*Peabody College*
VANDERBILT UNIVERSITY
NASHVILLE, TENNESSEE 37203

The Alliance Project

**Headquarters**
Peabody College, Box 160
Hill Student Center, Rm. 101
(615) 343-5610
1-800-831-6134
Fax (615) 343-5611
alliance@vanderbilt.edu

**Washington, DC Metropolitan Office**
10860 Hampton Road
Fairfax Station, VA 22039
(703) 239-1557
Fax (703) 503-8627
Email: judysd@gte.net

Fall 1997

# Advances in Teaching and Instructional Design

The following is a section of the *Nineteenth Annual Report to Congress on the Implementation of the Individuals with Disabilities Education Act (IDEA)*. The full text of the material is presented, but table numbers have been changed for this free-standing version.

This module reports on work conducted by Russell Gersten at the Eugene Research Institute, one of several research institutes funded by the Office of Special Education Programs (OSEP). The institute conducts research on linguistic diversity, technology, teacher development, and instructional design.

THE PAST DECADE has witnessed a "quiet revolution," both in what educators envision as an appropriate education for students with disabilities, and in schools' ability to provide such an education. These subtle but significant changes have been due, in large part, to applied research studies supported by OSEP. Recent advances also have enabled educators to consistently think about a much broader, richer curriculum that supports students' complex thinking, learning, and achievement. Advances have also provided educators with guidelines for strategically and efficiently building proficiencies in reading and writing and mathematics.

This module describes several major advances in the areas of instructional design and teaching for students with disabilities. OSEP has a long history of taking relatively abstract principles from psychology and sociology and utilizing them to develop feasible interventions that account for the realities of classrooms and schools (Gersten, Schiller, & McInerney, in press). These interventions, many of which were developed and validated, initially, for children with learning disabilities, can also be used with other students who experience problems related to their academic performance. In general, this module describes interventions validated through research that not only improve students' knowledge but increase both their persistence in learning and their ability to learn from new experiences.

Before discussing these advances, some of the major changes in special education that have occurred in the past ten years are reviewed. The review provides the context for understanding how research supported by OSEP has contributed to advances in teaching strategies and instructional design for students with disabilities.

## CHANGING CONTEXT FOR SPECIAL EDUCATION TEACHING

A decade ago, the primary instructional goal for most students with disabilities was remediation of deficits in academic skills. Often, even secondary students with disabilities would spend much of their academic day on "drill and practice" in arithmetic computation, spelling, and other academic tasks that rarely demanded use of cognitive skills. Such practices reflected the mistaken belief among many educators that the development of basic academic skills, such as the ability to read, compute, and understand basic mathematics facts, write expressively, and spell correctly, was an essential precursor to development of problem-solving and comprehension abilities. The steady emphasis on the "basics" provided many students with disabilities with an inadequate and unstimulating curriculum. In fact, this practice seemed to backfire in several respects.

First, many students failed to really learn basic skills, even after many years of special education (Woodward & Howard, 1994; Parmer, Cawley, & Frazita 1996). Second, students with disabilities lacked access to a meaningful curriculum. Due to the heavy reliance in many classrooms on textbook-based instruction, students with disabilities (many of whom are not skilled independent readers) were essentially excluded from comprehensible lessons in subjects such as science or social studies (McIntosh, Vaughn, Schumm, Haager, & Lee, 1993). In fact, students were, often unwittingly, deprived of instructional experiences essential for subsequent employment and involvement in society.

Finally, the shift away from a purely remedial model was spurred by the widespread realization among educators that disabilities do not simply "disappear" when students learn how to read or acquire mathematical, writing, or spelling skills. Without question, teaching these necessary skills to students with disabilities is an essential part of special education. However, research consistently demonstrates that many students with learning disabilities will continue to experience difficulties in areas related to memory, language (especially abstract language), and the abilities required to organize material.

Providing meaningful access to the core curriculum to students with disabilities is increasingly considered a major element of the very purpose of the IDEA. That goal is also related to inclusion of special education students in the ambitious goals and performance standards of Goals 2000.

## ADVANCES IN TEACHING ESSENTIAL CONCEPTS AND BUILDING PROBLEM-SOLVING ABILITIES

### THE NEED FOR EXPLICIT INSTRUCTION

As researchers examined the learning characteristics of children with many types of learning disabilities and related academic problems, educators' understanding of how these children learn contributed to development of more sophisticated instructional interventions. Researchers such as Deshler and Schumaker (1993) and Englert and Thomas (1987) observed that students with learning disabilities were, typically, unaware of the "tricks of the trade" and that proficient learners use problem solving strategies to organize their thoughts or plan an approach to solve complex problems. Building upon these and other studies, as well as on theoretical models (e.g., Swanson, 1988), special education researchers began to develop and validate instructional approaches that teach such strategies to students with disabilities.

