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In this Issue:

The Power of Strategy Instruction

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If you've ever played the game of chess, chances are you used a fairly unsophisticated approach when first making your way around the board. It's also likely that basic tactics quickly emerged after just a few games—moves that were at first aimless and erratic became much more planned and organized. You may have even found yourself thinking several moves ahead, beginning to develop a strategy. Some obvious strategies may have easily become part of your regular chess-playing arsenal. Other, more advanced strategies, however, may not develop without additional training or lots of practice.

It's always a good idea to have a plan of attack—and not just for chess. When it comes to teaching and learning, having a plan—or strategy— is definitely the way to go.

Strategy Instruction is a powerful student-centered approach to teaching that is backed by years of quality research. In fact, strategic approaches to learning new concepts and skills are often what separate good learners from poor ones. Considering that many students with disabilities struggle with developing strategies for learning and remembering on their own, a parent or teacher skilled in introducing this process can make a world of difference.

Strategy instruction supplies students with the same tools and techniques that efficient learners use to understand and learn new material or skills. With continued guidance and ample opportunities for practice, students learn to integrate new information with what they already know, in a way that makes sense—making it easier for them to recall the information or skill at a later time, even in a different situation or setting.

Not only does an impressive body of research exist with respect to strategy instruction, but that library of knowledge is also extremely broad and has direct and immediate application to practice in almost every area of the educational curriculum.

Welcome to Our New Publication Series!

With this inaugural edition of ***Evidence for Education***, NICHCY launches a new publication series exploring the best evidence-based practices education has to offer.

So who's it for, exactly? Well, it's for you, exactly—that is, if you're interested in learning more about what works in teaching children with disabilities. Each of us within the education community has a role to play in implementing practices based on the best available evidence—from state general and special education directors to district and school-level administrators, to classroom teachers, to related services providers, to policy makers, to parents—with students as the ultimate beneficiaries.

What sort of information will you find here? First, you'll find an easy-to-read review of educational research relating to specific academic or behavioral interventions. You'll also find practical examples of the topic at hand. Finally, you'll find connections to more detailed resources to assist you in moving the research into practice.

Coming Next: **Accommodations for Testing**

National Dissemination Center for Children with Disabilities (NICHCY)

Even better, this method of instruction is appropriate and effective for students who have disabilities, as well as for those who do not. That's right, *all* students can benefit from understanding the strategies that good learners use. What's more, a skillful teacher can play a critical part in guiding students to use strategies until their use becomes an automatic part of each student's repertoire.

Let us begin by looking more closely at strategy instruction: its roots, outcomes of the multitude of studies, and its promise as a powerful research-based practice that results in improved student performance. ❖

Early Studies of The Good Learner

As a youth, the well-known mathematician George Pólya found that he much preferred the challenge of solving new problems over the simple memorization of solutions to old ones. It is little wonder, then, while studying for a career in law, he grew so tired of having to memorize boring legal terms that he dropped out of law school. Only later did he earn a degree in mathematics.

Early in his professional career Pólya tutored students who were struggling in math and developed an approach that equipped these students with the general skills needed to identify and solve problems across a range of circumstances. Pólya would later become professor of mathematics at Stanford University where he dedicated a significant portion of his career to the study of problem solving. In 1945 he published the best-seller, "*How to Solve It,*" where he laid out his problem-solving model in four easy steps: *Identify, Plan, Monitor, and Check.*

Strategy instruction has its earliest roots in this and similar work exploring the approach of the "good learner"—that is, what good learners do when they read, write, listen, do math, study, or prepare an oral presentation for class (Belmont, Butterfield, & Ferretti, 1982; Flavell, Beach, & Chinsky, 1966; Garner, 1982; Hayes & Flower, 1980; Logan, Olson, & Lindsey, 1993; Pressley, Heisel, McCormick, & Nakamura, 1982; Pressley, 1989; Rubin, 1975). The underlying premise of these investigations was, if we discovered what good learners do, we could teach poor or struggling learners to do these things and thereby improve their performance.

