Strategram

Strategic Math Series: Part Three
— Instructional Procedures and Field Test Results —

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To help teach basic facts, all lessons in the Strategic Math Series include a sequence of procedures that has proven effective with students who have learning difficulties. The primary instructional procedures are as follows: Give an Advance Organizer, Describe and Model, Conduct Guided Practice, Conduct Independent Practice, Conduct Problem-Solving Practice, Administer Minute Probe, Administer Facts Review, Conduct Pig Game Practice, and Provide Feedback. Except for Conduct Problem-Solving Practice, Administer Minute Probe, and Conduct Pig Game Practice, these procedures are similar to teaching procedures in other academic strategies in the Strategies Intervention Model.

Conduct Problem-Solving Practice. To teach students the thought process involved in problem solving, the teacher uses a graduated sequence of word problems. For example, in Lesson 1, students begin solving problems involving three words, and by Lesson 21, they are writing their own word problems. Along the way, students learn to extract any information that may be irrelevant to a problem. Thus, when students complete a facts program, they are able to solve word problems with and without extraneous information and to write their own problems.

Administer Minute Probe. To help students increase their rate of computation, a 1-minute timed probe is given to students during Lessons 11, 13, 15, 16, 18, 20, and 21. Depending upon the needs of the students, the probe may be given during additional lessons

in this phase. The purpose of this probe is to provide the student with independent practice in quickly computing the respective facts.

Conduct Pig Game Practice. Beginning in Lesson 11 and continuing through Lesson 21, additional practice of the respective facts is encouraged on the learning sheets under the heading "Pig Game Practice." These problems are to be completed while playing one of several "Pig Games." Although considered optional activities, Pig Games serve as an entertaining way to further practice the target facts.

In a previous issue of Strategram, the components of effective math instruction were presented. An inspection of Table 1 (see page 2) reveals how these ten components of effective math instruction were incorporated into the Strategic Math Series instructional design. The Strategic Math Series includes from one to six instructional procedures or activities for each component. Placement of effective teaching routines within a curriculum helps teachers translate research into classroom practices. In addition to facilitating best practices in math instruction, this procedure enables teachers to provide feedback concerning how to improve the application of the components in their classrooms.

Field Test Results of the Strategic Math Series

The Strategic Math Series curriculum for basic facts has been primarily field tested

TABLE 1

Effective Math Instruction and Related Strategic Math Series Curriculum Components

Effective Math Instruction Components	Related Curriculum Components
Select Appropriate Math Content	A graduated word problem sequence is used. Use the mnemonic DRAW computation strategy (See **Strategram** Vol. 4 No. 2, pg. 3). Computation problems are solved via objects, pictures, drawings, and numbers. Word problems are created. Basic facts are the target skill.
Establish Goals and Expectancies	Pretest ensures essential preskills. Pretest establishes need for target skill. Student signs a commitment to learn. Mastery or goal criteria are set. Progress on each goal is monitored.
Provide Systematic and Explicit Instruction	Each lesson features advance organizer, description and model, guided practice, independence practice, and feedback.
Teach Students to Understand Math Concepts	The instructional sequence features the CRA sequence (See Strategram Vol. 4 - No. 2) and the teaching of relationships and rules.
Monitor Progress	Progress of each lesson is monitored on a chart. Percentage and rate scores are monitored against a mastery criterion.
Provide Feedback	A teacher-directed six-step elaborated feedback routine is used in each lesson.
Teach to Mastery	After an understanding of the targeted concept is achieved, practice-to-mastery lessons are used to achieve a fluency criterion.
Teach Problem Solving	Problem solving activities are used in each lesson. Students learn to solve problems with and without extraneous information and to create their own word problems.
Teach Generalization	Students are provided multiple examples of the targeted math concept at the concrete, representational, and abstract levels. Problems are presented in vertical and horizontal formats.
Promote a Positive Attitude Toward Math	Success on each lesson is facilitated via explicit and carefully sequenced instruction. Goal setting and goal attainment is included in each lesson. Elaborated feedback is provided in each lesson. Targeted math concepts are applied to the daily lives of students. Practice-to-mastery activities feature high interest formats (e.g., Pig games, peer teaching). Charts of progress provide visual displays of progress and encourage students to comprehend the relationship between their behavior and learning outcomes.