The research of Williams (1992) described a major comprehension problem of many students with disabilities and helped provide direction for instructional interventions. When asked to

retell (or summarize) stories, many students with disabilities tended to add seemingly extraneous elements. Williams found that the elements were based upon their personal feelings and their experiences, rather than being derived from the text. In fact, at times, these personal experiences and associations tended to "override" information presented in the book they were reading.

Instructional approaches have been developed to help students perceive what others in society view as important. One advance in the past decade is the realization that an important goal of instruction is to show students how the academic material studied is related to their lives (Kinzer, Gabella, & Rieth, 1994) or the lives of others (Harniss, Hollenbeck, Crawford, & Carnine, 1994). When this instructional practice is utilized, retention of material increases.

In summary, the need for explicit instruction for many students with disabilities was derived from the understanding that often students with learning disabilities (or other problems related to academic performance): (1) have a difficult time organizing information on their own (especially abstract information), (2) bring limited background knowledge to many academic activities (especially those involving abstractions), and (3) need a good deal of feedback and practice to retain abstract information.

What Is Explicit Instruction? To introduce students to complex concepts and to build essential skills in reading and mathematics, teachers, and the instructional materials they use, should be "explicit about what needs to be done, or said, or written -- rather than leaving it to learners to make inferences from experiences that are unmediated by such help" (Cazden, 1992, p. 111). The purpose of the instructional interventions described in this section is to provide essential structures or frameworks so that students can make sense of new concepts, relationships, and learning experiences. Students are provided with models of appropriate methods for solving problems or explaining relationships, are supported amply during the stages of the learning process, and are provided with adequate practice. Examples are selected so students see the whole range of situations for which a concept is relevant or the wide range of uses of a strategy.

Explicit instruction is an important technique in special education. It provides explicit frameworks for students with disabilities to use as they write or study or engage in group activities. The explicit frameworks offer a shared language that teachers and students can use as they engage in cognitive activities and as they work with one another (Mashes, Fuchs, Fuchs, Henley, & Sanders, 1994). The ultimate rationale is that, by immersion in a learning environment that is rich in clear, explicit discussions of relationships, and full of a systematic use of relevant examples, students increasingly make linkage on their own.

The principles of explicit instruction, described in table 1, were adapted from Carnine, Jones, and Dixon (1994), and Gersten, Carnine, and Woodward (1987). Because instructional design research continues to evolve, and the principles shift from one academic domain to another, no one set of principles is exact.

Table 1
Principles of Explicit Instruction

- Providing students with an adequate range of examples to exemplify a concept or problem-solving strategy:
- Providing models of proficient performance, including step-by-step strategies (at times) or broad, generic questions and guidelines that focus attention and prompt deep processing;
- Providing experiences where students explain how and why they make decisions;
- Providing frequent feedback on quality of performance and support so that students persist in activities; and
- Providing adequate practice and activities that are interesting and engaging.

An Example of Explicit Instruction: Preventing Reading Failure in the Early Grades. Recent research by O'Connor, Notari-Syverson, and Vadasy (1996) has addressed prevention of reading failure in a fashion consistent with the instructional design principles.

Students spend time each day engaged in series of phonemic activities (i.e., activities that build students' knowledge of letter sounds, their understanding that words are composed of such sounds, practice in composing sounds into real words, and breaking real words into component sounds). Increasingly, research suggests that students must develop phonemic awareness in order to become readers. Though some students develop this awareness on their own, it often does not occur for students with disabilities.

The activities that serve as the basis of the reading interventions can be thought of as more systematic components of activities that teachers always have done with kindergartners. Two examples are using Dr. Seuss books to introduce the concept of rhyming and focusing children's attention on the first letter sound of common words. What distinguishes the instructional activities of O'Connor et al. (1996) is adherence to several key instructional design principles. The first is related to the instructional design principles of example selection (Carnine, 1994). Students begin with easy, clear instances of these principles and then move on to more subtle and difficult examples. In addition, they receive adequate numbers of examples each day, so that even students with erratic attention spans and weak memories still grasp the principles. The second is that the new principles and skills are practiced and reviewed so that they become automatic for students. This is particularly important when teaching phonemic skills (O'Connor et al., 1996). Student engagement is increased by the variety of activities, the game-like nature of many of the activities, and the fact the students are asked to do most of the work.

