OSEP Research Institutes: Bridging Research and Practice

The article that follows is the seventh installment of a new column, *Bridging Research and Practice*, that will appear in each issue of TEC for the next year or two. In this column, three of the federally funded special education research institutes report to you, the practitioner, on their progress in areas that will be particularly helpful to you in working with your students. The U.S. Office of Special Education Programs (OSEP) has funded these three research institutes to study specific curricular and instructional interventions that will accelerate the learning of students with disabilities in curricular areas:

CASL (Center on Accelerating Student Learning) focuses on accelerating reading, math, and writing development in grades K-3. The Directors of CASL are Lynn and Doug Fuchs of Vanderbilt University. CASL research sites are also located at Columbia University (Joanna Williams) and the University of Maryland (Steve Graham and Karen Harris).

REACH (Research Institute to Accelerate Content Learning through High Support for Students with Disabilities in Grades 4-8) is examining interventions that reflect high expectations, content, and support for students. The Director of REACH is Catherine Cobb Morocco at Education Development Center in Newton, MA. Research partners include the University of Michigan (Annemarie Palincsar and Shirley Magnusson), the University of Delaware (Ralph Ferretti, Charles MacArthur, and Cynthia Okolo), and the University of Puget Sound (John Woodward).

The Institute for Academic Access (IAA) is conducting research to develop instructional methods and materials to provide students with authentic access to the high school general curriculum. The Institute Directors are Don Deshler and Jean Schumaker of the University of Kansas, Lawrence. Research partners include the University of Oregon and school districts in Kansas, California, Washington, and Oregon.

This issue features the Institute for Academic Access (IAA).

BIG Ideas (plus a little effort) Produce Big Results

Bonnie Grossen, Jennifer Caros, Doug Carnine, Betsy Davis, Don Deshler, Jean Schumaker, Janis Bulgren, Keith Lenz, Gary Adams, Jean-Ellen Jantzen, and Janet Marquis

The major initiative of the Institute for Academic Access (IAA) is to improve the success of students with disabilities in rigorous high school general education curricula. A critical aspect of that broad effort is the restructuring of courses required for obtaining a high school diploma. Because high school students with disabilities tend to achieve at relatively low levels and educational policy is increasing the demands for student performance accountability, IAA researchers are finding ways to accelerate students' acquisition of required standards for high school exit exams and beyond.

To this end, one line of IAA research focuses on high-need high schools, where large numbers of students, not just students with disabilities, are failing to meet new standards. Restructuring activities focus on changing the design of traditional instruction through alternative programs designed specifically to accelerate learning. The group of restructured courses has been called "the BIG Accommodation Model" (Carnine, 1994). Successfully implementing the research contained in the BIG Accommodation Model requires three components:

1. Curricula engineered to accelerate learning
2. Early, intensive in-class coaching
3. Continuous progress monitoring

Curricula Engineered to Accelerate Learning

Curricular materials that accelerate the learning of high-need students are engineered to incorporate six principles of instructional design (for details, see Kameenui & Carnine, 2001) that serve to accommodate the needs of diverse learners. Table 1 contrasts these six principles of accommodation with traditional instruction.

BIG programs and practices share the following characteristics:

- They have been thoroughly field-tested and revised for successful learning for all students.
- Crucial accommodations for diverse learners are built into the curriculum.
- The programs in the various subject areas complement one another by teaching important components of language arts, math, and science, and by reinforcing that learning across disciplines. Language arts and higher order thinking are highlighted below.

Language Arts

Decoding. The most important priority is to make sure that all students can decode adequately; otherwise, they have limited access to learning. The *Corrective Reading Decoding Program* (Engelmann & Associates, 1999) is used with students who have difficulty decoding. The *Corrective Reading* program teaches the most common sound-symbol relationships and provides students with extensive practice in reading decodable text. The program has been proven to be highly effective in accelerating the reading growth of older diverse learners who have fallen behind.

Vocabulary. High-need learners generally have a weak vocabulary. To catch up they must learn new words at a rapid rate. The programs used to teach history, earth science, and mathematics include well-designed vocabulary components. In addition, the core programs for language arts teach students how to use context to figure out the meanings of words.

Higher-Order Thinking

Big ideas integrate content. Programs get better results when they are organized around "big ideas" (Woodward, 1994), as big ideas yield more power from less learning time. For example, the central big idea of the earth science videodisc program (Systems Impact, Incorporated, 1987) is convection. Meteorologists predict the weather based in part on their knowledge of convection. Most textbooks describe convection in only one paragraph, so students never learn that convection is the basis for making predictions in earth science.

