with learning disabilities need intensive daily instruction if they are to master learning strategies (Ellis *et al.*, 1991).

Analysis of the Instructor Manuals as a Barrier

Professionals in the field of strategy instruction voiced a concern that the scripts provided in the instructor's manuals for the *Learning Strategies Curriculum* might serve as a barrier for some teachers who might feel that they are restricted from using their own teaching styles and words as they implement the instruction. As a result of this feedback, a study was conducted to determine how teachers were using the instructor's manuals. The goal was to determine whether the teachers were restricting their instruction to the words scripted in the manuals or whether they were using the script as a model for what they were to say as they provided instruction using their own words and teaching styles.

Fifteen teachers volunteered for the study. All the teachers had received at least an overview of strategy instruction and inservice instruction in how to teach the Word Identification Strategy. They had an average of 9 years of experience in special education and 12 years total teaching experiencing. Their mean age was 38 years, and all had master's degrees. Eight of the teachers were first-year implementors of strategy instruction whereas seven had 2 or 3 years of experience. The eight first-year implementors were teaching the Word Identification Strategy for the first time. The seven teachers that were experienced in strategy instruction all had taught the Word Identification Strategy previously at least once.

To measure the teachers' adherence to the script in the instructor's manual, a checklist was developed that was based on the organization of the script in *The Word Identification Strategy: Instructor's Manual* (Lenz *et al.*, 1984). (This manual was chosen because of the relatively short script for the Describe stage of instruction, which enabled observation of the whole Describe stage in two or three class periods.) The script in the manual was organized according to boldfaced headings in an outline format. Thus, the checklist included all the boldfaced headings to represent the information covered under the heading (hereafter referred to as instructional steps). It also included spaces next to each instructional step for the observer to indicate (1) the sequence in which the step was covered relative to the other items in the list, (2) whether the information subsumed under the step was covered verbatim, (3) whether the teacher expanded on the information presented in the manual for the step, or (4) whether the teacher omitted information presented in the manual for the step. It also included spaces next to each step for the observer to indicate whether the

teacher read from the manual constantly, whether the teacher referred to the manual occasionally, or whether the teacher did not refer to the manual at all during the instruction of the step. Finally, it included spaces for the observer to note whether interaction occurred between the teacher and students during the presentation of each step.

Each teacher informed the research staff of the date on which instruction for the Describe stage would begin. The teachers were informed that the Describe stage was being observed for the purpose of judging the effectiveness of the instruction in the Describe stage for the Word Identification Strategy. Although every effort was made to observe each teacher's instruction for the entire stage, scheduling problems occasionally occurred. At the minimum, for all teachers, the first day of instruction was observed. During each observation, the observer referred to a copy of the script and completed a checklist. All sessions were tape recorded for later reference and reliability assessment.

To evaluate the interobserver reliability of the scoring, a second observer listened to a randomly selected samples of 13% of the tapes and recorded observations on the checklist. Observers' responses were compared item-by-item. The total percentage of agreement was 91%.

Four of the teachers (27%) presented the instruction in such a way that the observation checklist could not be used, that is, there was no discernible relationship between the script and the way instruction was presented by these teachers. These teachers' responses are not included in the percentages discussed here. (Two of the teachers had adapted the instruction in appropriate ways for their elementary students. Although they purported to be teaching the Word Identification Strategy, the other two teachers significantly departed from the recommended sequence and content of instruction.) For the remaining teachers, the results showed that, of the instructional steps observed, 79% were covered in the sequence suggested by the manual. In 17 of 35 classes (48%), the sequence of instruction exceeded a 90% match between how the steps were actually presented and how they were recommended to be presented in the manual. In 13 of the 35 classes (37%), the teachers matched the sequence exactly.

Although a majority of the teachers was, generally, following the sequence of instruction, only 8% of the instructional steps was presented verbatim. For 59% of the steps covered, the teachers expanded on the information in the manual. They added examples, prompted student responses, added personal information, or added additional material of some type. For 18% of the steps, the teachers omitted information. For 14% of the steps, some of the information was expanded on and some of the information was omitted. The teachers referred constantly to the manual during only 14% of the instructional steps. During the majority of the steps (85%),

the teachers occasionally glanced at the manual for reference. During 1% of the steps, the teachers did not refer to the manual at all.

Student involvement in the instruction was frequent. The teachers involved students in the instruction during 76% of the instructional steps, a level higher than that called for in the script. Thus, one way the teachers expanded on the scripted instruction was by asking additional questions or prompting some kind of student response.

In summary, four of the teachers (about 25%) were not restricted by the manuals at all; their instruction was so dissimilar to the instruction specified in the manual that observers could not use the observation checklist. The remaining teachers did not use the script verbatim, although they followed the basic sequence of instruction as recommended in the script. They involved students frequently, and they transformed the information in a large majority of the instructional steps in some way. They used the manual as a guide for instruction in such a way that they could ensure that the majority of information was covered and that they could monitor the students while they were presenting the instruction. These results were obtained when the teachers were told that they would be observed presenting the Describe stage of instruction for the Word Identification Strategy. Whether they would have followed the sequence of instruction in the manual this closely when an observer was not present is not known. Additionally, whether the instruction as presented by the manuals is so formidable to some teachers that they never begin the instruction is not known. All the teachers in this study began the instruction and implemented it for several weeks.

Summary

To summarize the barrier identification studies, the sequence of studies that was conducted indicated that teachers might be hampered by lack of an overall instructional plan, their own mind set toward instruction, the preparation time required to begin strategy instruction, a lack of support, their own skills as teachers and managers, and interruptions in the instruction. The data from Kea's study were cause for concern because the teachers observed were using few of the teaching behaviors validated in the literature as critical for producing learning gains. The results of the study of the implementation of the instructional stages indicate that few students were reaching mastery on the strategies and that instruction for the majority of students often did not proceed beyond the Controlled Practice stage of instruction. These findings are not surprising if special education teachers are not using the teaching skills that are critical for insuring learning gains and if strategy instruction is often interrupted.