## ADVANCES IN COGNITIVE STRATEGY INSTRUCTION

A major technique adopted by many educators who use explicit instruction has been cognitive strategy instruction. In the words of Harris and Pressley (1991, p. 395), "Strategy instruction provides students with their culture's best kept secrets about how to obtain academic success." It teaches strategies many students either would not discover at all or would discover only after a great deal of frustration and failure. These strategies, some relatively complex, others

seemingly quite simple, are typically derived from observations of how competent students perform these tasks. The goal is to provide students a structure or a series of steps they can use to help them distinguish important from less important material (to be reminded of how others organize themselves and their resources to complete the task successfully). These strategies can be applied to a variety of academic areas, including expressive writing, reading comprehension, mathematical problem solving, and scientific reasoning.

Typically, students are first taught a plan of action to utilize when pursuing a cognitive goal. In the second, most extensive phase of instruction, students must learn to use the plan proficiently. Students receive feedback from their teachers or peers and learn from watching fellow students how to use the same plan of action.

Another critical aspect of cognitive strategy instruction is the development of routine, or the virtually automatic use of strategies. Concurrently, teachers attempt to build a sense of "ownership" by the students. In other words, students are encouraged to make minor shifts in the strategy, to streamline it, and to expand on facets of interest. Teachers convey a sense that there is not one precise method but that methods can and should be evaluated and discussed.

Metacognitive knowledge is "an understanding of where and how to use it" (Harris & Pressley, 1991, p. 398). Metacognitive knowledge develops from observing the efficacy of the strategy through repeated use of learned strategies. Through this lengthy process of learning and using strategies, the individual modifies them, and ultimately invents new strategies based on the old. The goal of strategy instruction is to help students understand when and how to apply a particular strategy. This is very important for students with learning disabilities because this is precisely the domain in which they have the most problems -- learning how to apply what they know to novel situations.

In the following sections, a number of research-based examples of cognitive strategies are presented.

Procedural Facilitators: A Means to Deep Processing of Text. Procedural facilitators (or procedural prompts) are a series of questions that teachers use on a daily basis with a group of adolescents with reading disabilities to promote deep processing and understanding. The questions are structured, but the students are allowed great latitude in their approaches to them.

Procedural facilitators for reading comprehension are both cognitive (examples 1 and 2) and metacognitive (examples 3 and 4). As shown in table 2, they encourage students to link what they read in the text to their background knowledge (example 2). In addition, each student's perspective is continually valued (example 5).

Table 2
Examples of Procedural Prompts for Reading Comprehension

1. "How does _____ affect _____ ?"
2. "What is a new example of _____ ?
3. "What do you find most difficult in the passage you just read?"
4. "How can you try to figure this out?"
5. "Tell me what you learned from reading this. . .what were the main points, the most interesting things?"

Adapted from Anderson and Roit (1993).

During reading class, for example, the teacher would clarify that each student's responses to the questions in table 2 are likely to be different from each other, as well as different from those of the teacher. In this way, the students' "images are personal" (Harris & Pressley, 1991, p. 396). However, students need to be able to discuss and justify their decisions. This discussion led to the type of deep processing that promotes comprehension.

Story Grammar. Another commonly used cognitive strategy, story grammar, is an example of what researchers call a text structure. Research by anthropologists has found that when people tell stories, their narratives follow certain set patterns. These patterns are called story grammars. To increase students' understanding of the stories they read, they are explicitly taught the elements of story grammar and asked to apply them to subsequent stories. Table 3 contains a sample story grammar adapted from Harris & Pressley (1991).

Table 3
Example of Story Grammar Questions

1. Who is the main character? Who else is in the story?
2. When does the story take place?
3. Where does the story take place?
4. What does the main character want to do?
5. What happens when he or she tries to do it?
6. How does the story end?
7. How does the main character feel?

Adapted from Harris & Pressley (1991).

Whereas proficient readers usually assimilate key elements as they read, some students with disabilities fail to do so. By systematically teaching these elements, students can begin to grasp the essential elements of literary analysis. The teacher and the class can “work through” how the elements fit together and how they lead to a potential theme. The story grammar elements provide a common language so that teachers can help students organize what they have read. It also provides them with a means to discern what is important and what is not as important; in other words, a means to prioritize. This strategy has been shown to enhance the comprehension of short stories by students with learning disabilities (Gurney, Gersten, Dimino, & Carnine, 1990; Harris & Pressley, 1991).