This early research showed that, indeed, good learners take very specific and systematic actions that less effective learners typically do not. Effective writers, for example, use three recursive stages in preparing written work: *planning*, *writing*, and *revising*. Within those general areas, more strategies are deployed. Strategies also play a key role in the effectiveness of good readers. In fact, strategies play a key role in all learning tasks. As important, this research also demonstrated that students can be taught to use strategies that they have not developed themselves.

Researchers then focused on naming and categorizing the strategies that good learners use and found that certain strategies tend to be very task-specific, meaning that they are useful when learning or performing certain tasks. Researchers call these concrete, action-based activities *cognitive strategies*. Examples include taking notes, asking questions, or filling out a chart. However, researchers also found that an essential element arched across how good learners approach tasks—*metacognitive awareness* (Campione, Brown, & Connell, 1988). Metacognitive awareness, simply, is the learner's awareness of the learning process and what it takes to achieve good results in a specific learning task.

Various strategies exist under the umbrella of metacognitive awareness, but a particularly illustrative one is self-evaluation, or the ability to stand back from one's work—say, a paper on the causes of the Civil War for history class—and evaluate it objectively, making correc-

"This appears to be fact; but how can people discover such facts? And how could I invent or discover such things myself?"

—George Pólya, *Mathematician*

"The dream begins, most of the time, with a teacher who believes in you, who tugs and pushes and leads you on to the next plateau, sometimes poking you with a sharp stick called truth."

—Dan Rather, *Journalist*

tions or revisions based upon that analysis. Similarly, a good reader will monitor comprehension while reading and take action when something does not make sense—for example, look back in the text for clarification or consciously hold the question in mind while continuing to read.

Because of the executive nature of metacognitive strategies—similar to a foreman overseeing all parts of a project and directing the action, including any problem solving that needs to occur—they are often referred to as *self-regulatory strategies*. It's easy to see why self-regulated learners tend to achieve academically. They set goals for learning, talk to themselves in positive ways about learning, use self-instruction to guide themselves through a learning problem, keep track of (or monitor) their comprehension or progress, and reward themselves for success.

The next wave of strategy research, not surprisingly, focused upon translating these findings into instructional approaches to teach less effective learners how to approach academic tasks in the systematic manner of the good learner (Ellis, Deshler, Lenz, Schumaker, & Clark, 1991; Mastropieri & Scruggs, 1991; Scruggs & Wong, 1990; Thompson & Rubin, 1996; Weinstein & Mayer, 1986). After more than 20 years of such research, the field has definitive knowledge about what works in strategy instruction and why. We know now, for example, that the most effective strategy interventions combine the use of cognitive and metacognitive strategies. A plethora of approaches abound (we will spotlight a sampling of the most well-documented below and in future *Evidence* editions).

Teacher-ready materials are steadily emerging to translate this research into classroom practice. As publishers respond to federal mandates that instruction be based on scientific evidence of effectiveness, the latest student textbooks frequently incorporate strategy instruction as an explicit part of their materials. This is visible in textbooks that begin chapters by asking students to think about what they already know about the topic to be addressed, in literature series that ask students to predict what will happen next, and in student materials that require students to create concept maps or graphic organizers for the information presented. All of these activities relate to strategies of the good learner; all are derived from decades of research into effective teaching and learning.

The remainder of this *Evidence for Education* is devoted to spotlighting several of the most notable and well-documented strategy interventions. These summaries are provided, not as recommendations to exclude other intervention approaches, but to illustrate how powerfully research can inform educational practice and how appropriate application of research can lead to well-packaged and well-specified educational interventions that can make a positive difference in student learning and student outcomes. ❖

How To Solve It

George Pólya's 1945 best seller, *How to Solve It*, was among the first formal attempts to promote and define a strategic model for learning. Elements from his four-step approach form the basis of contemporary approaches to strategy instruction:

1. Understand the problem.
   - Can the problem be restated in another way?
   - What is required to solve it?
2. Make a plan.
   - Look for patterns.
   - Eliminate possibilities.
   - Is the problem related to others solved in the past?
3. Carry out the plan.
   - Be careful.
   - Be patient.
   - Be persistent.
4. Check your work.
   - What worked? What didn't?
   - How could your work be better?

From: Pólya, G. (1945). *How to solve it.* Princeton, NJ: Princeton University Press.