in special education settings. A total of twenty-two teachers from seven Florida school districts used the Strategic Math Series. Of the one-hundred and nine elementary students who participated, one-hundred and two were identified as learning disabled, five as emotionally handicapped, and two as at risk for school failure. Field testing took place in small-group (less than seven students) and large-group (seven to eighteen students) instructional arrangements. Of the twenty-two teachers who participated, twenty-one (ninety-six percent) indicated they would use the Strategic Math Series curriculum again. Of the seventy-five students who were asked to complete follow-up questionnaires, sixty percent rated the Strategic Math Series as better than other math instruction, and thirty-one percent rated it as good as other math instruction. Thus, ninety-one percent rated the curriculum as good as or better than other math instruction. Given the teacher and student satisfaction, it was concluded that the Strategic Math Series has positive consumer satisfaction.

Computation acquisition and generalization data. Inspection of the results in Table 2 indicates that students were able to acquire the respective facts within Lessons 1-10 (5 hours of instruction). For example, the total mean scores demonstrate that the average gain (thirty-two to ninety-one percent) across skills was fifty-nine percent. Moreover, the generalization findings reveal that the students were able to apply the DRAW strategy to solve computation problems that they were not taught.

Word problem data. An examination of Table 2 indicates that students were able to learn word problems successfully. The pretest was conducted prior to Lesson 1, and

Table 2			
Field Test Data on Computation, Word Problem, and Rate Scores Across Basic Facts			
Computation Scores	Pretest	Posttest	Generalization
Total	32%	91%	95%
	N = 89	N = 89	N = 65
Word Problems	Pretest		Posttest
Total	34%		91%
	N = 49		N = 49
Rate Scores (No. Correct/ Incorrect-per minute)	Pretest 8/4	Posttest 18/1	Follow-up 15/2	Percentage Rate Increase Per Week = 51%

Note: Totals are for addition, subtraction, multiplication and division.

the posttest was administered one to five days after Lesson 21 was completed.

Computation mastery data. The initial rate data were collected after Lesson 8 (the first abstract lesson), and the posttest rate data were collected after Lesson 21. The follow-up data were gathered three to five days after Lesson 21 by examiners whom the students did not know. Inspection of Table 2 indicates that the students were able to increase their rates for all skills. Across all skills the mean rate improvement was one-hundred and thirty-two percent after Lessons 9-21. Given that fifteen percent to twenty-five percent weekly improvement is considered a good criterion for improving the rate of correct responses, these data are very positive. The mean weekly percentage increase was fifty-one percent across skills with a range of thirty-one percent to sixty-nine percent.

Data summary. Overall, the field test data indicate that students with mild disabilities (one-hundred and two learning disabled, five emotionally handicapped, and two at risk) were able to: (a) acquire computational skills across facts, (b) solve word problems with and

without extraneous information, and (c) create word problems involving facts, (d) apply a mnemonic strategy to difficult problems, (e) increase rate of computation, and (f) generalize math skills across examiners, settings, and tasks.

Educators are challenged with the task of putting best practices in the schools. One plan for promoting these practices is to develop and field test a curriculum that incorporates effective teaching routines. Math materials that incorporate effective teaching practices need to be established in the nation's schools. If this happens, perhaps future efforts will not be directed toward reforming an ineffective math curriculum but toward refining quality instructional practices.