THE INTERVENTION STUDIES

Several studies have been conducted to evaluate ways of reducing some of the identified barriers to strategy instruction. This line of programmatic research is ongoing, and several additional studies are either currently being completed or being planned. The studies that have been completed already relate to the preparation time required to begin strategy instruction, the lack of support for teachers, the interruption of strategy instruction, lack of teacher skills, and the tendency of teachers not to reinstate strategy instruction in subsequent school years.

The Materials Study

Since teachers and trainers had mentioned that the gathering of materials and equipment for strategy instruction can be a daunting task, a study was conducted to determine the effects of providing needed materials and equipment to the teachers at the inservice workshop. Conceivably, the provision of needed materials might serve as a gesture of administrative support for the implementation of strategy instruction as well as reduce the time demands outside of class for strategy instruction. Additionally, the provision of materials and equipment from a central source might save the district money. For example, by copying all needed handouts at a central source, copying costs can be reduced. Valuable teacher time can be spent planning for instruction and presenting instruction instead of searching for equipment and copying handouts for students.

Twenty teachers volunteered to participate in the study. They were serving students with learning disabilities at the elementary, junior-high, and high-school levels. They were randomly assigned to two groups. The groups were stratified by school level so both groups had teachers teaching elementary, junior-high, and high-school students represented in approximately the same numbers. Teachers assigned to the same school building were assigned to the same group. With the exception of one teacher in Group 1 (age = 58 years), both groups were very comparable in age (mean age: Group 1 = 37 years; Group 2 = 35 years), the number of years teaching students with learning disabilities (mean: Group 1 = 8.4 years; Group 2 = 9.3 years), their total years of teaching experience (mean: Group 1 = 10.5 years; Group 2 = 9.4 years), and the amount of education they had (all teachers except one in each group held master's degrees).

For each learning strategy to be taught, a list of the necessary materials and equipment was developed. These lists included such items as copies of any worksheets needed (enough for 10 students), overhead transparencies of the cue cards and an overhead projector for use in describing and modeling the strategy, reading materials for the Controlled Practice stage of

instruction, blank note cards for the students to use in making their own cue cards, a large calendar for use in setting goals, and tape recorders and audiotapes for recording student practice attempts. The consumable materials were prepared and organized for each targeted teacher, and necessary equipment was found within the district.

The two groups of teachers attended separate inservice training sessions. Both groups received a 3-hr overview of strategy instruction and separate 3-hr sessions on instructing the Word Identification Strategy and the Paraphrasing Strategy. (These two strategies were selected because the types of materials and equipment needed to teach them are roughly equivalent.) Inservice sessions were held on school days and substitute teachers were provided for the teachers. These separate sessions were scheduled 12 weeks apart to insure that teachers had plenty of time to implement instruction in the Word Identification Strategy before receiving training in the Paraphrasing Strategy. For the Word Identification Strategy, teachers in Group 1 received the instructor's manual and all the materials and equipment needed for teaching the strategy; teachers in Group 2 received the instructor's manual, which included detailed lists of the materials and equipment needed. For the Paraphrasing Strategy, teachers in Group 2 received all the needed materials and equipment; teachers in Group 1 received the instructor's manual. During the training sessions, all the teachers were invited to attend monthly 1-hr support-group meetings (see "Support Group Study" for a description of these meetings). These meetings were held at the teachers' convenience outside the regular school day. After the sessions, all the teachers had access to the staff member employed by the district for providing consultation, support, and encouragement to the teachers. Both groups could also access needed equipment through this person.

Two measures were examined in this study. At the end of each strategy training session, each teacher filled out an Implementation Planning Form (Clark, 1990). On the form, the teacher indicated the date on which he or she intended to begin the strategy instruction. From the teachers' responses on this form, the number of days between the inservice session and the planned date of implementation could be determined for each teacher. Additionally, the teachers completed a Weekly Report Form each week indicating the names of students involved in strategy instruction that week, the strategy being taught, and the stage(s) of instruction that had been presented. From the teachers' responses on this form, the number of days before each teacher started instruction and the number of students involved in strategy instruction with each teacher during each week of the semester was determined.

The mean days of preparation time anticipated by the teachers varied according to whether or not they received the materials and equipment for

the strategy instruction. Teachers who received the materials and equipment planned a mean of 6.7 days between the training session and the onset of instruction; teachers who did not receive the materials and equipment planned a mean of 8 days. This pattern was seen regardless of whether Group 1 or Group 2 received the material support. The differences between the means approached statistical significance, as indicated by separate *t* tests for independent group means ($t = 1.3597$, $df = 16$, $p < .10$ for the comparison in which Group 1 received the materials; $t = 1.2814$, $df = 16$, $p < .10$ for the comparison in which Group 2 received the materials).

When the number of students served on a weekly basis was averaged for each group, the pattern shown in Figure 1 emerged. The teachers who received the materials and equipment taught the strategy to more students. The direction of the differences between the two groups is consistently in favor of the group that received the materials except for the one week immediately following the second training session. The differences for the first strategy are smaller than those for the second strategy, which was taught at the end of the school year during the months of April and May. Whether or not this difference is caused by the rush of activities at the end of the school year or by the fact that teachers were adding the second learning strategy to their program is not known at this time.

Consequently, the provision of material support may have an effect on teachers' planning for instruction. The teachers receiving the support in this study anticipated fewer days of preparation before starting instruction and served more students. Whether this phenomenon is restricted to the strategies trained, to the end of the school year, or to the addition of

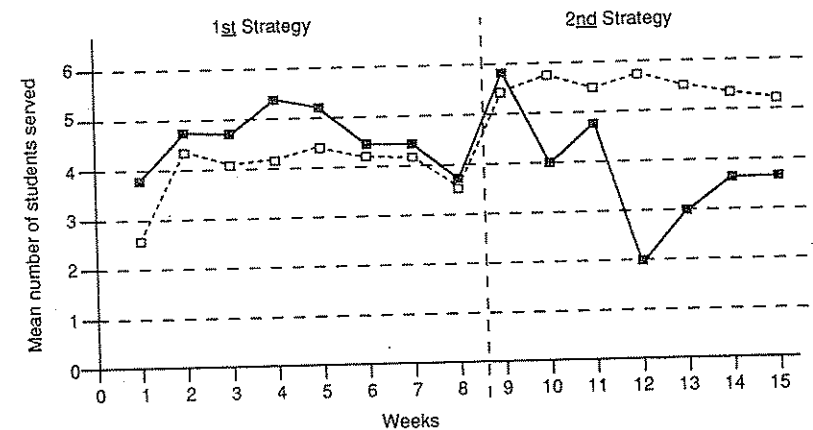


Fig. 1 The average number of students served per week by each group. ■ Group 1: First strategy, with materials; second strategy, without materials. □ Group 2: First strategy, without materials; second strategy, with materials.

subsequent strategies to a program is unclear. Since instruction in many of the other strategies requires more materials and worksheets than the two strategies trained in this study, one might assume that assembling the materials would be an even more formidable barrier for instruction in those strategies.

