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Instructional routines and learning strategies that promote understanding of content area concepts

Common demands of middle and secondary schools may contribute to some students' learning difficulties, especially those with learning disabilities. Two approaches for comprehension of content area concepts and a learning strategy students may use independently are presented.

Research findings indicate that reading and other curricular demands of middle and secondary schools, as well as common classroom teaching practices, may compound existing learning difficulties for some students, particularly those who have learning disabilities (LD) (Deshler, Schumaker, Lenz, & Ellis, 1984).

At the middle and secondary levels, curriculum primarily focuses on content teaching and learning. Content area demands center around learning domain-specific and general concepts. A concept is a word or phrase representing a meaningful category or class of events, ideas, actions, or objects (Bulgren, Deshler, & Schumaker, 1993; Rumelhart, 1981). Understanding of concepts is the foundation for acquisition and application of much knowledge in content areas (e.g., Meyer, 1991).

For example, understanding of events such as civil wars, ideas such as democracy, actions such as civil disobedience, and objects such as fossils is necessary for acquisition of wider and deeper knowledge that uses and builds on those concepts. Concepts have meaning on their own and may help define associated concepts (e.g., Cenozoic-era fossil) or be embedded in other concepts (e.g., representative democracy).

Another content area demand is to use effective processes of learning. A wide array of processes has been theorized to influence conceptual learning, such as those incorporating prior knowledge, interest, motivation, questioning, analogic thought, and recognition of structure and expository relationships (Pressley & McCormick, 1995). It is assumed that students come to a content course knowing how to process information and motivated to learn. As a result, presenting the content is the teacher's domain; deciding how to learn is the student's domain (e.g., Armbruster et al., 1991). Unfortunately, many students have not developed

the skills to learn effectively. Therefore, for many students, and particularly those with LD, the integrative application of both effective processes of learning and concept learning is a poorly met challenge (e.g., Carlisle, 1993). Explicit instruction that would facilitate integration of such process and content learning by students with LD is rarely done (e.g., Armbruster et al., 1991).

Students with LD often lack much of the prior knowledge of concepts requisite to benefit from the secondary curriculum (Bos & Anders, 1987, 1990). They also tend not to use efficient skills and strategies for learning, unless specifically cued to do so (Dole, Valencia, Greer, & Wardrop, 1991). In addition, they often do not generalize their use of newly learned content or skills and strategies across texts, settings, conditions, and time unless they are specifically taught to do so (Borkowski & Muthukrishna, 1992; Brown & Palincsar, 1989; Ellis, Lenz, & Sabornie, 1987; Schmidt, Deshler, Schumaker, & Alley, 1989).

To help students achieve high standards, including low achievers and those with LD, teachers must collaborate with their students in learning and applying both content and the skills and strategies needed for learning. Teachers in secondary-level content classrooms, however, face the challenge of teaching complex content area information to classes that contain students of diverse ability (Brophy, 1992) who possess different levels of background knowledge (Bulgren & Lenz, 1996; Schumaker & Deshler, 1984). These differences among students become especially challenging for secondary-level teachers in light of content area curricular demands.

A teacher can respond successfully to the instructional challenge of integrating the teaching of process and content by taking a central role as planner and mediator of learning, in order to guide all students toward independence as learners (Bulgren & Lenz, 1996; Jones, Palincsar, Ogle, & Carr, 1987). Such independence implies students' knowledge of both concepts and the processes for thinking about those concepts. In this capacity, teachers must present their students with appropriate learning experiences that enhance the students' ability to comprehend and master the content (Pressley & McCormick, 1995). That is, teachers must adopt strategic teaching practices that will help students acquire both concepts critical to curricular content and learning strategies they need to be independent learners and processors of information.

Different approaches may be appropriate for integrating process and content learning, depending on the type of learning task. The approach will, in turn, influence the active roles that teachers and students will assume. One approach is to use *strategic teaching*, which is a form of instruction in which the teacher compensates for students' lack of strategies and models and guides students in learning how to learn (Bulgren & Lenz, 1996).

