

OSEP Research Institutes: Bridging Research and Practice



The article that follows is the third 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 IAA.

Making Learning Easier: Connecting New Knowledge to Things Students Already Know

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The Institute for Academic Access (IAA) is a collaborative partnership between faculty and staff at the University of Kansas (Jan Bulgren, Don Deshler, Keith Lenz, and Jean Schumaker) and the University of Oregon (Doug Carnine, Betsy Davis, and Bonnie Grossen). The primary goal of the IAA is to determine ways to improve the educational outcomes for adolescents with disabilities by designing instructional methods that take into account the students' unique characteristics and the complex dynamics that are unique to high-school curricula and schools. In order to accomplish this goal, IAA researchers are teaming with classroom teachers to determine ways to restructure courses required for standard high school diplomas so that students with disabilities can be successful. They are:

- Considering the *standards* students must meet;
- Selecting the *critical content* and "big ideas" related to those standards;
- Thinking carefully about course content in light of the *needs of all stu-*

dents in these academically diverse classes;

- Organizing and transforming that content into forms that are "learner friendly" (i.e., *easy to understand and remember*);
- Considering what *processes students must use* to learn the content;
- Showing students *how to use these processes* to learn the content;
- Presenting the content in a way that *involves students* in the learning process;
- Using *specially structured materials* to teach difficult information/skills;
- Setting up *multiple practice opportunities* for students to practice learning the content;
- *Assessing the students' mastery* of the content and attainment of the standards; and
- Providing them with *helpful feedback and further instruction*, as needed, to promote mastery.

During the life of the IAA, several instructional packages will be designed and validated for use in these restruc-

tured courses. The end objective will be to provide educators with a *menu* of validated practices from which they can choose and with which they can build core academic courses that are specially tailored to their students, subject matter, and schools.

Challenges Facing Students with Disabilities in High-School Settings

There are some major trends in education that are making the situation facing high-school students with disabilities challenging. Among these trends are the following:

- The expectation that all learners, including those with disabilities, pass standards-based assessments (Erickson, Ysselydke, Thurlow, & Elliot, 1998);
- The prevailing practice of including adolescents with disabilities in the general education classes (Hock, Schumaker, & Deshler, 1999);
- The growing expectation that students not merely acquire but inde-

pendently apply high-level thinking skills within subject areas in authentic problem-solving activities (Kameenui & Carnine, 1998); and

- The clear expectations set forth in P.L. 105-17 that programming for students with disabilities be outcome-based within the context of successfully mastering (and not merely gaining access to) the general education curriculum (Turnbull, Rainbolt, & Buchele-Ash, 1997).

The problems that adolescents with disabilities face when trying to succeed within the general education curriculum are exacerbated by the fact that their disabilities are often related to:

- organizing content information,
- differentiating major ideas from supporting information,
- comparing and/or contrasting information,
- reading and understanding large amounts of content information,
- relating one's background knowledge to a new set of information,
- holding large quantities of information in memory, and
- expressing information on tests and in papers.

The skills associated with all of these activities are typically prerequisites to success at an average or above level in most required high-school classes. When deficits in these areas have a negative effect on student learning, teachers must pay particular attention to what content information is selected for students to learn, how that information is presented to students, and how students are guided to interact with that information.

Content Enhancement Routines

Several instructional routines, called Content Enhancement Routines, have been developed over the past 18 years for use in general education classes to meet the needs of students with disabilities. Four types of Content Enhancement Routines have been validated:

- *Organizing Routines* show students how information is organized and related.
- *Understanding Routines* teach students about major concepts and main ideas.

- *Recall Routines* help students remember important details.
- *Application Routines* allow students to produce and apply what they have learned.

Key instructional principles associated with Content Enhancement

The Content Enhancement approach is based on several validated instructional principles. Specifically, research has shown that students learn more when:

- They are actively involved in the learning process;
- Abstract, complex concepts are presented in concrete forms;
- Information is tied to previously learned information;
- Important information is distinguished from unimportant information;
- The relationships among the pieces of information are made explicit; and
- Students are explicitly shown how to learn specific types of content.

Through consistent application of the instructional principles described above, all students' learning is enriched without sacrificing large amounts of content. Critical features of the content are selected and transformed in a manner that promotes student learning, and instruction is carried out in a partnership with students. In short, this instructional approach focuses on methods that teachers can use to enhance the delivery of information they consider to be most important for students to learn.

The Concept Anchoring Routine

The *Concept Anchoring Routine* (Bulgren, Schumaker, & Deshler, 1997), one of the understanding routines within the Content Enhancement Series, is a package of instructional methods that teachers can use to help an academically diverse group of students understand and master key concepts within curriculum content. It is an example of the types of routines currently being developed and tested through the IAA.