Support Team Study

The results of the barrier survey indicated that teachers feel a lack of support for strategy instruction. This finding is not surprising in light of many authors' descriptions of the teacher's job (e.g., Duffy and Roehler, 1985; Sarason, Davidson, & Blatt, 1986; Skrtic, 1988) in which teachers are typically described as isolated from each other. This isolation is particularly evident for special education teachers who work in buildings separated from other special education teachers and special education administrators. This isolation is cause for concern, especially when a teacher is attempting to learn to implement new instructional procedures. Thus, a study was conducted to determine the effects of providing interpersonal support to teachers learning to implement strategy instruction.

Twenty-four teachers volunteered for the study. They taught students with learning disabilities at the elementary, junior-high, and high-school levels. They were randomly assigned to two groups. The groups were stratified by school level so each group contained approximately the same number of teachers at each school level. Teachers from the same school building were assigned to the same group. This process resulted in 11 teachers in the experimental group and 13 teachers in the control group. The experimental group teachers were older ($M = 45.7$ years) than the control group teachers ($M = 37.4$ years), had fewer years of experience teaching students with learning disabilities (mean: experimental group = 5.7 years; control group = 9.4 years), and had slightly more years of teaching experience (mean: experimental group = 12.5 years; control group = 10.8 years). All the teachers except two in the experimental group and one in the control group held master's degrees. All the teachers agreed to teach a learning strategy to at least three students during at least one class period per day.

All the teachers had received a 3-hour overview of strategy instruction and previous training in at least two other strategies. For this study, they received an additional 6-hr training session in how to teach the FIRST-Letter Mnemonic Strategy. The teachers in the two groups were trained in separate training sessions on consecutive days. The two training sessions were equivalent, except the final minutes of the training session for the experimental group were spent in assigning the teachers to one of two

support teams (one group had five members, and the other had six members), explaining the purpose of the support team meetings, setting the time and place for the first support group meeting, and telling the teachers what to bring to the support group session (stories of successes, concerns, and challenges, and copies of their students' pretests).

Each support team met for 60–90 min once a month, except for the last month of the school year, at a location and time convenient for the teachers. All meetings took place outside school time. Attending the meetings were the teachers and the administrative staff person responsible for organizing the strategy training and insuring the implementation of strategy instruction. All support team meetings were led by this administrator. An eight-element agenda was used to guide the content of the meetings. First, the teachers were encouraged to share stories of successes and progress in strategy instruction. Next, their concerns and challenges were elicited. Third, the teachers were asked to select the concerns and challenges that they wished to discuss further. Fourth, for each challenge, the teachers brainstormed potential solutions for the selected concerns and challenges. After a list of potential solutions had been generated for a given challenge, the teachers evaluated the solutions for potential application. Next, the teacher(s) who had identified the challenge were encouraged to use one of the solutions, and were prompted to set goals orally about when and how they would implement the solutions. Next, the content of the session was summarized. Finally, the next meeting time and place were set. Each support group met three times over the course of the study (one semester).

The teachers in the Control Group were not assigned to support teams. They had unlimited access to the administrator responsible for organizing strategy instruction and insuring its implementation. The last few minutes of their training session was devoted to additional scoring practice to insure that they experienced training time equivalent to the experimental group in the initial training session.

All the teachers submitted a Weekly Report Form each week for the duration of the study. On the form, they named the students receiving instruction in the FIRST-Letter Mnemonic Strategy and the instructional stage presented each day to each student. From the teachers' responses on this form, the number of days between the inservice session and the onset of strategy instruction, the number of students receiving instruction each week, and the amount of progress made through the instructional stages were determined.

All the teachers (100%) in the experimental group began the strategy instruction. Only 7 teachers (49%) of the 13 in the control group did so. For the teachers who actually implemented the instruction, the average number of days before starting instruction was 9.36 for the experimental

group and 13.4 for the control group. A one-way analysis of variance established this as a statistically significant difference ($F = 9.440$, $df = 1$, $p < .010$).

The number of students served by the two groups of teachers also varied significantly. The experimental group taught an average of 5.18 students, whereas the control teachers averaged 2.15 students. (The teachers who did not implement the instruction were treated as if they served 0 students.) This difference was found to be significant at the .01 level ($F = 9.459$, $df = 1$) when a one-way analysis of variance was computed.

When the last stage of instruction to which the teachers had progressed by the end of the semester was compared across the two groups, some differences were apparent. The students of teachers in the experimental group had, as a whole, progressed farther through the instructional stages than the students of teachers in the control group, although the differences were not large ($p < .10$).

The Intensity of Instruction Study

Since the instructional time that was lost to a variety of interruptions was cause for concern, a case study was conducted to determine whether the generation of new policies and management procedures by the teachers in cooperation with a consultant could increase the amount of instructional time spent on learning strategy instruction. This study took place during two school years in two school districts in eastern Kansas. During the first year, two resource room programs (Programs A and B) were involved in the study. After the first year, Program B's school district built a second high school. One of the teachers from Program B was transferred to this new school. She became affiliated with Program C, which was included in the second year of this study. All three schools were located in middle class communities. The student populations of the schools in the first year were approximately 1700 and 1600 for Programs A and B, respectively. The student populations were approximately 1700, 1000, and 700 in the second year of the study for Programs A, B, and C, respectively. During the first year, Program A had 44 students with learning disabilities and Program B had 39 students with learning disabilities enrolled in the program. Both programs had four special education teachers. Program A's teachers had an average of 6.1 years and Program B's teachers had an average of 4.0 years of teaching experience in special education. All the teachers had master's degrees. During the second year, Program A had 32 students, Program B had 29 students, and Program C had 19 students enrolled. The teachers in Program A had had extensive training in learning strategy instruction over several years. They were able to teach 4–10 strategies apiece. Teachers in Programs B and C had had no formal training in learning strategy instruction.