To illustrate strategic teaching, we present teaching routines designed to respond to the demand to teach complex curricular information to students of diverse ability. They reflect the philosophy of Content Enhancement (Lenz & Bulgren, 1995; Lenz, Bulgren, & Hudson, 1990; Schumaker, Deshler, & McKnight, 1991), which is a process of teaching scientific or cultural knowledge to a heterogeneous group of students in which both group and individual learning needs are met while the integrity of the content is maintained. In strategic teaching, critical features of the content are selected, organized, manipulated, and complemented in a manner that promotes effective and efficient information processing. The content is delivered in a partnership with students, in a manner that facilitates and enriches learning for all students.

Another possible approach is to use techniques defined as *strategy integration approaches*. These are approaches to instruction that weave the teaching of learning strategies into content area learning at the same time that subject area content is being taught (Bulgren & Lenz, 1996).

To illustrate a strategy integration approach, we present a learning strategy designed to respond to inclusive content area teaching demands (Scanlon, Schumaker, & Deshler, 1994). It is based on the Strategies Intervention Model (Ellis, Deshler, Lenz, Schumaker, & Clark, 1991). Instruction in the strategy was designed to promote integrated learning of content and processes for learning. Critical features

of the strategy include student decision making about the relevance of content and construction of representations of that knowledge.

An understanding of the different ways concepts can be taught allows a teacher the opportunity to select instructional approaches ideally suited to conveying understanding of a single concept, analysis or application of relationships between or among concepts, or representations of knowledge of relationships among concepts. To illustrate the instructional routines and learning strategy presented, we provide examples of each using a single content lesson.

Examples from a content lesson

We selected the topic of Native Americans and settlers sharing the West for the content lesson. For illustrative purposes, we developed a short reading passage about the topic that contains information of the type students in an inclusive high school social studies classroom are expected to learn (see Figure 1). We constructed a Concept Diagram (Figure 2) and Concept Comparison Table (Figure 3). They illustrate teaching devices a teacher could use in conjunction with their associated teaching routines to interactively teach students a single concept and analysis of relationships between or among concepts, respectively. We also present samples of student application of the ORDER Strategy (Figure 4) to represent the independent learning strategy that students can use to apply their knowledge of relationships among concepts in the lesson.

Figure 1
Sample lesson: Uses for the land

In the 1800s, two groups of people found themselves sharing the West. Pioneers arrived in the West only after making a very difficult trip. Native Americans had long lived in the western part of the country. Many Native Americans lived in teepees made of skins, which they would take apart and move to new areas as the buffalo herds moved on. The pioneers who stayed became known as "settlers" because they built permanent homes. These homes were often built of sod, which was held together by clumps of roots.

Native Americans living in the West considered the land as a gift to be shared. Land belonged to the whole tribe. Crops were used for the good of all. The settlers chose to divide the land into farms and ranches. These were to be for the sole ownership and use of the family that claimed or bought them. The settlers hunted animals for sport, as well as for food and skins. The Native Americans valued animals as a source of food and skins and would not hunt them for sport. Each group believed its views to be right.

The reading-based lesson focuses on a comparison of settlers and Native Americans in the West of the United States of the 1800s. It was designed to provide students ample opportunity to understand concepts such as *settlers*, compare concepts such as *settlers* and *Native Americans*, or independently apply processes of comparing and contrasting information based on text structure and prior knowledge.

Using devices such as the Concept Diagram and Comparison Table and their associated teaching routines places major emphasis on the teacher's role as mediator of knowledge. Although students are involved interactively in the learning process, the teacher has a major role in guiding and monitoring the learning process. We designed the Concept Diagram and the Comparison Table to be presented in conjunction with prescribed instructional routines. The routines include the following: (a) cueing students about the topic, its importance, the use of the device, and expectations regarding participation; (b) using a set of specific steps associated with each component part of the instructional device; and (c) reviewing students' understanding of the content and the processes involved in learning that content (Bulgren et al., 1993).