Spotlight on...

The SIM Model

Researchers at the University of Kansas have been deeply involved in researching learning strategies since the 1970s and have done much to define and articulate the benefits of strategy instruction, particularly for students with learning disabilities (LD). This work has resulted in one of the most well-researched models for teaching students to use learning strategies. This model has been known for years as the *SIM*, which stands for the *Strategic Instruction Model*. Over the past 25 years, SIM has emerged into a multi-system, comprehensive school-wide approach with coordinated evidence-based teaching and learning components at its core.

The teaching component of SIM is made up of a series of teacher-focused **Content Enhancement Teaching Routines** designed so that a teacher can deliver organized content in an engaging and learner-friendly manner. One set of routines, for example, walks teachers through the planning of individual lessons, whole units, or even complete courses. Other routines offer practical recommendations for guiding students through an exploration of overarching concepts that may connect to material learned previously.

The **Learning Strategies Curriculum** of SIM is a series of interconnected, student-centered strategies designed to transform weak or passive learners into students who know how to learn and apply their knowledge and skills actively across various learning environments. The Learning Strategies Curriculum has seven discrete strands and contains more than 30 strategies to improve skills and performance related to:

- Reading
- Expressive Writing
- Math and Problem Solving
- Studying and Remembering
- Assignments and Test Taking
- Motivation
- Interacting with Others

Taken together, these teaching and learning strategies can greatly improve learning outcomes for students entering the classroom with different learning styles and abilities. When this sort of strategic instruction is coordinated and implemented across teachers and environments—say, a general education and special education classroom—student successes can be even more pronounced!

More on SIM Research

Content Enhancement Teaching Routine:

The Course Organizer Routine is designed to help teachers plan courses around core content. The routine is used to introduce central concepts to students at the beginning of a course and is revisited throughout the course to relate newly acquired knowledge to main ideas already learned.

Research Findings:

Teachers who use this routine spend more time introducing main course themes than do teachers who have not learned the routine.

LD students in classes that used the *Course Organizer Routine* correctly answered an average of eight "big idea" questions by the end of the course, while LD students in the class that did not use the routine answered an average of only four.[1]

Learning Strategies Curriculum:

SCORE Skills: Social Skills for Cooperative Groups is designed to equip students with a set of skills to work effectively in groups. Students learn to:

Share ideas
Compliment others
Offer help or encouragement
Recommend changes nicely
Exercise self-control

Research Findings:

Students who learned *SCORE Skills* improved from an average of 25% cooperative skills used in a group setting to 78%. By comparison, a group of students who did not receive training had an average of 25% and 28% for the same time periods.[2]

"Our children are only children once. If we fail to educate them today, they will fail to succeed tomorrow."

—Judy Heumann,
U.S. Assistant Secretary
Office of Special Education and Rehabilitative Services, 1993-2001

The University of Kansas Center for Research on Learning:
[1] http://www.ku-crl.org/sim/routines/course.html
[2] http://www.ku-crl.org/sim/strategies/score.html

SIM Content Literacy Continuum: A Working Example

Content Mastery

What it looks like for students:

All students, regardless of level of literacy development, engage in the process of learning core curricular content.

What it looks like for teachers:

Teachers promote content mastery by using ***Content Enhancement Routines***, adjusting the routines appropriately for students of differing literacy levels.

Example:

When beginning a history unit on "The American Revolution," the teacher works with students to create a unit organizer highlighting the core content to be covered. Teacher and students refer to the organizer throughout the unit to provide context for newly learned content and to reinforce previously learned material.

Embedded Strategy Instruction

What it looks like for students:

Students are introduced to a range of learning strategies designed to develop literacy skills across an entire curriculum.

What it looks like for teachers:

Teachers first teach a variety of learning strategies directly to students and then embed further strategy instruction when presenting core content. Teachers continue to prompt and model appropriate strategy use and provide opportunities for individual and group practice throughout the year.

Example:

At the start of the school year the teacher explains that being able to paraphrase information about the American Revolution is useful for writing reports, answering questions, and discussing main themes.