A time-sample observation system was used to record the activities in each of the programs including each of the student's and teacher's activities, the instructional or noninstructional nature of the activities, and the instructional approach being used. Each person in the room was observed for 30 sec, and all items regarding that person's behavior were recorded before moving on to the next person. Everyone in the room was observed once before a new observation "loop" was initiated. An average of six "loops" were watched in a 50-min class period, but this number varied according to the number of students and teachers present in the room at a given time. During each school year, sufficient class periods to constitute at least 6 full days were observed in each program. The observations were spaced over the school year, and each class period was observed at least six times. Only class periods that followed the program's typical routine were observed, that is, field trips, special movies, and class periods interrupted by assemblies were not observed.

The interobserver reliability of the measurement system was determined by having two observers independently, but simultaneously, observe each of the resource room programs during at least 10% of the class periods. Their records were compared item-by-item, and the percentage of agreement was calculated. During the first school year, the agreement was 96.7%; during the second year, agreement 92.1%.

At the end of the first school year, the data gathered with the observation system were shown to the teachers in Program A. They were asked to discuss the data and to design a set of policies and management procedures that would insure that their program was a "learning strategies" program. Assistance was provided to the teachers by the experimenters when it was requested. The resulting set of policies and procedures was aimed at providing guidelines for making decisions about students' educational programs and tracking each student's progress. The goals adopted by the teachers included (1) insuring that the students in the program would participate in learning strategy instruction as appropriate for their skill levels, (2) insuring that the students would be involved in strategy instruction for more than 70% of the time they spent in the resource room, (3) insuring that student time in the room would be spent on instructional tasks, and (4) insuring that decisions that might deviate from fulfilling these goals would be made according to a set of guidelines. The teachers divided the class period into two 25-min periods and planned instruction for two learning strategies for each student in each class. They specified a goal that each student would master three to four learning strategies per school year. They also specified what kinds of interruptions would be allowed, how chronic absences would be handled, what students and teachers would be expected to do at the beginning and end of the class period and during the transition from one period of strategy instruction to another to reduce the

loss of instructional time, and how students' needs for tutoring in mainstream classes would be handled.

The data from the first year were also shared with the teachers in Program B and their principal. The data were explained and discussed, but there were no discussions of how improvements might be made in the presence of the researchers.

Table 2 shows the proportions of time the students and teachers spent in instructional activities in each program in Years 1 and 2. The students in both Programs A and B were spending comparable amounts of time in instructional activities. The percentage of time spent in instructional activities substantially increased in both Programs A and B from Year 1 to Year 2 for both teachers and students. Both teachers and students in Program A were spending about 82% of their time in instructional activities in Year 2.

During Year 1, the instructional time for students and teachers in Program A was almost equally divided among the learning strategy, remedial, and tutorial approaches, although the program had been labeled by the teachers as a "learning strategy" program (see Table 3). The large majority of instructional time for students in Program B was devoted to the remedial approach. Instructional time for teachers in Program B was largely devoted to the remedial approach; about one-fifth of their time was devoted to the tutorial approach.

During Year 2, the pattern changed substantially for Program A; more than 70% of teacher and student was time spent in learning strategy instruction. Some time was still being spent in other types of instruction, but this time was less than one-fourth of the instructional time. Students and teachers in Programs B and C were spending about two-thirds of their instructional time in tutorial instruction and about one-third of their time in remedial instruction. The learning strategies approach was used infrequently in these two programs (less than 1% of the time).

In summary, the development of policies and procedures by teachers specifying how learning strategy instruction was to take place in a program affected the intensity of learning strategy instruction. Program A students,

Table 2
Percentage of Intervals Spent in Instructional Activities during the Intensity-of-Instruction Study

	Program A		Program B		Program C
	Year 1	Year 2	Year 1	Year 2	Year 2
Teachers	55	82	38	66	49
Students	69	82	66	83	87

Table 3
Percentage of Instructional Intervals Spent in Different Instructional Approaches during the Intensity-of-Instruction Study

Approach	Teachers						Students					
	Program A		Program B		Program C		Program A		Program B		Program C	
	Year 1	Year 2	Year 1	Year 2	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	
Learning strategies	36.0	76.7	1.0	0.0	0.0	35.0	73.7	0.0	0.3	0.0	0.1	
Tutorial	30.0	12.0	18.0	65.5	65.5	30.0	16.7	4.0	67.1	4.0	59.7	
Remedial	30.0	8.7	69.0	34.5	29.5	31.0	7.8	82	29.3	82	39.3	
Career-vocational	1.0	0.0	1.0	0.0	0.0	2.0	0.3	6.0	0.4	6.0	0.4	
Functional	2.0	2.6	7.0	0.0	2.0	1.0	1.5	8.0	2.8	8.0	0.5	
Compensatory	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Memory/thinking	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	
Unidentifiable												
other approach	1.0	0.0	4.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	

who were spending an average of 12 min per day in learning strategies instruction in a program that was labeled a "learning strategy" program in Year 1, were able to experience an average of 31.4 min of learning strategies instruction per day in Year 2. Thus, the teachers, through their development of a set of policies to guide their decision making, were able to increase the time spent in learning strategy instruction by 162%. This change in instructional emphasis resulted in most of the students mastering an average of three learning strategies in Year 2, compared with an average of 1 learning strategy in Year 1.

The Feedback Study

Since special education teachers do not give substantial feedback to students (Kea, 1987), and students often fail to reach mastery, a study was conducted to determine whether teachers' feedback skills could be enhanced and whether their use of specialized feedback routines could improve their students' learning (Kline *et al.*, 1991). The hypothesis was that enhancing teachers' skills would reduce a barrier to strategy instruction. The study had two parts. In Part 1, special education teachers were taught to provide feedback to their students. The effect of this training on their ability to provide feedback in simulated and real feedback sessions was determined. In Part 2, the effects of teacher use of feedback routines on student performance were measured.