The main purpose of the *Concept Anchoring Routine* is to help students connect new information they are expected to learn information that is already familiar to them. The power of this instructional tool is that it capital-

izes on the fact that all students, regardless of their academic history, have a rich set of background experiences and knowledge that can be tapped. Helping students make the connection between known and unknown information is especially important if the new information to be learned is abstract or complex (e.g., "federalism" or "commensalism"). If students are expected to learn abstract concepts in isolation without calling upon information they already know, they will not be likely to learn the new concepts. However, if teachers tie new knowledge to be learned to information students already know, learning new concepts becomes much easier!

The Concept Anchoring Routine consists of three components: (1) the Anchoring Table; (2) the Linking Steps; and (3) the Cue-Do-Review Sequence.

The Anchoring Table

This instructional tool (see Figure 1) is a two-dimensional table that allows the teacher to display information related to a new and important concept. This table is used to explain to students how critical aspects of the new concept are related to something with which the student is already familiar.

Prior to class, the teacher drafts an Anchoring Table like the one shown in Figure 1; hence, this device serves as an excellent planning tool for teachers. The teacher uses this draft to plan the interactive process that will take place in class with the students. However, the final table is constructed by the students and teacher in class.

The Linking Steps

The seven Linking Steps, which are listed at the bottom of the Anchoring Table in Figure 1, serve as a guide for the teacher during the in-class interactive construction of the Anchoring Table where the teacher and students interact to decide how to fill in the Table. The teacher asks questions to guide and facilitate an active discussion.

The Cue-Do-Review Sequence

There are three instructional phases in this sequence. During the "Cue" phase, the teacher cues students that the routine will be used and encourages them

Figure 1. Anchoring Table for the Concept “Federalism in the USA”

Unit: _____		Anchoring Table		Name: _____	Date: _____
③ Known Information Teachers administrators rules penalties not sure if powers are written down teachers make assignments administrators expel	② Known Concept Decision making in your school.		① New Concept Federalism in the U.S. A.		
	④ Characteristics of Known Concept Decisions are made by administrators & teachers.	⑥ Characteristics Shared 2 groups are involved.	⑤ Characteristics of New Concept Decisions are made by state & national govts.		
	Rules, written or understood, tell how power is divided.	Rules tell how power is divided.	Rules, based on Constitution, tell how power is divided.		
	Some powers belong to administrators (expel).	Some powers belong to one group.	Some powers belong to national govt (war, money).		
	Some powers belong to teachers (give assignments).	Some powers belong to the other group.	Some powers belong to states (education, marriage, gambling).		
	Some powers belong to both (make rules, set penalties).	Some powers belong to both groups.	Some powers belong to both (tax, punish crimes).		
⑦ Understanding of the New Concept: Federalism in the U.S. A. is a form of government in which decisions are made by both state and national governments. Rules to decide how power is divided are based on the Constitution. Some powers (e.g., make war, coin money) belong to the national govt. Other powers (education, marriage, gambling) belong to the states. Some powers (e.g., tax, punish crimes) belong to both.					
ANCHORS Linking Steps: 1. Announce the New Concept 2. Name Known Concept 3. Collect Known Information 4. Highlight Characteristics of Known Concept 5. Observe Characteristics of New Concept 6. Reveal Characteristics Shared 7. State Understanding of New Concept					

She would also specify what she expected them to do to participate in the routine.

The Do phase

Secondly, in the “Do” phase, the teacher would follow the seven Linking Steps as follows.

1. *Announce the Concept Name:* The teacher would name the new concept along with a rationale of why the students should understand it.

2. *Name the Known Concept:* The teacher would name a concept about which she was confident the students knew a great deal. In this case, the teacher chose “temperature control systems in modern buildings.”

3. *Collect Known Information:* During this step, the teacher leads a brainstorm discussion with students to surface specific knowledge that they have about

to carefully attend to and actively participate in the co-construction of the Anchoring Table. In the “Do” phase, the seven Linking Steps are used to construct the Anchoring Table. In the “Review” phase, the teacher reviews the students’ understanding of both the information related to the concept and the thinking processes used to construct the table.

The Cue phase

First, in the “Cue” phase, she would tell the students that they were going to be studying an important new concept and that they would be completing an Anchoring Table together. She would explain how tying new information to known information improves learning.

the Known Concept. The information that students share during this instructional phase is listed on the left hand side of the Anchoring Table under the heading “Known Information.”

4. *Highlight Characteristics of the Known Concept:* From the list of information generated by the students, the teacher

An Example

Teachers selectively use the *Anchoring Routine* to teach those concepts that they deem to be (1) of considerable importance to student understanding of core course content, and (2) potentially difficult to understand. For example, in a science class, if a teacher concludes that the concept of “temperature control systems in warm-blooded animals” meets these two criteria, she would use the Anchoring Routine in the following manner to teach this concept. (See Figure 2 for a completed Table.)