The teacher then outlines the steps of the ***Paraphrasing Strategy*** and models its use for the class. Classroom activities and homework assignments are designed which require students to use paraphrasing strategies, both verbally and in written form. Targeted feedback is given to tailor and encourage strategy use.

Explicit Strategy Instruction Options

What it looks like for students:

Students who struggle with learning and implementing strategies in the regular classroom are presented with more focused and explicit instruction by support personnel.

What it looks like for teachers:

Supplemental instruction by trained support personnel can take place in a variety of settings, including: general education classrooms, pull-out resource room sessions, or after-school tutoring programs.

Example:

The general education teacher may notice that some students are experiencing difficulty paraphrasing core information about the American Revolution. A resource room teacher can then work separately with this group of students to reintroduce and break down the steps of the ***Paraphrasing Strategy***. Students may learn to paraphrase sentence by sentence, or paragraph by paragraph, working daily for 15-20 minutes for several weeks or more until they are able to readily apply the skills across different classroom situations.

For more information on the SIM Model, including research findings and a complete description of the Content Enhancement routines and Learning Strategies Curriculum, visit the University of Kansas Center for Research on Learning at: http://www.ku-crl.org/sim/index.html

(Adapted from the *Strategic Instruction Model Content Literacy Continuum: Leveraging research to promote school-wide literacy in secondary schools.* The above example describes three of the five levels in the Content Literacy Continuum (CLC) framework. CLC is a valuable tool for evaluating the factors that influence the success of secondary literacy efforts, leveraging the talents of secondary school faculty, and organizing instruction to increase in intensity as the deficits that certain subgroups of students demonstrate become evident. D. Deshler, personal communication, August 28, 2006.)

Spotlight on...

SRSD for Writing

Over the past 25 years, the body of research on writing has grown from investigating technical and grammatical requirements to identifying the types of skills and strategies that good writers use when they write. This research has revealed that skilled writers spend time *planning*, *monitoring*, *evaluating*, *revising*, and *managing* the writing process. Poor writers, in contrast, often do not employ any of these skills (Gersten & Baker, 2001; Graham & Harris, 2003). Teaching struggling students the very skills and strategies used by expert writers has been the sensible next step and key focus of many expressive writing interventions.

One of the instructional interventions with the strongest and most consistent research base is **Self-Regulated Strategy Development**, or **SRSD** for short. Pioneered by Steve Graham and Karen Harris at the University of Maryland, SRSD has been used in spelling, reading, and math, but the area receiving the most focused attention has been SRSD in writing. Self-regulated strategy development is a method designed to help students learn and use—and eventually adopt as their own—the strategies used by skilled writers. SRSD is more than simply strategy instruction. It encourages students to monitor, evaluate, and revise their writing—promoting self-regulation skills, increasing content knowledge, and improving motivation.

SRSD instruction is built upon six underlying stages :

1. Develop and activate background knowledge (Class)
2. Discuss the strategy, including benefits and expectations (Class)
3. Model the strategy (Teacher)
4. Memorize the strategy (Student)
5. Support the strategy collaboratively (Teacher & Class)
6. Use the strategy by yourself, independently (Student)

"The heart of SRSD has been establishing that every child can write."

—Karen Harris, Steve Graham, & Tanya Schmidt, *Researchers*

In turn, these instructional stages are meshed with four general strategies that students are taught to use on their own (hence, the term *self-regulation*):

1. Goal setting
2. Self-instruction (e.g., talk-aloud)
3. Self-monitoring
4. Self-reinforcement

Together, the process of explicit strategy instruction and extensive self-regulation has proven effective for students as early as the 2nd grade, improving not only the quality of student writing, but also their knowledge of the writing process.

Fundamental features of SRSD include:

- Explicit and extensive strategy instruction on writing, self-regulation, and content knowledge
- Interactive learning and active collaboration
- Individualized instructional support and feedback tailored to student needs and abilities
- Self-paced learning, with proficiency demonstrations required in order to progress from one stage of instruction to the next
- The continuous introduction of new strategies and novel ways to use previously taught strategies

For more information on SRSD—

The IRIS Center at Vanderbilt University has an interactive tutorial, including video clips and "how to" information, at: http://iris.peabody.vanderbilt.edu/srs/chalcycle.htm

Combining Strategy Instruction with Direct Instruction

Because Children with Disabilities differ widely in their individual strengths, weaknesses, and learning styles, it would make sense that no single instructional model can be recommended for all. Regardless, it may be assumed that certain fundamental teaching principles exist and that effective interventions include components that leverage these principles, adapting them for use with students with diverse learning needs, across different content areas and classroom settings.