Eighteen teachers participated in Part 1 of the study. They all volunteered to participate in inservice training for the Sentence Writing Strategy and to participate in this study. They were randomly assigned to one of the three groups: a group to receive training in a special feedback routine (the feedback group); a group to receive training in the special feedback routine and training in how to teach students a feedback-acceptance routine (the feedback-plus-acceptance group); and a comparison group. The six teachers in the feedback group ranged in age from 31 to 58 ($M = 41.8$). Their total years of teaching ranged from 6 to 30 years ($M = 15.3$), and their years of teaching with students with learning disabilities ranged from 5 to 10 years ($M = 9.6$). The six teachers in the feedback-plus-acceptance group ranged in age from 28 to 41 years ($M = 35.3$). Their total years of teaching experience ranged from 3 to 18 years ($M = 6.8$), and their years of teaching students with learning disabilities ranged from 3 to 18 years ($M = 6.6$). The age of the six teachers in the comparison group ranged from 29 to 51 years ($M = 41$). Their years of teaching experience ranged from 7 to 15 years ($M = 12.1$), whereas their years of experience teaching students with learning disabilities ranged from 7 to 10 years ($M = 8.3$). All 18 teachers received an overview of strategy instruction and a 6-hr inservice session on how to teach the Sentence Writing Strategy.

A checklist of the steps of the Feedback Routine (for the Feedback-Acceptance Routine) was used to measure the teachers' delivery of feedback in simulated feedback sessions (test probes) and in the natural environment of the classroom (generalization probes.). The interobserver reliability of this measurement system was determined by having a second independent observer score a randomly selected sample of teacher performances (21% of the test probes and 13% of the generalization probes). Observers' checklists were compared item-by-item and the percentage of agreement was calculated as for previous studies. The agreement for test probes was 94% and for generalization probes was 95%.

A variation of the multiple-baseline-across-teachers design (a multiple-probe design) was used to evaluate the effects of teacher training. In brief, teacher training consisted of describing the Feedback Routine (or the Feedback-Acceptance Routine), modeling it, and having the teacher practice the routine in simulated feedback sessions. Additional instruction and feedback was provided to the teacher as needed until he or she met a specified criterion of performance.

The six teachers in the feedback group and the six teachers in the feedback-acceptance group learned the routine they were taught to criterion levels. During baseline, their performance often included scoring a paper correctly, using a pleasant voice tone, and making positive remarks to the student. Infrequently, they pointed out error categories to the student. On the average, during test probes, they performed about 20% of the steps of the feedback routine before training. After training, the teachers categorized the student's errors, explained to the student the category of error being made, provided suggestions on how to avoid the error in the future, designed a ministrategy to help the student avoid the error, modeled the ministrategy, had the student practice applying the ministrategy, and prompted the student to summarize the feedback. On average, during test probes, they performed about 80% of the steps of the feedback routine after training. Improvement in teacher performance on test probes occurred only after learning the feedback routine in each teacher's case. The teachers generalized their use of the feedback routine to their classrooms and applied it when giving feedback to their students at levels comparable to the levels they achieved in the simulated sessions. The performance of the comparison group teachers was comparable to the performance of the teachers in the other two groups during baseline and remained stable throughout the remainder of the study.

In Part 2 of the study, the performance of these teachers' students on lessons was monitored. Two measures were used: the trials required for mastery and the repetition of errors. These measures were derived from student worksheets completed while learning the Sentence Writing Strategy (Sheldon & Schumaker, 1985). Interscorer reliability was determined by

having a second scorer independently score the students' worksheets, comparing the score item-by-item, and calculating the percentage of agreement. The agreement for a 10% random sample of the trials to mastery scores was 100%, and the agreement for a 10% random sample of error repetitions was also 100%.

The results of Part 2 of the study showed significant differences between the performance of students of teachers who used one of the feedback routines and the performance of students of the comparison teachers. The students of the feedback group teachers and the feedback-plus-acceptance group teachers completed significantly fewer worksheets before reaching mastery and repeated significantly fewer errors on subsequent trials when the students of comparison teachers. These results were replicated across several lesson sets. The results for high school students were the most dramatic: when given the specialized feedback by their teachers, high school students had to complete half as many worksheets as comparison students before reaching mastery. Such a reduction in instructional time is critical for students who have very little time left for learning important skills. In short, special education teachers' critical teaching skills were enhanced in this study, resulting in improved performance by their students.

An additional finding of the study relates to the reinitiation of strategy instruction. When the teachers who had participated in this study were interviewed in the subsequent school year, they were asked whether they were continuing to teach the Sentence Writing Strategy. Seven of the eleven teachers in the feedback groups who were still teachers in the district were still teaching the Sentence Writing Strategy. None of the comparison teachers had reinitiated instruction in the strategy.

The Reinitiation Study

Because some of the teachers whose skills had improved in the study just discussed did not reinitiate instruction the second year, additional means of insuring that teachers reimplement instruction appeared necessary. Thus, another study was conducted to determine whether a relatively inexpensive intervention could be developed that would have an effect on the rate of reinitiation of strategy instruction.

Seventeen teachers volunteered for additional strategy training after their first year of strategy training was completed. They were randomly assigned to one of two groups. As in the previous studies, the groups were stratified by school level, and teachers in the same school building were assigned to the same group. This selection process resulted in an experimental group with 8 teachers and a comparison group with 9 teachers. The mean age of the groups was similar (37.7 years for the comparison group; 39.3 years for the experimental group. The experimental group had more

experience teaching students with learning disabilities (mean: experimental group = 12.1 years; comparison group = 9.6 years), but on average the groups had about the same total years of teaching experience (mean: experimental group = 12 years; comparison group = 13 years). The amount of education the two groups had was similar; all the teachers in the study, except two in the experimental group, had master's degrees.

The intervention for the experimental group consisted of a 3-hour inservice session at the beginning of the school year. The agenda for the session was designed with three goals in mind: (1) to remind the teachers of the successes they had experienced in the previous year in teaching the two strategies they had learned; (2) to review the instructional procedures for those strategies; and (3) to help the teachers integrate instruction in the strategies learned in the previous year with instruction in new strategies. Thus, during the inservice session, the teachers were first asked to share stories of their successes in the previous year while teaching strategies. They also shared with each other sample student products from before and after strategy instruction. Next, the teachers reviewed the instructional procedures with each other. Each of the instructional stages was reviewed, and teacher questions were solicited and answered. New activities related to each of the strategies were presented for the teachers to use in the coming year. Concerns of the teachers were addressed through a group problem-solving process. Third, information was presented about how the teachers might integrate strategy instruction into each student's Individualized Education Program and about how they might manage teaching more than one strategy at one time.