Similarly, the history text uses the problem-solution-effect big idea to organize the events of history (Carnine, Crawford, Harniss, & Hollenbeck, 1995). Students learn that history is built around attempts to solve problems among groups of people. Every solution to a problem generally leads to a new problem. For example, the automobile solved a transportation problem, but the effect of that solution was a new problem: pollution. So history can be characterized as a chain of problems. By studying the ways humans solved problems in the past, and the effects of those solutions, students can identify better solutions for the future and attempt to avoid some of the mistakes of the past.

Bigger ideas integrate across content areas. The programs and practices in our research model provide for transfer across subject areas, thus maximizing instructional efficiency. Students learn important skills for processing, critiquing, and researching information, which they apply in all subject areas. They learn, for example, that opinions must be based on evidence, that the evidence must logically support opinions, and that the evidence must be accurate according to a reliable source. Students learn to look for contradictions and inconsistencies, to consider all possible explanations for a set of facts, and then search for more information to rule out some of the explanations.

For example, a series of activities are designed to teach students to use a ruling-out process when constructing knowledge (Engelmann & Grossen, 1999). This process is the essence of the scientific method. Figure 1 illustrates one of the early tasks. Students must figure out what is in the mystery box and write a paragraph describing their thinking process. The outline diagram provides a template for their paragraphs

Table 1. Contrast Between Instruction with Accommodations for Diverse Learners and Traditional Instruction	
Six Principles of Accommodation for Diverse Learners	**Traditional Instruction**
Big Ideas, concepts and principles that facilitate the most efficient and broad acquisition of knowledge across a range of examples are presented. Big ideas make it possible for students to learn the most and learn it as efficiently as possible, because "small" ideas can often be best understood in relationship to larger, "umbrella concepts."	A barrage of unrelated facts and details are presented. The links between concepts are obscured.
Conspicuous Strategies made up of specific steps that lead to solving complex problems are taught.	Strategies are seldom taught.
Background Knowledge is pretaught.	Important prerequisite learning is often not evaluated or taught.
Mediated Scaffolding provides personal guidance, assistance, and support that gradually fades as students become more proficient and independent.	Little direction or provision for scaffolding the progression of learning toward greater student independence is provided.
Judicious Review requires students to draw upon and apply previously learned knowledge over time.	Review is often minimal.
Strategic Integration blends new knowledge with old knowledge to build bigger big ideas.	Spiraling of topics does not carefully integrate units.

and the icons graphically represent the type of thinking involved. Specifically, the trapezoid prompts a summary statement, or topic sentence. The boxes illustrate the stepwise nature of the ruling-out process used in constructing knowledge. Finally, another trapezoid indicates a concluding sentence. To figure out the mystery object, students read the first clue, "The object is red," and then review the possibilities. Following the outline diagram, they write, "Clue A rules out the banana. That object is not red," and so on.

This thinking strategy has wide application. For example, Figure 2 illustrates the application of the ruling-out process to shopping. Henry needs a

jacket and has several requirements. In the scenario presented in Figure 2, there is a jacket that meets his requirements. In other activities, the students encounter scenarios where no option meets all the requirements, thus forcing them to weigh the alternatives and choose the best option.

Students use this same ruling-out process for many other kinds of applications. For example, they use it to select the best plan for accomplishing a goal, such as learning how to ride a horse when a person lives in the city, has no money, and has no horse. This process also represents the fundamental thinking involved in setting up and interpreting the outcomes of scientific experi-

Figure 1. The Mystery Box

Follow the outline diagram to explain how you identified the mystery object.
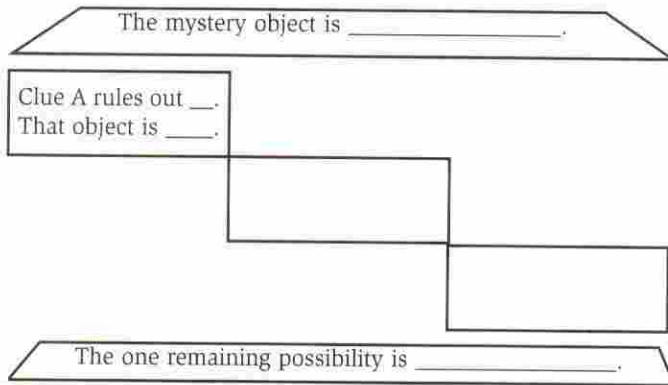
Possibilities
banana
cherry
strawberry
apple
raspberry

?
Mystery Object
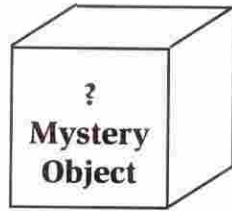
Clues
A. The object is red.
B. The object is not taller than a silver dollar.
C. The object has a "stone" inside.