The impressive teaching and learning gains realized with strategy instruction suggest that many of these fundamental components are embedded within this approach. It's worth noting, however, that an equally strong evidence base exists for *direct instruction*, an alternative instructional method that emphasizes fast-paced teacher probes and sequenced drill-repetition-practice routines. Surely within direct instruction, fundamental teaching and learning components can also be found, so how does one choose? The answer is— you don't have to.

Lee Swanson at the University of California, Riverside, has conducted several detailed meta-analyses to determine exactly which underlying instructional principles help students with LD learn best. Together with Maureen Hoskyn, Swanson has found that, in fact, academic performance—particularly in the areas of reading comprehension, vocabulary, and creativity—improved significantly whether students were taught using either strategy instruction or direct instruction. Perhaps more interesting, however, was the finding that outcomes were greatest for instructional approaches that *combined* aspects of each method (Swanson, 2001; Swanson & Hoskyn, 2001).

Swanson has taken this work further by conducting a second level of analysis where he identified the following eight clusters of instructional components shared across interventions utilizing strategic or direct instruction:

1. Explicit direct instruction (sequencing & segmentation)
2. Explicit strategy instruction
3. Monitoring

Writing with POW-er!

Students learning to write through SRSD learn the mnemonics "POW" + "TREE" to help them with the process:

Pick an Idea
Organize Notes
Write and Say More

+

Topic Sentence
Reasons—at least 3
Explain Reasons Further
Ending, Wrap It Up Right

A recent meta-analysis of 18 research studies (Graham & Harris, 2003) supports the effectiveness of SRSD:

- for students with LD;
- with students who are average or poor writers;
- across different writing genres;
- at the elementary and middle school levels.

Maryland Literacy Research Center: http://www.education.umd.edu/literacy/srsd/srsd1.htm

Summarized in...
NICHCY Research-to-Practice Database: http://research.nichcy.org/MetaAnalysis.asp?ID=47

4. Individualized training
5. Small interactive group instruction
6. Teacher-indirect instruction
7. Verbal questioning
8. Technology-mediated instruction

Though these clusters of components were found across interventions, not all contributed equally, if at all, to improved student outcomes. Of these clusters, *explicit strategy instruction* was found to have the most significant impact on student performance and was characterized by the following components:

Explicit Practice—encompasses many activities related to review and practice (e.g., repeated practice, weekly reviews, and/or daily feedback).

Strategy Cues—includes think-aloud models, the teacher verbalizing steps or procedures during a lesson, and other reminders to use specific strategies or steps.

Elaboration—includes explanations about concepts, repetition of information or text, or additional information provided by the teacher.

For more information on these studies:

Searching for the Best Model for Instructing Students with Learning Disabilities, at:
http://research.nichcy.org/MetaAnalysis.asp?ID=94

Experimental Intervention Research on Students with Learning Disabilities: A Meta-Analysis of Treatment Outcomes, at:
http://research.nichcy.org/MetaAnalysis.asp?ID=95

Promise Beyond LD

While it's true that Strategy Instruction enjoys a solid research base, to date most of the studies to support its use have focused on the academic outcomes of students with LD. Still, the positive impact on this group of learners has not gone unnoticed by researchers and educators working with other student populations.

For example, *Braille* versions of many SIM strategies have been developed, providing students with visual impairments an opportunity to participate alongside their non-impaired peers in many general education settings. In addition to empowering these students both socially and academically, Braille SIM routines also serve to equip teachers with additional tools designed to reach them. Joyce Russo, a teacher who has spent over 10 years working with visually impaired students, has noticed that SIM strategies have been well received by her students: "They loved it. They really got into working with SCORE Skills." Russo has also recognized a difference in the way she is now able to teach: "There was a real frustration there. A lot of the time you felt like you were just tutoring students instead of giving them skills they could take back to the classroom" (Phelps, 2001).