Concept Diagram and concept teaching routine. The Concept Diagram is a two-dimensional instructional tool that allows the teacher to display information related to a key concept. Information and relationships are displayed in a way that enhances student understanding and retention of conceptual information. Specifically, the Concept Diagram focuses on a key concept, the larger class to which it belongs, its characteristics, examples and nonexamples, and a summary of understanding. A draft of a Concept Diagram is created by the teacher prior to class and then presented to the class in an interactive process, with the teacher taking the role as mediator. For example, after students have had a chance to read or discuss the sample passage, the teacher cues the students that a Concept Diagram

will be used to explore the concept of settlers. The teacher provides prompts about notetaking, the form and process involved in developing the Concept Diagram, expectations for participation in the discussion, and reminders about the importance of the concept and where it would be used at other times in the class. (See Figure 2.)

Then, the teacher proceeds to develop the Concept Diagram following the seven steps cued on the device by the acronym CONCEPT. The acronym guides the students in the following steps:

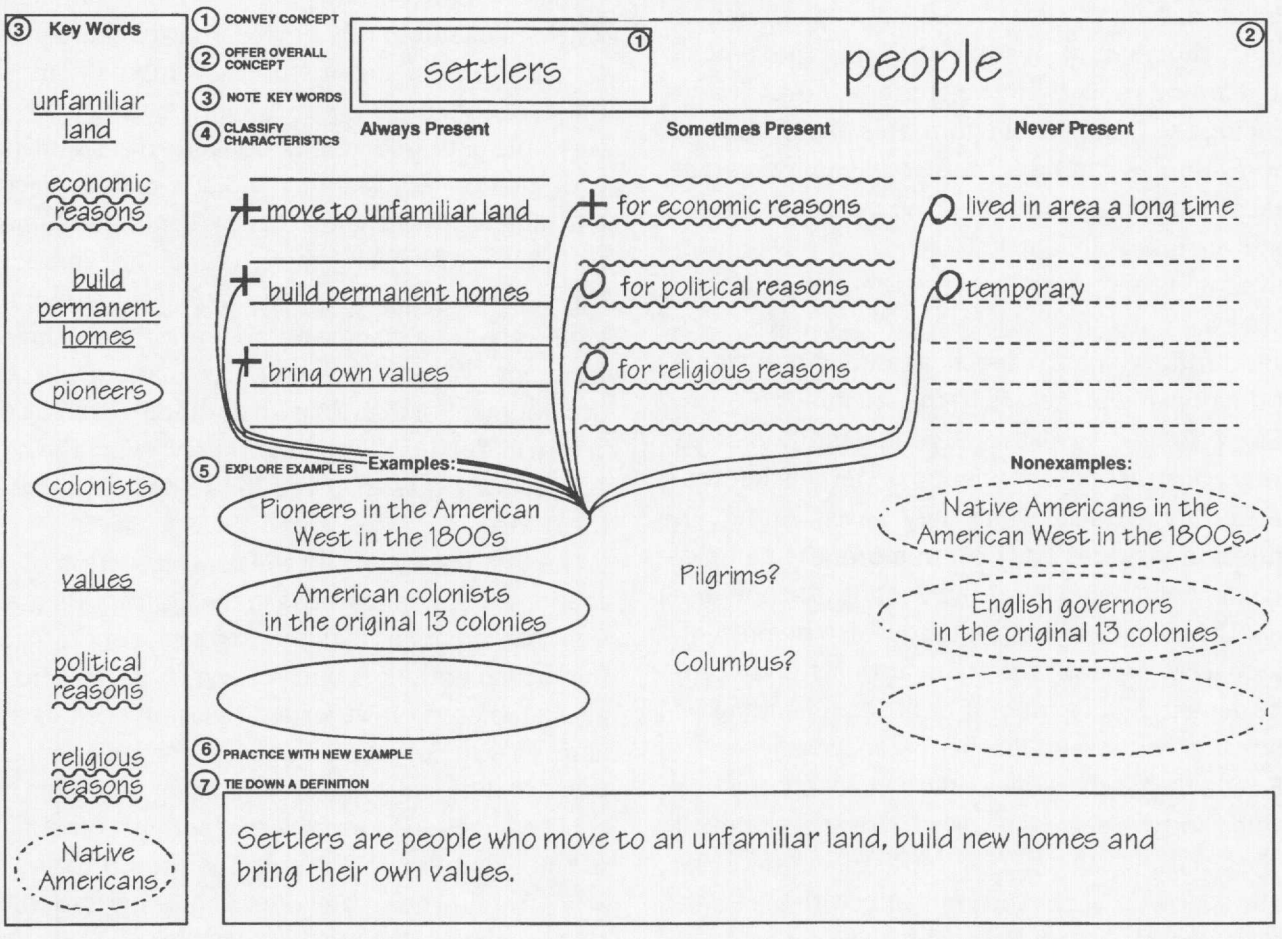
Step 1: Convey the concept. The concept is named (*settlers*).