Where Do You Fit in the "BIG" Picture (of SIM Implementation)? - Part Two
by
Frank Kline

In the last Strategram, you were introduced to the concept of innovation configurations. This concept is that differing constraints in a situation will change the use of any innovation, such as the Strategies Intervention Model. These differences in implementation may or may not result in the effects intended by the developer. The Strategies Intervention Model Configuration Checklist is an attempt to anticipate and even illustrate the differences in implementation across the critical elements as identified by the KU-IRLD and SIM users. The Strategies Intervention Model Configuration Checklist contains items related to the Curriculum, Instruction, and Environment

"One characteristic of a strategic environment is the promotion of student independence."

components. The items illustrate ideal as well as less than ideal implementations. This allows a teacher to examine his or her own program and construct a profile showing the strengths and weaknesses of the program.

The Strategies Intervention Model Configuration Checklist is divided into three sections: curriculum, instruction, and environment. The curriculum section (items 1-5) focuses on what is being taught. The instruction section (items 6-18) focuses on how the curriculum is being taught. The environment section (items 19-31) focuses on the setting in which instruction occurs. The sections on curriculum and instruction were presented and described in depth in Strategram, Vol. 4, No. 2. In addition, suggestions about how teachers could place their programs on the checklist and develop a profile of implementation were offered. These suggestions focused on document review and reflection as the most practical methods for teachers to use for self-assessment purposes. In Part Two, the environment section of the checklist will be presented and explained with suggestions on how teachers may use the Strategies Intervention Model Configuration Checklist to devise an individualized program for professional development. Parts 1 and 2 of this series combine to provide a complete picture of SIM implementation, including suggestions about how to place a particular program on the checklist and how to use the results to create a personalized professional development

package.

Environment

The environment section of the SIM Configuration Checklist starts with item 19 and runs through item 31 (see pages 6 & 7). The focus of this section is on the environment in which strategies are taught. A strategic environment is one that: (a) requires a team approach, (b) is data based (for example, stresses the importance of knowledge of progress on a frequent basis), (c) focuses on the development of the program as well as the student's skills, (d) promotes the most effective use of resources, and (e) actively promotes student independence. This is the ideal environment for teaching non-strategic students to become more strategic in their approach to school work. The SIM Configuration Checklist attempts to illustrate this ideal environment,

There are thirteen critical elements that describe the strategic environment outlined above. It is important to note, however, that the differences between instruction and environment are not always clear. For that reason, several items in the instruction section relate to environmental consideration and vice versa.

Because less attention is generally devoted during training sessions to creating a strategic environment than is spent on instructional matters (for example, how to score the pretest), each part of the strategic environment will be described, and the items associated with it will be examined. The numbers referred to are the item numbers as listed on the checklist.

One characteristic of a strategic environment is the promotion of student independence. This characteristic is illustrated in items numbered 10, 11,

"Ideal implementation includes not only the interactions prescribed by law and policy. . . but also communications designed especially to contribute to knowledge about the SIM. . ."

23, and 30. Included are items related to teacher language, student language, access to materials, and cues for independent strategy use. Items related to generalization could also be included.

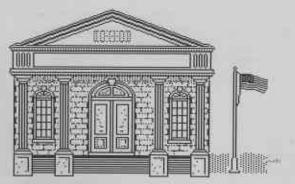A second characteristic of a strategic environment to examine is the measurement and

evaluation process. As each student learns a strategy, the teacher essentially replicates the experiment that originally validated the strategy. The mastery criteria set up in the manuals are the data base for each individual instructional decision that a teacher makes. Items numbered 14-16 [see the Instruction Section of SIM Configuration Checklist, Strategram, Vol. 4, No. 2, p. 8)]. In addition, item number 16 covers decisions about the entire program and the communication of the results. Items number 25 and 26 (see page 6) document that the teacher is making more qualitative decisions based on student grades, data, and on their experiences teaching the strategies. Specifically, item number 25 attempts to assess how the teacher has attempted to make the instruction and his or her experiences relevant to the students. Item number 26 assesses the degree to which the teacher adapts the instructional script provided in each strategy manual. Note that these descriptions of implementation do not specify that the teacher read the script verbatim.