Outline diagram

The mystery object is _____.

Clue A rules out __.
That object is ____.

The one remaining possibility is _____.

Figure 2. Henry's Shopping Problem

Part A

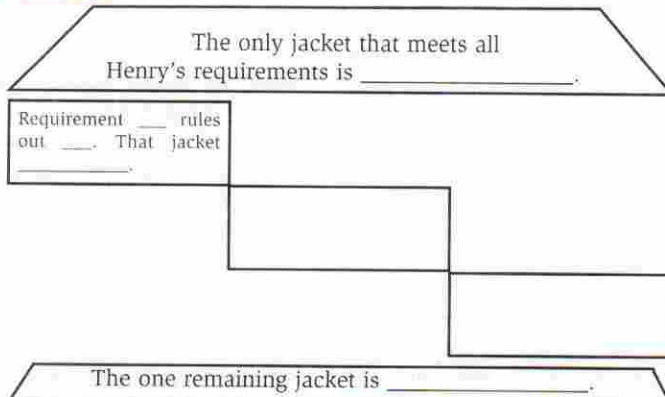**Follow the outline diagram to write how you selected the best jacket for Henry.**

Henry's requirements
1. The jacket must cost less than $200.00.
2. The jacket must be washable.
3. The jacket must offer superior protection against the cold.
4. The jacket must weigh no more than 4 pounds.

Facts

Jacket	Stormbuster	Windblaster	Leader	King Kold	Winderness
Price	$179.00	$187.99	$156.00	$206.00	$187.00
Weight	4 lb.	3 lb. 2 oz.	2 lb. 8 oz.	3 lb. 7 oz.	4 lb. 3 oz.
Protection against cold	superior	superior	good	superior	superior
Cleaning	washable	dry clean only	washable	washable	washable

Outline diagram

The only jacket that meets all Henry's requirements is _____.

Requirement ___ rules out ___. That jacket _____.

The one remaining jacket is _____.

ments. Figure 3 illustrates a problem requiring that an experiment take place before a conclusion can be drawn. Not all the possible explanations for the observation have been ruled out. The students describe a short experiment and then explain how to interpret the data, depending on how the experiment turns out. One of the remaining possible explanations for the observation will be ruled out in this experiment.

The outline diagrams shown in Figures 1 to 3 provide students with a clear model of the wording and processes involved in higher-order thinking. Later, when the outline diagrams are removed, students are able to work successfully, having internalized the thinking patterns. Thus, the outline diagrams function much as training wheels do when children learn how to ride a bike.

Early, Intensive In-Class Coaching

Designing lessons that incorporate the six principles of accommodation takes at least five times as much time as actually delivering the lessons. Clearly, teachers do not have the time to design the lessons themselves. Consequently, we give the teachers the core lesson plans for teaching the big ideas. With ready-made lesson plans, training can proceed more efficiently.

However, no matter how efficient the training is or how complete the lesson plan is, in-class coaching is still necessary. Techniques for bringing the low performers to criterion, while keeping the lessons challenging for the most proficient students, seem best communicated in the context of the classroom. As a result, we have developed a resource-efficient training system in which model schools host training sessions and teachers-in-training actually practice the presentation techniques with master teachers and their students. The master teachers first model the techniques, then team-teach with the trainee, and finally just monitor and give tips to the teacher, who has become quite proficient in the strategies. See Grossen & Scott, in press, for a more detailed description of the training model. Also see http://www. higher-scores.org for more information.

Continuous Progress Monitoring

We have found that continuous progress monitoring using an electronic database (Caros, 2001; see http://www.seira.ca for more information) greatly improves