Step 2: Offer overall concept. The overall or larger concept group into which the concept *settlers* fits is presented or elicited (*people in America*).

Step 3: Note the key words. The students are asked to participate by developing a list of key words about the concept. At this point, the teacher is able to determine levels of prior knowledge about the concept and fill in any gaps in understanding. Students are involved in identifying words or phrases according to how they will be used in the completion of the Concept Diagram. This is accomplished by working interactively to underline words that are characteristics and circle those that are examples.

Step 4: Classify characteristics. The students participate with the teacher in filling out the Concept Diagram by classifying characteristics into those that are always present, sometimes present, and never present in the concept of *settlers*. In this concept, settlers always move to an unfamiliar land,

Figure 2
Concept diagram: Settlers



build permanent homes, and bring personal values. The reasons can be economic, political, or religious. However, a settler can never have lived in the area a long time or intend to be temporary.

Step 5. *Explore examples.* The teacher asks students to sort potential instances into either examples or nonexamples of the concepts and to check each example or nonexample against the characteristics that must always be present or never be present. For example, the example of "pioneers in the American West in the 1800s" has all of the characteristics that must always be present in the concept. However, some Native Americans in the American West in the 1800s had lived in the area a long time; the possession of even one "never characteristic" means they could not fit into the concept of a *settler.*

Step 6: *Practice with new examples.* The teacher provides opportunities for the students to practice their understanding by asking them to decide if new instances are examples or nonexamples. The teacher has a great deal of latitude regarding how to vary the amount of support during this part of the learning process. If the students are still new at using the Concept Diagram, this exploration of new examples can be a class activity with a great deal of teacher support. In other cases, when students are more familiar with the use of the steps involved in developing a Concept Diagram, this step can be a group or individual activity, or assessment tool, during which the teacher can begin to transfer the thinking processes to the students.

Step 7: *Tie down a definition.* A good definition of *settlers* is constructed as students, under teacher mediation, synthesize what they have learned. A definition includes, at the minimum, the name of the concept, the name of the overall concept, and all of the characteristics that must also be present. The teacher has latitude again at this step to provide a great deal of support or little, depending on student expertise and teacher objectives.

Finally, the teacher reviews the content information learned and the process involved in the development of the Concept Diagram. This step assures knowledge of the specific concept and familiarity with the thinking process involved in the analysis of a concept.