Think Sheets To Promote Effective Writing. Several cognitive strategies use "text structures" for factual (expository) material. Like story grammar, text structures have been used to increase comprehension and promote expressive writing in history and science. For example, the compare-contrast text structure has been used successfully to assist some students with disabilities in the elementary grades in "getting started" in the writing process (Englert et al., 1992).

A *problem-solution-effect* text structure is another example of a cognitive strategy which has been used successfully as a basis for teaching American history to students with learning disabilities (Harniss et al., 1994; Kinder & Bursick, 1993). Using this text structure, students view historical events as problems facing groups of people. They learn to articulate the problems, the attempts a nation or group of people took to attempt to solve their problems, and then evaluate the success or failure. Students are encouraged to view this event from multiple perspectives. In other words, they may view the American Revolution from both the colonists' and the British perspective, or analyze the Russian Revolution from the perspectives of a factory worker and a landlord.

## LEARNING THROUGH EXPERIENCE: RESEARCH ON ANCHORED INSTRUCTION

Numerous researchers have used advances in cognitive science research to design an innovative instructional approach called anchored instruction. Anchored instruction is described as follows: "situating or anchoring instruction involves recreating some of the advantages of the informal learning environments like those that occur in. . .apprenticeships. . .These permit sustained exploration by students and teachers (that). . . enable them to see and understand how information and knowledge can be used as tools for real-world problem-solving" (Cognition and Technology Group at Vanderbilt Learning Technology Center, 1993, p. 121).

This section describes research projects that show promise for enhancing engagement of students with disabilities in learning, motivation, and genuine understanding of abstract concepts. These studies address several learning problems that many students with disabilities experience. The first is the issue of enhancing students' intrinsic motivation -- their ability to expend adequate intellectual energy in learning activities. The second is retention and transfer. As previously noted, students with disabilities often have great difficulty remembering what they have previously learned and using it in novel situations.

## APPLYING PRINCIPLES FROM SCIENCE AND MATHEMATICS TO REAL WORLD PROBLEMS

There are several possible methods for increasing retention and enhancing transfer of skills learned. Two recently conducted research studies that have several features in common are described below. In both cases, the researchers first taught students the essential academic concepts explicitly and then engaged them in a strategy called authentic problem solving. In one case, the concepts were from biology, in the other from mathematics.

In the first study (Hollingsworth & Woodward, 1993), students were given an array of scenarios or health profiles of individuals and asked to describe what their problems were and what steps should be taken to prevent serious health problems. Often these problems involved prioritization (e.g., weighing the importance of cutting down on smoking versus increasing exercise to reduce the risk of cancer). Students were provided with a series of procedural facilitators to help them with the problem-solving process. The students with disabilities not only performed well on these problem-solving exercises but also remembered the core biology information significantly better than the students taught with more traditional methods.

Similarly, in mathematics, Bottge and Hasselbring (1993) found that by providing students with "anchored instruction," that is, an array of real-world problems in which they could practice and expand upon their knowledge of mathematical operations involving fractions, students were able to transfer their problem-solving abilities to new situations. In this study, the students applied their knowledge of fractions as they learned how to build a kite frame from a plan and a materials list, with only a limited amount of money with which to purchase materials. The instructor used a series of procedural prompts to help support the students when they experienced difficulties.

## INCREASING STUDENT ENGAGEMENT IN LEARNING THROUGH PEER TUTORING

The importance of students' active engagement in learning and its relationship to increased achievement in areas such as reading and mathematics have long been known. Recent longitudinal research (McKinney & Osborne, 1993) has demonstrated that regardless of current levels of academic performance, the ability to persist on academic tasks was a key predictor of how well and how much students learn in school. In the past decade, major initiatives have attempted to train teachers in methods that increased students' engagement in learning. However, educators now realize that engagement often increases dramatically when teachers break out of the lecture-recitation mode and use peers to teach others (Greenwood et al., 1992) or to work collaboratively on academic projects.

Classwide peer tutoring techniques are based on direct observations of student performance in the classroom by special education researchers, such as Greenwood and colleagues at the University of Kansas (1992). This body of observational research consistently demonstrated that some students with disabilities were rarely engaged in academic activity in general education classrooms. Delquadri, Greenwood, Whorton, Carta, and Hall (1986) describe a typical special education student in a fourth grade class, whom we will call Juwan.