Teachers in the comparison group also received a 3-hour inservice session at the beginning of the school year on the same day that the teachers in the experimental group received training. During this session, they were given information about math instruction for their students. Both groups of teachers received training in a new learning strategy on the next day.

Three dependent measures were employed. The first measure was whether or not the teachers reinitiated instruction in each of the strategies learned the previous year. The second measure was the number of days between the start of the school year and the day on which instruction was initiated for each of the strategies learned in the previous year. The third measure was the number of students the teachers included in the instruction. This information was gathered through the use of the Weekly Report Form described earlier.

Six of the eight teachers in the experimental group (75%) and three of the nine teachers in the comparison group (33%) reinitiated instruction of the Word Identification Strategy. Teachers who did not reinitiate instruction in a strategy were considered to have started instruction on the last day of the study (they received a score of 150 days) for the purposes of the statistical

analyses involving separate independent sample *t* tests. The experimental teachers began the instruction in a mean of 64.5 days, and the comparison teachers began the instruction in a mean of 126.8 days. The difference between the means was significant at the .05 level. The experimental group teachers served a mean of 5.37 students; the control group served a mean of 1.44 students. This difference was also significant at the .05 level.

None of the teachers reinitiated instruction in the Paraphrasing Strategy. When a researcher inquired why they had not, they responded that they wanted their students to master the Word Identification Strategy before receiving instruction in the Paraphrasing Strategy. They had not planned to teach both strategies during the same school year because they were devoting their time to learning how to teach a third and a fourth strategy.

DISCUSSION AND CONCLUSIONS

To summarize, teaching students to use learning strategies as a means of improving their overall performance on school-related tasks has gained increased attention from researchers, product developers, and teachers over the past decade. Studies have shown that students can, in fact, master and use a broad array of learning strategies in dealing with the problems they are expected to solve and the academic tasks they are expected to complete. Many of the investigations, however, either have been conducted in laboratory settings, or have involved instruction that was provided by teachers who were not necessarily representative of the overall teaching corps in today's schools. Strategy instruction has often been provided by seasoned teachers who were sought out because of their highly regarded teaching repertoires and who volunteered to implement the new interventions or by preservice teachers who did not have the same level of responsibility as inservice teachers, or the instruction was provided in atypical school settings (e.g., a private school with an extraordinarily talented and seasoned staff, administrative support for strategy instruction, and extremely favorable teacher/student ratios). The question of whether learning strategy interventions can impact educational practice in a broad array of educational settings when introduced to a cross section of teachers representing a variety of backgrounds and levels of expertise needs to be addressed if learning strategy instruction is to be viewed as a viable and central part of the instructional process in all the nation's schools.

The line of research reported here represents a programmatic effort to address this question through two phases of research. One phase focused on the identification of barriers that might negatively impact the implementation of learning strategy instruction with students who are at risk for school failure. The findings that emerged from this phase enabled the

delineation of an interesting array of potential barriers including those related to setting factors (e.g., lack of administrative support and high start-up costs), teacher factors (e.g., a poor mind set and failure to use critical teaching skills), programmatic factors (e.g., lack of overall plans that specify how strategy instruction will be incorporated into ongoing instruction, and competing role expectations for resource room teachers), and instructional factors (e.g., high rates of interruptions during strategy instruction, bogging down during the instructional process, and not insuring that students demonstrate mastery and generalization of the strategy). Although each of these barriers has been described separately, in all likelihood they probably operate in combination, thus presenting a complex array of potentially interfering factors to the newly trained practitioner.

As these barriers were identified, a host of tactics was studied to determine methods of overcoming certain barriers and promoting the implementation of learning strategy instruction. Among the factors that were found to be effective in facilitating implementation were (1) providing teachers with the materials needed to support strategy instruction (e.g., progress charts, supplementary reading books, work sheets) to reduce start-up costs, (2) affording teachers an opportunity to meet regularly as support teams for the purpose of interacting with other teachers to share ideas and to solve problems, (3) having teachers develop a set of policies and procedures for insuring the efficient operation of the classroom relative to the intensive delivery of strategy instruction, (4) training teachers in the use of a feedback routine that enhances the speed with which students reach mastery on a given strategy as well as increases the probability that strategy instruction will be reinitiated by the teacher, and (5) providing teachers with a refresher training session at the beginning of an academic year for the purpose of encouraging the reinitiation of strategy instruction during the upcoming school year. Although the power of each of these procedures varied, each was shown to contribute to improved implementation in some way. Logically, the combination of all or several of these tactics should have an even greater impact on the implementation of strategy instruction than the use of each in isolation.

Several issues and questions arise that warrant further discussion. The first is a very basic one: What constitutes successful implementation of strategy instruction? The field of learning strategy instruction is relatively young; thus, data on initial and repeated implementation attempts by teachers working in a variety of settings generally have not been reported. Consequently, program designers and evaluators are uncertain about the standard to use to determine whether the adoption of strategy instruction is acceptable. Clearly, the implementation of any educational innovation will vary considerably depending on the complexity of the innovation, the target population, and the background and commitment of the staff, among

a host of other factors (Heck, Stiegelbauer, Hall, & Louks, 1981). Until the literature contains a database on the implementation that can be expected, making evaluative statements about whether a given implementation level for learning strategy instruction is successful or unsuccessful depends on arbitrary criteria.

Related to this issue is the question of the dimensions that should be considered in implementation research. When the present line of research was initially conceived, the goal was to measure only the percentage of trained teachers who initially implemented learning strategy instruction after training. Once the research was underway, the necessity of gathering information on additional implementation measures became apparent. For example, we realized the initial implementation of instruction in a strategy must be differentiated from reinitiation of that instruction with new groups of students and across subsequent school years when we witnessed some teachers immediately reinitiating instruction in a variety of ways and other teachers not doing so. In addition, we realized that the quality of implementation must also be measured when we observed some teachers not completing all the stages of instruction. Clearly, additional measures of the quality of strategic teaching are needed in addition to those reported here.