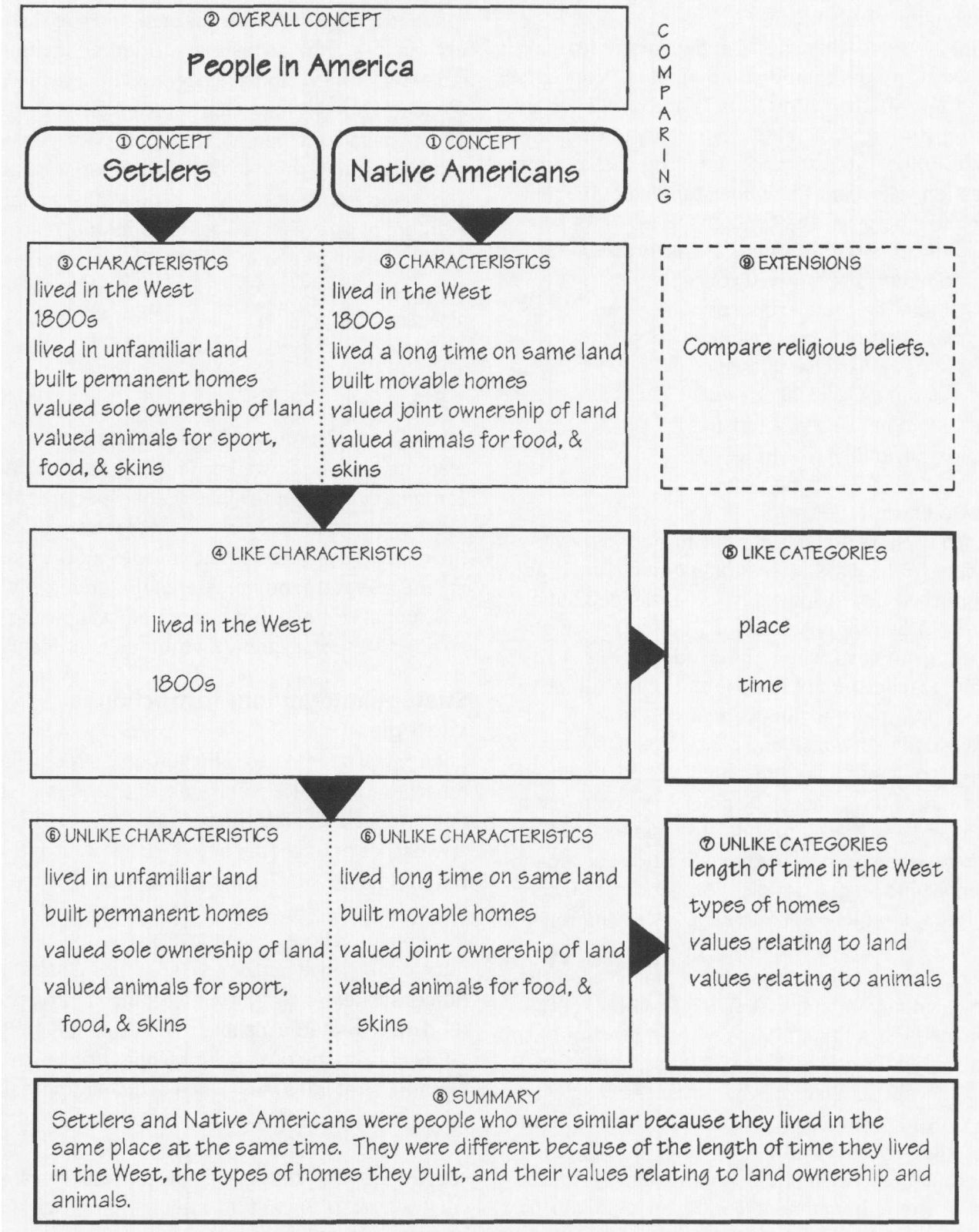
The examples we developed are certainly not the only way to present the concepts. Teachers at different levels will present fewer or more characteristics, and simpler or more challenging examples depending on student ability and course objectives.

Comparison Table and comparison teaching routine. The two-dimensional Comparison Table allows the teacher to display information about two or more important concepts. The teacher uses the Comparison Table to draw student attention to critical characteristics of each concept and show how these characteristics are alike and different. Specifically, the Comparison Table is focused on the larger concept class to which the targeted concepts belong, characteristics of the concepts, characteristics that are alike and different, the larger categories into which the characteristics fit, and a summary of understanding. A draft of the Comparison Table is created by the teacher prior to class and used as a guide during class.

The Comparison Table presented in Figure 3 provides an example of a device that teachers might prepare to help social studies students compare the concepts of *settlers* and *Native Americans.* Using the same pattern of instruction already established with the Concept Diagram and associated concept teaching routine, the teacher presents the Comparison Table within a teaching routine that embodies three parts: (a) cueing the students in a manner similar to that discussed above for the Concept Diagram, (b) using the steps associated with the development of the Comparison Table (cued by the acronym COMPARING), and (c) reviewing the content and process involved in the development of the device.

The first three steps of the central section of the routine are similar to those in the Concept Diagram: Concepts are identified, the larger concept category into which both fit is named, and characteristics of each are noted. However, a discussion of characteristics that the concepts have in common and those that are different are ways of further analyzing the concepts in Steps 4 and 6. An important component of the Comparison Table is the identification in Steps 5 and 7 of the categories or clusters into which characteristics that are alike or different fit. For ex-

Figure 3
Comparison table: People in America



ample, "types of homes" is a larger category that can be used to describe differences between pioneers who built permanent homes and Native Americans who built movable homes.