When first observed, Juwan was engaged in reading for only 8 of the 60 minutes of the reading period. He ". . .was seldom called on by the teacher to read or answer questions; instead the child passively watched the teacher provide instruction" (p. 536). However, with intensive instruction from a reading specialist, Juwan's academic engagement dramatically quadrupled. His growth in oral reading grew at a corresponding rate, tripling his oral reading accuracy rate.

Juwan's progress underscored the importance of academic engagement for students' academic growth. However, Greenwood and his colleagues (1992) realized that intensive one-on-one instruction was not always possible for the large number of students in need of assistance -- nor was it necessarily always desirable. So they began to experiment with the concept of students working with each other on many of the activities that students normally work on individually. For example, students were asked to practice reading to each other, to answer questions for one another, and to provide feedback for each other. Over 40 studies conducted in classrooms across the country have demonstrated that use of classwide peer tutoring can dramatically increase the amount of time students with learning disabilities spend engaged in learning. The data also indicate strong and significant growth in achievement among students who had previously experienced difficulty learning.

The effect on students with disabilities was, initially, examined in a series of controlled experimental studies. The approach was then refined and expanded to include a wide range of academic areas and age groups. Although ongoing data collection and record keeping were crucial to earlier research, current approaches place much less emphasis on these. Similarly, contemporary approaches allow teachers to use a wide range of implementation strategies. In a sense, the original concept of peer tutoring has been adapted to "fit" the realities of various

learning situations. In addition, it is important to note that the improvement experienced by students with disabilities in classes that used peer tutoring is roughly equivalent to that made by their nondisabled peers (Mashes et al., 1994).

In summary, the advantages of classwide peer tutoring include increased engagement in reading and mathematics, opportunities to share information with and provide feedback to peers in a private fashion, and opportunities to build the fluency in and familiarity with the core basic skills essential for comprehension or problem solving.

## SUMMARY

During the past decade, significant advances have been made in instructional design and teaching strategies that enhance the access of students with disabilities to complex concepts. Innovative instructional research has been shaped by many sources, including advances in cognitive science, classroom observational research, and descriptive studies of the learning characteristics of students with disabilities.

Building on well-established instructional design principles, many of which were developed initially in the 1970s and 1980s, special education for many students with disabilities has shifted from a primarily remedial emphasis to a more balanced approach that includes systematic development of reading and mathematics proficiency simultaneously with instruction involving abstract concepts. Students are provided an array of explicit strategies for learning, as well as explicit presentations of relationships among conceptual ideas and themes. Invariably, there is a system or logic to the instruction. As a result, students have opportunities to see numerous examples of the strategy or numerous instances of the concept, can verbalize their understanding, and can receive feedback on their responses. In addition, educators increasingly understand the benefits of structuring classrooms so that students are actively engaged in learning with their peers as well as thoughtfully engaged in learning with their teachers.

As research continues to provide information about these principles of instructional design and teaching, innovative interventions and approaches are, in the words of Harris and Pressley (1991), "unlocking the secrets" of learning for many students with disabilities. These advances are supporting the development of abilities in expressive writing, mathematical problem solving, and other higher order intellectual processes that help prepare students with disabilities for lifelong learning and achievement.

**REFERENCES**


Anderson, V. & Roit, M. (1993). Planning and implementing collaborative strategy instruction for delayed readers in grades 6- 10. *Elementary School Journal*, 94, 121-137.

Bottge, B. & Hasselbring, T. (1993). A comparison of two approaches for teaching complex, authentic mathematical problems to adolescents in remedial math classes. *Exceptional Children*, 59(6), 556-566.

Carnine, D. (1994). Introduction to the mini-series: Diverse learning and prevailing, emerging, and research-based educational approaches and their tools. *School Psychology Review*, 23(3), 341 -350.

Carnine, D., Jones, E., & Dixon, R. (1994). Mathematics: Educational tools for diverse learners. *School Psychology Review*, 23(3), 406-427.

Cazden, C.B. (1992). *Whole language plus: Essays on literacy in the United States and New Zealand.* New York: Teachers College Press.

Cognition and Technology Group at Vanderbilt Learning Technology Center (1993). Integrating media: Towards a theoretical framework for utilizing their potential. *Journal of Special Education Technology*, 100(3), 298-324.

Delquadri, J., Greenwood, C.R., Whorton, D., Carta, J.J., & Hall, R.V. (1986). Classwide peer tutoring. *Exceptional Children*, 52(6), 535-542.

Deshler, D.D. & Schumaker, J.B. (1993). Strategy mastery by at-risk students: Not a simple master. *Elementary School Journal,* 94(2), 153-167.