Similarly, SRSD (and strategy instruction more generally) has been extended for practical use with a wide range of learning populations, including those with mental retardation, brain injuries, and Asperger Syndrome. Even English Language Learners, who have increasingly found themselves placed in special education environments to remediate English skills, have experienced success with tailored strategy instruction. In the following sections you'll find examples of how the principles of strategy instruction have been extended and adapted to meet the special needs of these learners. ❖

> **"There was a real frustration there. A lot of time you felt like you were just tutoring students instead of giving them skills they could take back to the classroom."**
>
> **—Joyce Russo,**
> *Teacher*

CALLA:

Cognitive Academic Language Learning Approach

The Cognitive Academic Language Learning Approach (CALLA) was developed by Anna Uhl Chamot and J. Michael O'Malley (1994) at George Washington University. CALLA is a method of strategy instruction for teaching second and foreign language learners essential language knowledge as well as effective learning strategies that allow students to independently regulate their own learning. CALLA's primary goals are to guide students in:

- valuing their own prior knowledge and cultural experiences, and relating this knowledge to academic learning in a new language and culture;
- learning the content knowledge and the language skills that are most important for their future academic success;
- developing language awareness and critical literacy;
- selecting and using appropriate learning strategies and study skills that will develop academic knowledge and processes;
- developing abilities to work successfully with others in a social context;
- learning through hands-on, inquiry-based, and cooperative learning tasks;
- increasing motivation for academic learning and confidence in their ability to be successful in school; and
- evaluating their own learning and planning how to become more effective and independent learners.

For more information on CALLA:
http://www.gwu.edu/~calla/

The SODA Strategy

Children diagnosed with Asperger Syndrome have particular difficulty engaging in appropriate play and conversational routines with others. The SODA Strategy is a step-by-step strategy designed to lead these children through successful social interactions both inside and outside of the classroom.

STOP:

Provides a framework for students to evaluate the setting.

1. What activity is taking place here?
2. Who are the participants?
3. Where should I go to observe?

OBSERVE:

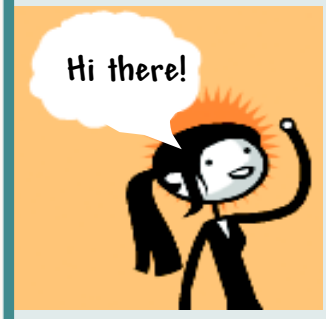
Prompts students to be aware of social cues used by others.

1. What are the people doing?
2. What are the people saying?
3. What nonverbal cues are they using?

DELIBERATE:

Helps students develop a plan for what to do or say.

1. With whom would I like to talk?
2. What would I like to say?
3. How would I know if others would like to visit with me?



ACT:

Encourages students to act on the plan and engage successfully with others.

1. Approach person with whom you'd like to visit.
2. Say, "Hello, how are you?"
3. Look for cues that this person would like to visit longer or would like to end this conversation.

Adapted from: Bock, M. A. (2001). SODA strategy: Enhancing the social interaction skills of youngsters with Asperger Syndrome. *Intervention in School and Clinic, 36,* 272-278.

Conclusion

Current educational policy initiatives and legislation, including *No Child Left Behind (NCLB)* and the *Individuals with Disabilities Education Act of 2004 (IDEA)*, rank among the most ambitious educational mandates in our country's history. Embedded within both of these laws are requirements for high-stakes testing and school accountability that have increased the demands placed upon students and teachers.

For many students with disabilities, these new demands have been accompanied by a shift from basic skills instruction delivered in special education classrooms to an engagement in more challenging content in general education settings. Instructional approaches based on the best available research evidence can only help to meet the new challenges faced by students and teachers alike.

It is clear from the research evidence that approaches that include strategy instruction can play a major role in meeting these challenges. Strategy instruction has the power to transform passive students into active learners equipped with the tools to promote strategic planning and independent reflection. When strategy instruction is implemented as a coordinated, school-wide system, student outcomes can be even greater, leading to transfer of knowledge, skills, and strategies to other academic and social settings.