Finally, the teacher checks and mediates learning by testing student understanding of the concepts and their relationships. This is accomplished by asking students to create a summary of their understanding (Step 8) and assigning a challenge question to extend their understanding of the relationships between the concepts (Step 9). In summary, the COMPARING steps are as follows:

1. Communicate targeted concepts,
2. Obtain the overall concept,
3. Make lists of known characteristics,
4. Pin down like characteristics,
5. Assemble like categories,
6. Record unlike characteristics,
7. Identify unlike categories,
8. Nail down a summary, and
9. Go beyond the basics.

Each of these steps is specifically tailored by the teacher to the class to ensure learning. This is accomplished by providing support as needed but allowing independent student application of the learning process when the students are ready. Again, teachers adapt the content of the tables to respond to their judgments regarding student prior knowledge, interest, and content demands.

Previously published research has documented the value of the Concept Diagram and Comparison Table and associated routines to enhance student learning when used by regular education secondary science and social studies classroom teachers (Bulgren, Deshler, & Schumaker, 1988; Bulgren et al., 1993; Bulgren, Lenz, Deshler, & Schumaker, 1995). Specifically, research on the use of the Concept Diagram and associated teaching routine indicated that both students with and without LD scored significantly better on tests designed to assess concept acquisition when their teachers used the routine than during normal instruction, that students scored significantly better on regularly scheduled teacher-made or commercial unit tests during the enhancement condition than during baseline, and took better notes (Bulgren et al., 1993). Groups of students with and without disabilities made comparable gains.

Similarly, research indicated that, for students enrolled in regular secondary science and social studies classes, low-achieving students, including students with LD, and average- and high-achieving students correctly answered substantially more test questions related to information that had been presented through the use of the Comparison Table and associated routine than test questions related to information presented using traditional teaching methods (Bulgren et al., 1995). Teachers received training and an instructor's manual with guidelines about planning, development, and use of the graphics and routines (Bulgren et al., 1993; Bulgren et al., 1995).

It should be noted that these devices and routines have been found effective when used with a planning routine as well as teaching routines that combine cues about the instruction, specialized delivery of the content, involvement of the students in the cognitive processes, and a review of the learning process and content material (Bulgren, Deshler, & Schumaker, 1993), but has not been shown to be an effective tool if simply distributed to students.

Strategy integration: Instruction in strategies

Learning strategies are efficient and effective approaches to specific learning tasks performed by students. Students use them to replace inefficient approaches or when they have no consistent and appropriate approach to task completion. The teaching of learning strategies independent of content learning (or, school-authentic tasks) has been found to be of limited effectiveness; students' generalization of strategies to content learning is often poor (Borkowski & Muthukrishna, 1992; Wong, 1994).

Specific instructional approaches for teaching learning strategies vary. One particular approach, strategy integration (see Bulgren & Lenz, 1996), involves teaching of strategies in conjunction with content teaching, thus easing the process of strategy generalization to content-area learning. What all strategy instructional approaches have in common is

active student involvement and increasing responsibility for student performance of the strategy.

The* ORDER *Strategy. The ORDER Strategy and its accompanying instructional routine were designed to enhance the integrated teaching of content and strategic processes of learning to students of diverse ability in the content classroom (Scanlon et al., 1994). In the instructional process, the individual student gradually assumes responsibility for electing to use the strategy and applying it to content learning, as the teacher moves from a role of instructor to facilitator to, finally, coach. Initially, the strategy is described and modeled by the teacher for the whole class. Under teacher guidance the whole class and small groups practice applying the strategy as they study regular content; as the students grow in their proficiency, they increasingly assume responsibility for performing the strategy individually.

Student understanding of relationships among concepts is encouraged by exploring the contexts that relate them. The central activity of the strategy is the students' graphic depiction of the primary expository relationship among key concepts. Following their learning of the ORDER Strategy, two middle school students each created one of the graphic organizers in Figure 4. The students designed these organizers to reflect what they considered to be key information from the reading "Uses for the Land" and the primary expository relationship uniting that information.