Englert, C.S. & Thomas, C.C. (1987). Sensitivity to text structure in reading and writing: A comparison between learning disabled and non-learning disabled students. *Learning Disability Quarterly*, 10(2), 93- 105.

Englert, C.S., Raphael, T.E., & Anderson, L.M. (1992). *Cognitive strategy instruction in writing project.* East Lansing, MI: Institute for Research on Teaching.

Gersten, R., Carnine, D., & Woodward, J. (1987). Direct instruction research: The third decade. *Remedial and Special Education*, 8(6), 48-56.

Gersten, R., Schiller, E., & McInerney, M. Advances in teaching and learning. In M. McInerney et al., (in press), *Supporting legislative intent: How special education research improves policies and practices in schools* (pp. III- 1-III- 19). Washington, DC: American Institutes for Research.

Greenwood, C.R., Carta, J.J., Hart, B., Kamps, D., Terry, B., Areaga-Mayer, C., Atwater, J., Walker, D., Risley, T., & Delquadri, J. (1992). Out of the laboratory and into the community: 26 years of applied behavior analysis at the Juniper Gardens Children's Project. *American Psychologist*, 47, 1464- 1474.

Gurney, D., Gersten R., Dimino, J., & Carnine, D. (1990). Story grammar: Effective literature instruction for high school students with learning disabilities. *Journal of Learning Disabilities*, 23(6), 335-342.

Harniss, M., Hollenbeck, K.L., Crawford, D.B., & Carnine, D. (1994). Content organization and instructional design issues in the development of history texts. *Learning Disability Quarterly*, 17(3), 235-248.

Harris, K.R. & Pressley, M. (1991). The nature of cognitive strategy instruction: Interactive strategy construction. *Exceptional Children*, 57, 392-404.

Hollingsworth, M. & Woodward, J. (1993). Integrated learning: Explicit strategies and their role in problem-solving instruction for students with learning disabilities. *Exceptional Children*, 59(5), 444-455.

Kinder, D. & Bursick, W. (1993). History strategy instruction: Problem-solution-effect analysis, timeline, and vocabulary instruction. *Exceptional Children*, 59(4),324335.

Kinzer, C.K., Gabella, M.S., & Rieth, H.J. (1994). An argument for using multimedia and anchored instruction to facilitate mildly disabled students' learning of literacy and social studies. *Technology and Disability*, 3(2), 117-128.

Mathes, P., Fuchs, D., Fuchs, L.S., Henley, A.M., & Sanders, A. (1994). Increasing strategic reading practice with Peabody classwide peer tutoring. *Learning Disability Research and Practice*, 8(4), 233-243.

McIntosh, R., Vaughn, S., Schumm, J.S., Haager, D., & Lee, O. (1993). Observations of students with learning disabilities in general education classrooms. *Exceptional Children*, 60, 249-261.

McKinney, J.D., Osborne, S.S., & Schulte, A.C. (1993). Academic consequences of learning disability: Longitudinal prediction of results at 11 years of age. *Learning Disabilities Research and Practice*, 8(1), 19-27.

O'Connor, R.E., Notari-Syverson, A., & Vadasy, P.F. (1996). Ladders to literacy: The effects of teacher-led phonological activities for kindergarten children with and without learning disabilities. *Exceptional Children*, 63(1), 117- 130.

Parmer, R.S., Cawley, J.F., & Frazita, R.R. (1996). Word problem-solving by students with and without mild disabilities. *Exceptional Children*, 62(5), 415-429.

Swanson, H.L. (1988). Toward a metatheory of learning disabilities. *Journal of Learning Disabilities*, 21(4), 196-209.

Williams, J.P. (1992). Reading instruction and learning disabled children. In M.J. Dreher & W.H. Slater (Eds.), *Elementary school literacy: Critical issues* (pp. 157183). Norwood, MA: Christopher Gordon.

Woodward, J. & Howard, L. (1994). The misconceptions of youth: Errors and their mathematical meaning. *Exceptional Children*, 12(2), 149-163.

Source of this paper:
Gersten, R. (1997). Advances in teaching and instructional design. *Nineteenth annual report to Congress on the implementation of the Individuals with Disabilities Education Act*. Washington, DC: U.S. Department of Education, Office of Special Education Programs, pp. III-57 through III-74.

The Alliance Project (#8029K4085) is supported by the U.S. Department of Education, Office of Special Education Programs (OSEP). Opinions expressed herein are those of the sources and do not necessarily represent the position of the U.S. Department of Education.