A third characteristic of a strategic environment is the developmental aspect of the program. This element is contained in item number 16. The descriptive ideal for implementation includes not only the material and data naturally generated during strategy instruction but also includes additional materials and data illustrating student progress. In addition, these items include the communication of the assessment information as well as the generation of the information.

A fourth characteristic of a strategic environment

is the allotment of time and resources for strategy instruction (see items numbered 19-24 and 31). These items include scheduling students and strategies instruction as well as the allotment and use of time and materials. Item number 19 deals with the scheduling of specific strategies. Ideally this scheduling is not done in a vacuum, but is an effort to help the students meet a perceived need. Item number 22 deals with scheduling of students; it includes scheduling throughout the day as well as

scheduling students into particular groups. Items numbered 24 and 31 deal with the district commitment to strategy instruction and how a teacher uses that commitment.

A fifth characteristic of a strategic environment is the learning aspect represented by items numbered 27-29. These items cover the production and dissemination of information regarding the strategies to parents and colleagues. Ideal implementation includes not only the interactions proscribed by law and policy (for example, IEP conferences) but also

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communications designed especially to contribute to knowledge about the SIM (for example, written communications to parents or cooperative planning with general education teachers).

In summary, although there is a separate section of the SIM Configuration Checklist labeled "environment, "items related to the five characteristics of strategic environments are included throughout the Checklist. The items related to those characteristics that do not logically fit in other sections are included in the section labeled "environment."

Using the SIM Configuration Checklist

The major use of the SIM Configuration Checklist is to assist teachers in developing their own professional development package. The process starts with a critical self-evaluation of one's implementation of the Strategies Intervention Model. This process was covered in Part 1 of this series (Strategam, Vol. 4, No. 2). This section will provide suggestions for using that profile to develop a plan for professional development. The thoughts presented here are based in large part on the seven steps to self-directed professional development outlined by Christopher Clark.

Once you have developed a checklist profile of your program, carefully examine the strengths of your program. Teachers are often prone to focus on the the negative aspects of their performance. This is helpful; however, there is a danger in developing an unbalanced view of yourself as a teacher. For that reason, start by focusing on the strengths of your

STRATEGIES INTERVENTION MODEL
Configuration Checklist

Environment					
Ideal Implementation	√		√		√
19. Schedules strategies to help students meet setting demands, refers to how a strategy can help student meet demand during strategy instruction.		Schedules strategies to help students meet setting demands.		Teaches strategies regularly without considering setting demands, and without referring to them during instruction.	
20. Teacher allots sufficient time for strategy instruction (a minimum of 25-30 minutes per day per group).		Teacher allows interruptions to cancel strategy instruction no more than one day per week.			
21. Teacher uses allotted time so that 75% or more of the time the students are actively involved in strategy instruction		Teacher uses allotted time so that 60-75% of the time the students are actively involved in strategy instruction.			
22. Teacher groups students within and across hours for efficient strategy instruction.		Teacher works to group students in the same class efficiently for strategy instruction.			
23. Students have independent access to all materials and equipment necessary to learn the strategies being taught with teacher monitoring.		Students have access to some equipment and materials necessary.		Students must ask for and be given the equipment and materials by the teacher.	
24. Has a district approved committment to SIM and strategy instruction.		District level administrators and staff are aware of staff efforts in strategy instruction.		Teachers at the building level are aware of the strategies instruction.	
25. The teacher has aug- mented the manual (personal notes, added examples, put it in a three ring binder, etc.).				The teacher has highlighted or underlined portions of the manual.	
26. The teacher follows the sequence of events in the manual adjusted to include appropriate organizers, adding to the sequence of events appropriately.		The teacher follows the sequence of events in the manual for each stage of learning adjusting to include appropriate organizers.		The teacher follows the sequence of events in the manual for each stage of learning.	
27. The teacher has written statements decribing the learning strategies program beyond the district policy (e.g., policy notes, mission statement, statement of philosophy.		The teacher can answer questions about the philosophy/mission of the strategies program.			

program. Try to devise ideas and activities that will make these strengths even stronger. These strengths need to be considered early because not only are they necessary for a balanced view of your program, but you are most likely to experience success in building on a strength rather than in remediating a weakness.