We also realized that implementation of instruction in the first strategy must be differentiated from implementation of instruction in subsequent strategies. In several of the studies reported here, 100% of the teachers initially implemented instruction for the first and second learning strategies in which they were trained. However, when they were trained to instruct a third and fourth strategy in subsequent studies, the implementation rates for these later strategies reflected a significant drop. The reasons for this drop are unclear. Possible explanations include the following. The novelty of the new instruction may have worn off. Integrating instruction in more than two strategies into an instructional plan may require organizational and management skills beyond those required for instruction in one or two strategies. Teachers may need special training for incorporating a complex array of learning strategies into a program for at-risk students, and the expectations for teachers to perform a host of other instructional roles (e.g., tutoring students in academic content subjects such as science) in addition to teaching learning strategies to students may create a limit for the number of strategies that can be taught.

A third issue related to the implementation of strategy instruction concerns the context of the instruction. As data on the implementation of strategy instruction are described in the literature and discussed among professionals, the context within which the instruction has taken place is critical and should also be described, along with the intervention itself. In short, the type of student, the educational setting in which instruction occurs, the background of the teacher, and the commitment of the admin-

istration and school district may individually or collectively affect the outcomes of an effort to infuse strategy instruction.

Whether the results obtained in the studies reported here would be similar to those obtained with other strategy interventions in other contexts is unknown at this time. We suspect that they would not be similar, given the various reports from around the nation regarding the implementation of strategy instruction that has been achieved in other contexts. For example, in states like Florida where state department support, district support, and supervisory support are present for the implementation of learning strategy instruction, the rate and quality of implementation appear to be better than in the studies reported here. Many other sites report poorer rates and qualities of implementation. Additional research delineating the impact of contextual factors on the rate and quality of implementation is certainly needed.

A fourth issue regarding implementation research relates to the importance of determining the relative strength of the variables that have been identified as affecting implementation. For example, Kline and colleagues' (1991) research clearly underscored the importance of the skill level of teachers regarding the fluent use of feedback. The follow-up measures in this study indicated that a high percentage of teachers (64%) who were trained to give effective feedback to students while teaching a strategy retaught the strategy the following year, whereas none of the teachers who did not receive the special feedback training continued to implement the strategy instruction during the following school year. This finding clearly implies that training activities that focus on improving the technical teaching skills of teachers may be as important in enhancing implementation as those that focus on training teachers to teach a given strategy.

Once the pertinent variables have been weighted, administrative functioning and training and staff development efforts can be altered accordingly. For example, if teacher skill level turns out to be one of the more heavily weighted barriers to implementation, training agendas can be altered to include an emphasis on the critical prerequisite skills. Although Pressley and co-workers (1991b) and Schumaker and Clark (1990) have emphasized the importance of the intensity of teacher-training activities, few studies in this area have allowed for the fact that many teachers may not have the prerequisite skills needed for strategy instruction. Thus, the planning of training experiences for teachers in the area of strategy instruction may need to account for, among other things, instruction in the use of key technical teaching skills that facilitate the instruction of learning strategies as well as the provision of information on the content of the targeted strategy and the methodology for teaching that strategy. Additional research appears warranted with regard to providing teachers the skills they need for teaching strategies to students.

Another issue related to the implementation of strategy instruction is whether the most salient factors or variables have been studied with regard to improving implementation. Although variables such as use of certain teaching behaviors, administrative support, and start-up costs may be related to low implementation rates, they may not be the most critical factors. Variables related to the teacher's "mind set," such as a teacher's willingness to take risks, a teacher's beliefs about his or her own abilities, a teacher's beliefs about his or her students' abilities, a teacher's ability to conceptually integrate an educational innovation within ongoing instructional activities, or a teacher's cognitive or emotional ability to make the major paradigm shift required when adopting a new model of instruction, may be representative of classes of variables that more effectively explain why teachers fail to implementing learning strategy interventions than the variables studied here do.

Indeed, learning strategy instruction requires the adoption of a significantly different paradigm of instruction than paradigms traditionally adopted by most teachers of at-risk populations. Specifically, strategy instruction is theoretically grounded in information processing. Pressley and colleagues (1989) have indicated that few teachers have been exposed to information-processing models during their educational experiences. The importance of analyzing student performance in light of information-processing demands and designing instructional experiences to enable students to become more effective information processors—one of the overriding goals associated with learning strategy instruction—requires a markedly different approach to the teaching process than teachers have been prepared to use. Pressley and others (1991a) reported that the introduction of this new paradigm causes significant discomfort among teachers, in part because of the control they are required to give up to students when actively involving them in the learning process.

This instructional approach is not only significantly different for teachers, but is very demanding of them because of the complexity of good strategy use and the amount of work required to promote generalized strategy use in at-risk students. In describing the dynamics of classroom settings in which strategies instruction is successfully delivered, Pressley and co-workers (1992) indicated that these classrooms are exceedingly well-organized, and instruction is carefully orchestrated to provide students with a high degree of exposure to strategic approaches for most academic learning tasks. Most instructional routines in these classrooms are geared toward engaging students in strategic problem solving. This type of instruction may be perceived by teachers as very demanding to establish and maintain over an extended period of time. In short, learning strategy instruction may be perceived as demanding extraordinary levels of commitment, hard work, and high teaching skill levels for successful

implementation. As a result, many teachers may not even start the process because of the amount of perceived change that is required.

Although such variables as teachers' mind set and the amount change perceived to be necessary by a given teacher logically appear to be important, they tend to be more difficult to measure and alter than some of the variables studied in this research effort. Additional research is needed to more clearly identify these critical variables, develop reliable means of measuring them, and create methods of impacting them.