Figure 3. Sam's Experiment

Follow the outline diagram to write about the problem with Sam's test.
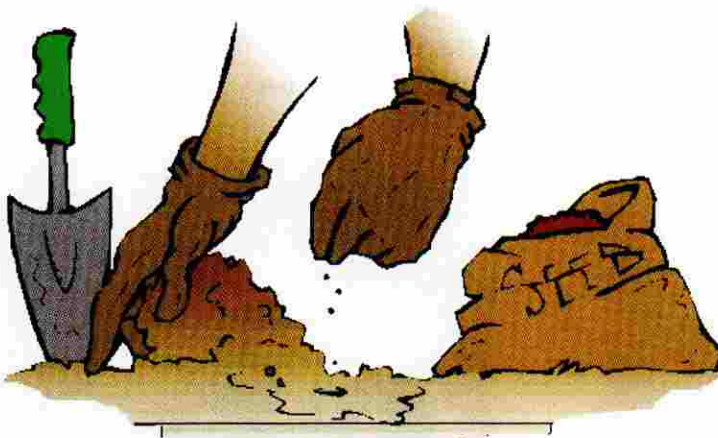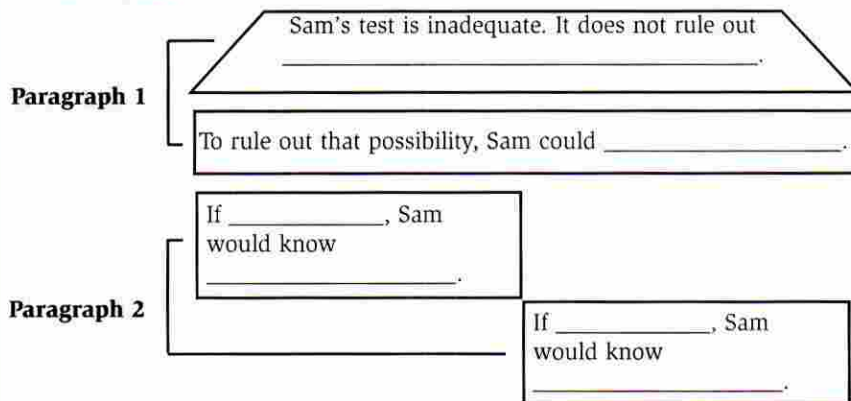
Sam's test

Sam did an experiment with maple seeds. He planted 600 seeds at a depth of one-half inch below the surface of the dirt. He controlled the temperature of the soil so it was above 60 degrees Fahrenheit. Nearly all the seeds sprouted.

He planted another batch of seeds 2 inches deep. He put them in a place that had a temperature that was less than 60 degrees. Almost none of those seeds sprouted.

Sam's conclusion

A temperature above 60 degrees causes the seeds to sprout.

Outline diagram

Paragraph 1

Sam's test is inadequate. It does not rule out _____ .

To rule out that possibility, Sam could _____ .

Paragraph 2

If _____, Sam would know _____ .

If _____, Sam would know _____ .

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the fidelity of an implementation. In our system, the teachers report individual students' scores on the mastery tests and the number of lessons taught monthly. Our goal is that all students will be successful on all parts of the mastery tests at all times, while teachers are able to cover content at a reasonable rate. Students who are proficient every step of the way are more likely to be proficient on the assessment of the standards, for which they are accountable in

the end. The coordinated efforts of all support personnel are required to implement continuous progress monitoring, including both collecting and acting on the data.

Summary

The BIG Accommodation Model achieves positive results if three elements are in place:

B = a curriculum engineered around big ideas and the other five principles of accommodation

I = intensive teaching that results from effective in-class coaching

G = great expectations that are operationalized through an electronic progress monitoring system that enables a school to prevent failure with timely intervention.

As with the Concept Anchoring Routine (discussed in *TEACHING Exceptional Children*, Vol. 33, No. 4, pp. 82-85), the BIG Accommodation Model is another component of comprehensive intervention packages being developed by the Institute for Academic Access. Thinking "BIG," researchers of IAA are united in working toward the goal of providing high school educators with validated practices appropriate for improving the success of their students in their particular situations. For more information, visit http://www.AcademicAccess.org.

References

Carnine, D. (March, 1994). The BIG accommodation program. *Educational Leadership*, 87-88.

Carnine, D., Crawford, D., Harniss, M., & Hollenbeck, K. (1995). *Understanding U.S. History*. Eugene: University of Oregon.

Caros, J. (2001). *Emerald ice, 4th-dimension database*. Vancouver, BC: Seira.

Engelmann, S., & Associates. (1999). *Corrective reading series*. Blacklick, OH: Science Research Associates.

Engelmann, S., & Grossen, B. (1999). *Reasoning and writing, level E*. Blacklick, OH: Science Research Associates.

Grossen, B., & Scott, C. (in press). An innovative model for professional development and dissemination of the BIG Accommodation model. *Exceptionality*.

Kameenui, E., & Carnine, D. (2001). *Effective teaching strategies that accommodate diverse learners*. Columbus, OH: Merrill.

Systems Impact Incorporated. (1987). *Earth science*. St. Louis, MO: Phoenix Film.

Woodward, J. (1994). Effects of curriculum discourse style on eighth graders' recall and problem solving in earth science. *The Elementary School Journal, 94*, 299-314.

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