Once you have made some inroads on further development of your strengths, begin some long range planning. A five-year plan should include long-range goals. Looking down the road is important because it provides direction for a person's efforts. However, in planning professional development, the paths are not often clear. For that reason, based on progress made, periodic assessment and revision of the plan, perhaps on a yearly basis, is necessary.

Once the plan is developed, gather the resources needed to achieve the goals that have been set. The first place to look for these resources is in one's "own backyard." There are often local resources that can be tapped to assist in a personal development plan. Local school districts often employ staff development specialists; occasionally, these individuals are experts in strategy instruction. Even if they are unavailable or unfamiliar with SIM, they may be able to direct you to additional resources. While searching your "own backyard," don't ignore the written word. The KU-IRLD has several different lists of publications that may be of interest to you. In addition, the library of the local university may be of assistance in providing articles and books of interest.

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Sometimes just asking to see the list of journals to which the library subscribes will provide inspiration. Remember that Strategram seeks to be a reference tool for you.

Once the resources immediately available in "your backyard" are exhausted, ask for support.

STRATEGIES INTERVENTION MODEL
Configuration Checklist (cont.)

Environment					
Ideal Implementation	√		√		√
28. Schedules regular meetings with general education teachers for cooperative planning and training in presentation techniques, strategy generalization tips.		Provides general education teachers with information about the strategies being taught, which students are working on what strategies. Gathers information for generalization activities.		Gathers sufficient information from the general education teachers to program generalization activities.	
29. Provides parents with written information concerning the learning strategies program being used. Integrates the learning strategies into the IEP.		Incorporates the learning strategies into the IEP and discusses them at conference time.			
30. Provides physical cues to strategy use in the general and special education rooms (e.g., cue cards in text books, posters etc.).		Provides physical cues to strategy use in the special education room.		Provides no physical cues for strategy use in room.	
31. Teacher uses larger district scope and sequence to include reviews of strategies and other strategies as necessary.		District level scope and sequence includes strategy instruction.		Individual teacher's scope and sequence of instruction includes strategy instruction.	

Many schools have the ability to provide support but for some reason do not make the information readily available. If you ask for support (for example, a day of professional observation in another strategy teacher's program) and you are told no, you have not lost anything. If, however, you don't ask, the specific support you desire probably will not be offered! At the least, assuming you ask in an appropriate manner, you will be perceived as a teacher desiring to improve their practice. At best, your request may be granted!

Since your profession is an important source of meaning in your life, creating the best professional development experiences possible makes good sense. Go first class! Read and correspond with the best authors. Interact with the best trainers. Observe the best teachers. Consult regularly with your best peers. In all areas of professional development, strive for excellence.

Finally, share your achievements. Many teachers often do not communicate their successes in the classroom. Sharing successes with appropriate audiences is essential to an ongoing development program. Charts showing the improvement of your students' work or a flyer describing your activities and successes are some of the ways to share. Many people are interested in the work you are doing. Parents, building administrators, district administrators, strategy trainers, and other teachers would be interested in the work that you are doing and the successes you have. If nothing else, the people or institutions that invest resources in your professional development deserve an accounting of the yield from that investment.

In summary, embark on a program of professional improvement. The SIM Configuration Checklist can be a helpful tool. Start with a serious and honest self appraisal. Once the appraisal is complete, build a five-year plan designed to improve your current strengths, develop others, and slowly work to remediate apparent weaknesses. Make this plan for the next five years, but revise it annually. When the plan is complete, look in your own backyard for the resources you need to complete the plan. Your district and even your school has many sources of help of which you may or may not be aware. Don't be afraid to ask for help, and go first class. You deserve it! Finally, share your successes with people who are interested in what you do!

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