A sixth issue related to the implementation of strategy instruction concerns the design of learning strategy interventions, including the strategies and the methodology used in teaching the strategies. The learning strategy interventions used in the studies reported here were a part of the SIM and the *Learning Strategies Curriculum*; a specific set of design features characterizes them (Deshler & Lenz, 1989). Because these interventions were developed for use with students with learning disabilities and other at-risk students, they have been designed with a high degree of specificity and instructional detail for the teacher to insure that students are exposed to the strategy content in a controlled, logical, and systematic fashion. Additionally, since both the strategies and the instructional methodology have been carefully tailored to meet the learning needs of adolescents who are at risk for school failure, they are relatively complex in nature. For example, the strategies in the *Learning Strategies Curriculum* have been characterized as being "complex learning strategy systems" rather than simple learning strategies (Ellis *et al.*, 1991). Such strategy systems were deemed necessary to enable adolescents to meet the demands present in their secondary school. Although the instructional methodology designed for teaching these strategy systems has been shown to be extremely effective with at-risk populations (Schumaker & Deshler, 1992), the detailed and relatively complex nature of the overall program may be negatively viewed by teachers. Such initial negative impressions of strategy instruction may negatively impact broad-scale implementation. Perhaps methods are needed for introducing strategy instruction to preservice teachers in such a way that the teachers develop the required "mind set" for strategy instruction before they begin teaching and to inservice teachers in a simplified way so they "get hooked" on using the approach before they are expected to implement more complex forms of the instruction. Clearly future research needs to explore new ways of training strategic teachers so they are open to teaching a variety of strategies and to using a variety of methodologies with their students.

A seventh issue related to the success of the implementation of strategy instruction is how strategy instruction is generally viewed in education, today and in the future. On the surface, learning strategy instruction may not appear to result in the immediate changes in student behavior that

correspond to the current emphases in education today and that can be measured by the kinds of assessment tools traditionally used by school personnel to determine the efficacy of instructional programs. Although some authors have claimed that students who have been taught strategies can make substantial gains in achievement when compared with students who have not learned strategies (e.g., Schumaker, Deshler, Alley, & Warner, 1983), such growth may not be expected or apparent. When immediate and direct changes are not predicted or realized on such measures, administrators may decide to deny or withdraw support for such instruction. Given the increased emphasis on such models as the outcome-based paradigm (e.g., Spady, 1988), in which student mastery of certain elements of a knowledge domain (e.g., history) is valued over proficiency in attacking an academic task (e.g., reading a history chapter in a strategic fashion), strategy researchers and developers can expect continued skepticism from educators.

The problem of "fitting in" with current educational values is exacerbated by the difficulty inherent in measuring strategic competence. Clearly, assessing student competence in memory and understanding of a given set of history content is relatively easy compared with assessing competence in how strategic learners approach a history task. Such assessment often requires that inferences be made because of the covert nature of the learning activity. Glasser (1990) has argued that, because of the growing and widespread concern that all that is taught must be measured, teachers are often pressured to limit what they teach in order to prepare their students for state- or district-made minimal competency tests. Such tests often fail to measure whether students really have become effective learners and not merely receptacles of fragments of measurable knowledge. A key element in promoting the broad-scale adoption of learning strategy instruction may be the development of evaluation models that allow teachers and administrators to demonstrate that students exposed to learning strategy instruction not only show increased knowledge acquisition but also showed increased proficiency as learners. There is some indication that process-oriented assessments such as those being explored in Michigan, Illinois, and California have promise as strategy assessment tools.

Significant refinements may be required in both the content and methods associated with learning strategy instruction, as well as in administrative functioning and teacher-training efforts, if successful implementation is to be expected in a cross section of the national teacher corps. Nevertheless, some caution is in order. Although there may be a need to create some simple strategies and streamlined instructional manuals to increase the "palatability" of strategy instruction for teachers new to the approach, such innovations should not be created at the expense of those features of strategy instruction central to producing changes in the performance of at-

risk learners. Strides may need to be made in refining strategy instruction, but such changes cannot compromise the integrity and strength of the interventions for the populations for whom they were initially intended.

Refinements in the structure of strategies and strategy instruction may be helpful. However, the most fruitful developments for the implementation of strategy instruction might come when education finds a place for strategy instruction, and administrative policies and teacher-training efforts are structured accordingly. Strategy instruction and the prerequisite skills associated with strategy instruction must be integrated into preservice instruction for teachers, and successful cost-effective means of training inservice teachers to implement strategy instruction must be developed.

Thus, the results reported here are viewed as a starting point: the beginning of a new realm of research. We view these research results as a positive addition to the experiential results gathered through eight years of training and dissemination efforts conducted by KU-IRLD affiliates in more than 600 school districts across the nation. These efforts have indicated that learning strategy interventions can be adopted on a broad-scale basis (Schumaker & Clark, 1990). The work completed in the states of California, Florida, Iowa, Kentucky, Nebraska, and North Carolina, for example, is evidence that the interventions can be successfully implemented across a broad array of school settings when the state department of education becomes involved in the effort. Indeed, personnel in some of the school districts in these states have been implementing strategy instruction for as many as eight years. A recent report from Florida indicates that 800 teachers are currently implementing strategy instruction and that 24 districts in the state have established demonstration classrooms (M. Mazzarino, personal communication).

To more thoroughly understand the factors that account for full-scale adoption and institutionalization of strategy instruction, future research efforts might focus on those schools and teachers at the extremes of the implementation continuum. Researchers might study, at one end of the continuum, teachers who have implemented instruction extensively and with high fidelity and, at the other end of the continuum, those who have totally rejected strategy instruction. An analysis of the variables that differentiate these two groups and their contexts may shed a good deal of light on the issue of strategy implementation.

Finally, as future research is conducted in this area, teachers as well as researchers must be highly involved. We are convinced that the research paradigm that the KU-IRLD staff has followed for the past 14 years has been productive because it has required researchers and teachers to team up in the specification of research questions as well as in the formulation and validation of instructional routines. We see this partnership as central in tasks that lie ahead relative to the refinement of strategy instruction and

the broad-scale implementation of that instruction. The commitment of teachers and researchers to work together better to understand the complex interactions and dynamics that are at play in teaching students how to become strategic learners is central to the resolution of a myriad of instructional issues. Some of the most productive work conducted in this area to date has resulted from efforts that have pooled the perspectives and expertise of professionals from both the teaching and research ranks (e.g., see the work conducted by Pressley and his colleagues, Gaskins and her colleagues, and the KU-IRLD staff and its associates). An exciting synergy has been demonstrated through these efforts; it holds promise for producing significant advancements in the years ahead.

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