Of course, caution should be taken to avoid a focus on teaching strategies at the expense of core content instruction (Gersten & Baker, 2000). Quality professional development can help educators strike the proper balance as well as ensure faithful and sustained implementation designed to maximize instructional impact.❖

Glossary

Content Enhancement Teaching Routines—A series of integrated teaching frameworks designed to deliver organized content in an engaging and learner-friendly manner.

Direct Instruction (DI)—A systematic, scripted form of instruction emphasizing lessons that are fast paced, sequenced, and focused.

Learning Disabilities (LD)—A term that refers to a group of disorders, any one of which can cause difficulty with learning and interfere with a person's skills and achievement. A learning disability is a neurobiological disorder that affects how the brain works to receive, process, store, respond to, or produce information. It can affect a person's ability to read, write, speak, spell, compute math, or reason. It can also affect a person's attention, memory, coordination, social skills, and emotional maturity.

Learning Strategies Curriculum—A series of interconnected, student-centered strategies designed to transform weak or passive learners into students who know how to learn and apply their knowledge actively across various learning environments.

Meta-Analysis—A widely used research method in which (a) a systematic and reproducible search strategy is used to find as many studies as possible that address a given topic; (b) clear criteria are presented for inclusion/exclusion of individual studies into a larger analysis; and (c) results of included studies are statistically combined to determine an overall effect (effect size) of one variable on another.

Metacognitive Awareness—One's awareness of the learning process and what it takes to achieve good results in a specific learning task.

Self-Evaluation—The ability to stand back from one's work, evaluate it objectively, and make corrections and revisions based upon that analysis.

Self-Regulated Strategy Development (SRSD)—A method of writing instruction designed to help students learn, use, and eventually adopt as their own, the strategies used by skilled writers.

Self-Regulatory Strategies—Methods learners use to direct, monitor, evaluate, pace, guide, or reinforce their own learning.

Strategic Instruction Model (SIM)—A comprehensive approach to teaching adolescents who struggle with becoming good readers, writers, and learners. It is designed to teach adolescents to read and understand large volumes of complex reading materials, and to express themselves effectively in writing. SIM integrates two kinds of interventions: student-focused interventions (Learning Strategies Curriculum) and teacher-focused interventions (Content Enhancement Routines).

Strategy Instruction—A method of teaching students how to learn by teaching them (a) the tools and techniques that efficient learners use to understand and learn new material or skills; (b) to integrate this new information with what is already known in a way that makes sense; and (c) to recall the information or skill later, even in a different situation or place.

References

Belmont, J. M., Butterfield, E. C., & Ferretti, R. P. (1982). To secure transfer of training instruct self-management skills. In D. K. Detterman & R. J. Sternberg (Eds.), *How and how much can intelligence be increased* (pp. 46-61). Norwood, NJ: Ablex.

Bock, M. A. (2001). SODA strategy: Enhancing the social interaction skills of youngsters with Asperger Syndrome. *Intervention in School and Clinic, 36,* 272-278.

Campione, J. C., Brown, A. L., & Connell, M. L. (1988). Metacognition: On the importance of understanding what you are doing. In R. I. Charles & E. A. Silver (Eds.), *Research agenda for mathematics education: The teaching and assessing of mathematical problem solving* (pp. 93-114). Hillsdale, NJ: Lawrence Erlbaum.

Chamot, A. U., & O'Malley, J. M. (1994). *CALLA handbook: Implementing the Cognitive Academic Language Learning Approach*. Reading, MA: Addison Wesley.

Ellis, E., Deshler, D. D., Lenz, B. K., Schumaker, J. B., & Clark, F. (1991). An instructional model for teaching learning strategies. *Focus on Exceptional Children,* 23(6), 1-24.

Flavell, J. H., Beach, D. R., & Chinsky, J. M. (1966). Spontaneous verbal rehearsal in a memory task as a function of age. *Child Development, 37,* 283-299.

Garner, R. (1982). *Text processing differences among readers*. (ERIC Document Reproduction Service No. ED 216 331)

Gersten, R., & Baker, S. (2000). The professional knowledge base on instructional practices that support cognitive growth for English-language learners. In R. Gersten, E. Schiller, & S. Vaughn (Eds.), *Contemporary special education research syntheses of the knowledge base on critical instructional issues*. Mahwah, NJ: Lawrence Erlbaum.