Figure 2. Anchoring Table for the Concept “Temperature Control Systems in Warm-Blooded Animals”

Unit: _____		Anchoring Table		Name: _____	Date: _____
③ Known Information furnace air conditioner 72 degrees thermostat notices change set temp. anywhere electronic signals	② Known Concept Temperature control systems in modern buildings		① New Concept Temperature control systems in warm-blooded animals		
	④ Characteristics of Known Concept Building temperature is set to stay the same (72°)	⑥ Characteristics Shared Inside temperature is supposed to stay the same.	⑤ Characteristics of New Concept Body temperature stays the same (98.6°)		
	Thermostats notice temperature changes.	Something notices temperature changes.	Nervous & endocrine systems notice temperature changes.		
	When temperature changes, thermostat sends electronic signals.	When temperature changes, a sensor sends signals.	When temperature changes, nervous & endocrine systems send signals.		
	Signals start action in furnace or air conditioner.	Signals start other systems.	Signals start action in circulatory system or muscles.		
	Furnace or air conditioner corrects building temperature to 72°	Systems correct temperature.	Circulatory system & muscles correct body temperature.		
⑦ Understanding of the New Concept: Temperature control systems in warm blooded animals are like those in modern buildings because the temperature is supposed to stay the same, but when the temperature changes, something notices. A sensor sends signals to start other systems that correct the temperature.					
ANCHORS Linking Steps: 1. Announce the New Concept 2. Name Known Concept 3. Collect Known Information 4. Highlight Characteristics of Known Concept 5. Observe Characteristics of New Concept 6. Reveal Characteristics Shared 7. State Understanding of New Concept					

underlines those terms that are characteristics considered to be most important in describing temperature control in buildings which will also facilitate understanding of the new concept (e.g., thermostat, furnace, electronic signals, etc.—See Figure 2). Each of these characteristics is added to the Anchoring Table on the lines under the heading “Characteristics of Known Concept.”

5. *Observe Characteristics of the New Concept:* In this step, each of the characteristics listed for the Known Concept is examined in terms of a similar or parallel characteristic in the New Concept. As these parallel characteristics are identified, they are listed on the right-hand side of the Table under the heading “Characteristics of the New Concept.”

6. *Reveal Characteristics Shared:* The purpose of this step is to have students identify a broad category within which the similar characteristics listed for the Known and the New Concept can both fit. For example, the category into which both “building temperature is set to stay the same (72 degrees)” for the Known Concept and “body temperature stays the same (98.6 degrees)” for the New Concept is the Shared Characteristic of “Inside temperature is to stay the same.” These shared characteristics are listed in the center of the Table under the heading “Characteristics Shared.”

7. *State Understanding of the New Concept:* In this final step, students are expected to demonstrate their understanding of the New Concept. In the box labeled “Understanding of the New Concept,” students are asked to write a definition of the New Concept. They are reminded that the definition should include the name for the new concept and each of its characteristics.

The Review phase

In the “Review” phase, the teacher briefly covers the key content covered in the lesson as well as asks the students something about the *Anchoring Routine* (e.g., “How has the Anchoring Table helped you learn this information?” or “How could you use this learning tool in some of your other classes?”)

Research

Four research studies have been conducted on the use of the Concept Anchoring Routine, and they indicate that this routine can enhance students’ performance in understanding and remembering secondary subject-matter content and that teachers found it useful and effective. One teacher noted: “We use a lot of analogies in science, but I never realized how much more useful they could be if they were developed with something like the Concept Anchoring Table. I used to say things to the class like, ‘You know that the epiglottis is like a pet door, right?’ However, I wouldn’t take time to find out for sure that all the students in the class knew what a pet door looked like or how it worked. I just didn’t check on their prior knowledge. Or in other cases, I realized that I did not take time to explain characteristics that the two parts of the analogy had in common. For example, if I compared alveoli to a sponge, I did not focus enough on the shared characteristics such as both are containers, can hold something, and can change size. These were important. So, with the Concept Anchoring Table, I was able to make my analogies more effective.”

Conclusion

The Concept Anchoring Routine can help adolescents with disabilities grapple with the many complex concepts they are expected to learn in rigorous general education classes. The effectiveness of this tool is directly related to using it on a regular basis, following the instructional procedures outlined in the instructional guide (Bulgren et al., 1997) and insisting upon the active involvement of students.

The Concept Anchoring Routine is similar to the types of routines that are currently being designed and tested through IAA auspices. These routines are expected to create a comprehensive package whereby teachers will be able to review the standards their students must meet, organize the content for their courses, units, and lessons, share those organizational understandings with their students, and interact with their students in new ways to promote

learning and recall of the course content. In addition to new routines being developed and tested through the IAA, the comprehensive package will be tested to determine its overall impact. Thus, the Concept Anchoring Routine will be tested in combination with a variety of other routines to determine student performance in relation to standards and course objectives.

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Training on the Concept Anchoring Routine is available through an International Training Network associated with the IAA. For information on certified trainers in your area, call 785-864-4780.