In the first two steps of the strategy, Open your mind and take notes and Recognize the structure, the students took notes on the content and predicted the expository structure (see Scanlon, Deshler, & Schumaker, 1996, for a detailed explanation of each strategy step). They then created their personal organizers following four substeps embedded in the third strategy step, Draw an organizer. In the fourth strategy step, Explain it, they reviewed and clarified their organizers, explaining them and modifying them as needed; and finally, in the fifth step, Reuse it, they finished the strategy by using their organizers as study guides.

Each step of the strategy guides the student to apply efficient processes of learning independently while studying regular curricular content. Only in the initial strategy learning stages are the teacher and other students directly involved in strategy application. The goal is to provide students with a tool for independently comprehending the important concepts of a lesson through recognizing their relationships. Thus, while the teacher facilitates description, modeling, and guided practice during the phase in which students are learning the ORDER Strategy, the proficient student eventually uses the strategy independently.

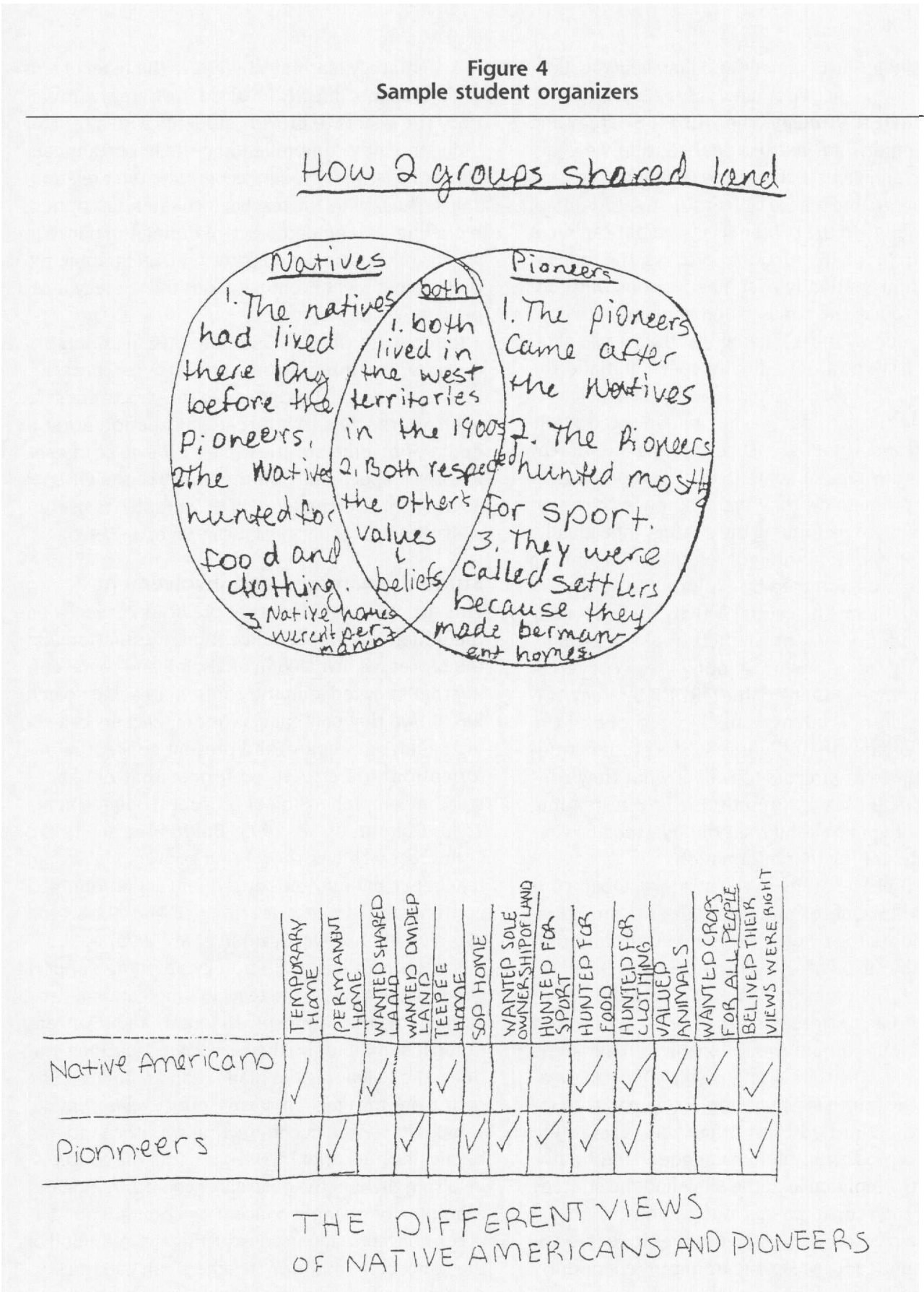
In summary, the ORDER Strategy is an example of a strategies integration approach to teaching. Previous research has indicated the effectiveness of such approaches to strategic instruction for students of diverse abilities (e.g., Ellis et al., 1991). Research specifically on the utility of the ORDER Strategy has further served to validate its usefulness (Scanlon et al., 1994; Scanlon et al., 1996).