Gersten, R., & Baker, S. (2001). Teaching expressive writing to students with learning disabilities: A meta-analysis. *Elementary School Journal, 101*(3), 251-272.

Graham, S., & Harris, K. R. (2003). Students with learning disabilities and the process of writing: A meta-analysis of SRSD studies. In H. L. Swanson, K. R. Harris, & S. Graham (Eds.), *Handbook of learning disabilities* (pp. 323-344). New York: Guilford Press.

Hayes J. R., & Flower, L. (1980). Identifying the organization of writing processes. In L. W. Gregg & E. R. Steinberg (Eds.), *Cognitive processes in writing* (pp. 3-30). Hillsdale, NJ: Erlbaum.

Logan, J. W., Olson, M. W., & Lindsey, T. P. (1993). Lessons from champion spellers. *Journal for the Education of the Gifted, 13,* 89-96.

Mastropieri, M. A., & Scruggs, T. E. (1991). *Teaching students ways to remember: Strategies for learning mnemonically*. Cambridge, MA: Brookline.

National Dissemination Center for Children with Disabilities (NICHCY). (2006). A structured abstract of "Experimental Intervention Research on Students with Learning Disabilities: A Meta-Analysis of Treatment Outcomes" (Swanson, H. L., & Hoskyn, M., 1998). Abstract retrieved May 09, 2006 from http://research.nichcy.org/MetaAnalysis.asp ?ID=95

National Dissemination Center for Children with Disabilities (NICHCY). (2006). A structured abstract of "Searching for the Best Model for Instructing Students with Learning Disabilities" (Swanson, H. L., 2001). Abstract retrieved May 09, 2006 from http://research.nichcy.org/MetaAnalysis.asp?ID=94

National Dissemination Center for Children with Disabilities (NICHCY). (2006). A structured abstract of "Students with Learning Disabilities and the Process of Writing: A Meta-Analysis of SRSD Studies" (Graham, S., & Harris, K. R., 2003). Abstract retrieved May 09, 2006 from http://research.nichcy. org/MetaAnalysis.asp?ID=47

Phelps, M. (2001). In focus: A tactile strategy. *Strategem, 13*(6), 1-6.

Pólya, G. (1945). *How to solve it*. Princeton, NJ: Princeton University Press.

Pressley, M. (1989). Strategies that improve children's memory and comprehension of text. *Elementary School Journal, 90*(1), 3-32.

Pressley, M., Heisel, B. E., McCormick, C. G., & Nakamura, G. V. (1982). Memory strategy instruction with children. In C. J. Brainerd & M. Pressley (Eds.), *Progress in cognitive development research: Vol. 2. Verbal processes in children* (pp. 125-159). New York: Springer-Verlag.

Rubin, J. (1975). What the "good language learner" can teach us. *TESOL Quarterly, 9,* 41-51.

Scruggs, T. E., & Wong, B. Y. L. (Eds.). (1990). *Intervention research in learning disabilities.* New York: Springer-Verlag.

The Strategic Instruction Model Content Literacy Continuum: Leveraging research to promote school-wide literacy in secondary schools. retrieved May 09, 2006 from http://contentliteracy.org/clc/files/clc-brochure.pdf

Swanson, H. L. (2001). Searching for the best model for instructing students with learning disabilities. *Focus on Exceptional Children, 34,* 1-15.

Swanson, H. L., & Hoskyn, M. (2001). Instructing adolescents with learning disabilities: A component and composite analysis. *Learning Disabilities Research & Practice, 16*(2), 109-119.

Thompson, I., & Rubin, J. (1996). Can strategy instruction improve listening comprehension? *Foreign Language Annals, 29*(3), 331-342.

Weinstein, C. E., & Mayer, R. E. (1986). The teaching of learning strategies. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed., pp. 315-327). New York: Macmillan.

"The teacher who is indeed wise does not bid you to enter the house of his wisdom but rather leads you to the threshold of your mind."

—Kahlil Gibran,
Artist, Poet, Writer

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