Student awareness and involvement

This article brings together previous research on the understanding of conceptual information and the processes involved in analyzing and representing that knowledge in the content areas. Research has shown that content classroom teachers can select, analyze, prepare, and present conceptual information in a structured format that enhances student comprehension of concepts (Bulgren et al., 1988; Bulgren et al., 1993; Bulgren et al., 1995). Other research has shown that content classroom teachers can simultaneously instruct students in content and process learning in the classroom (Scanlon et al., 1994; Scanlon et al., 1996).

For the routines and strategy, learning support varies depending on the teacher's mediational decisions. For the Concept Diagram and Concept Comparison Table and their associated teaching routines, the teacher is the planner and mediator. She or he plans the diagram or table prior to class, but develops the device in conjunction with the students by eliciting their prior knowledge about the concepts, involving them in the analysis of characteristics and examples of a single concept or comparisons between concepts, and in constructing the definition of the concept. In addition, teachers can cue the students to attend to each strategy step associated with

Figure 4
Sample student organizers



parts of the device. Teachers can also elect to assign independent activities to assess knowledge of the concept, knowledge of the processes involved in analyzing conceptual relationships between concepts, and even knowledge of the embedded strategy steps.

In the case of the ORDER Strategy, the teacher teaches the strategy to the students who then become responsible for independently applying their knowledge of the strategy. Strategy performance involves analyzing and relating concepts for depiction in a graphic organizer. The organizer reflects the student's understanding of information from reading a text or participating in a lesson, incorporating her or his related prior knowledge. Teachers could, however, assign the strategy as a small-group activity or a teacher-led classwide activity. In addition, completed organizers can be used for a variety of class activities, including assessment.

Two critical elements of the successful implementation of any device, routine, or learning strategy are student awareness of and involvement in the learning process. For maximum results, a partnership must exist in which both teacher and students know their own roles and the roles of others in the class. The teacher does not merely present information, but informs students of the teaching techniques being used, clarifies expectations for student participation as partners in the process, and makes students aware of how they will use knowledge and processes involved in the content lesson. Students are made familiar with all aspects of a device and every part of a routine or strategy so that they may think in an informed manner about its application and their role.

Each of the three approaches to concept learning in the content areas addresses a different type of concept learning. When using the Concept Diagram, the emphasis is on analysis of a concept and its component parts. Using the Comparison Table allows focus on clustering of characteristics of concepts into higher order categories to facilitate compare-and-contrast thinking. In the ORDER Strategy, the concept is considered as it is applied to one of its contexts. No one of these approaches is always "the correct approach," rather, they serve the teacher as she or he decides how best to help the students grow in their content area knowledge.

The fact that effective approaches to teaching content area concepts and processes for learning those concepts exist, such as the three highlighted in this article, does not mean that effective integration is easily accomplished. The institutional and motivational barriers to content area teachers taking increased responsibility for guiding the processes of learning in academically diverse classrooms are significant (Fuchs, Fuchs, Hamlett, Phillips, & Karns, 1995; Roberts & Mather, 1995; Schumm, Vaughn, Gordon, & Rothlein, 1994). Teaching practices that make no attempt to bridge process and content learning, however, will continue to be of moderate effectiveness for nurturing independent learners. The challenge to educators is to continue to investigate approaches such as those featured here and their effective integration into content area teaching, and thus content area learning.

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