

17

Structured Discovery



Standard #7: Planning for Instruction
Standard #8: Instructional Strategies

LEARNING OBJECTIVES

After reading this chapter, you should be able to:

- 17-1** Summarize the fundamental ideas of the structured discovery approach.
- 17-2** Describe the teaching events that are part of structured discovery lessons.
- 17-3** List common uses of the structured discovery model of instruction.
- 17-4** Describe the key planning considerations for structured discovery lessons.

CHAPTER OUTLINE

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| 17-1 THE FUNDAMENTALS OF THE STRUCTURED DISCOVERY LESSON MODEL | 17-4c Stating the Objective to Students |
| 17-2 TEACHING EVENTS IN STRUCTURED DISCOVERY | 17-4d Setting Up the Discovery |
| 17-3 USES OF STRUCTURED DISCOVERY | 17-4e Monitoring the Discovery |
| 17-4 KEY PLANNING CONSIDERATIONS | 17-4f Reviewing the Discovery |
| 17-4a Content Analysis | 17-4g Supervised Practice |
| 17-4b Writing the Objective | 17-4h Behavior Expectations |



Introduction

Structured discovery is the third lesson model we have included in this book. It is a model in which students “discover” information rather than having the teacher tell it to them. This discovery is planned, however. The idea is for students to discover the lesson objective predetermined by the teacher. Students are led to the specific objective in a convergent rather than divergent manner. Structured discovery uses an inductive approach to learning; the direct instruction model uses a deductive approach. In a **deductive learning approach**, the

teacher explicitly tells the students the rule or other generalization she wants them to learn and shows them examples. She then asks the students to practice applying the rule to new examples. The **inductive learning approach** turns this around. Students explore examples in order to come up with the rule themselves; then they apply the discovered rule to new examples. The structured discovery model will help round out a basic repertoire of skills needed to plan different types of lessons. See Figure 17.1.

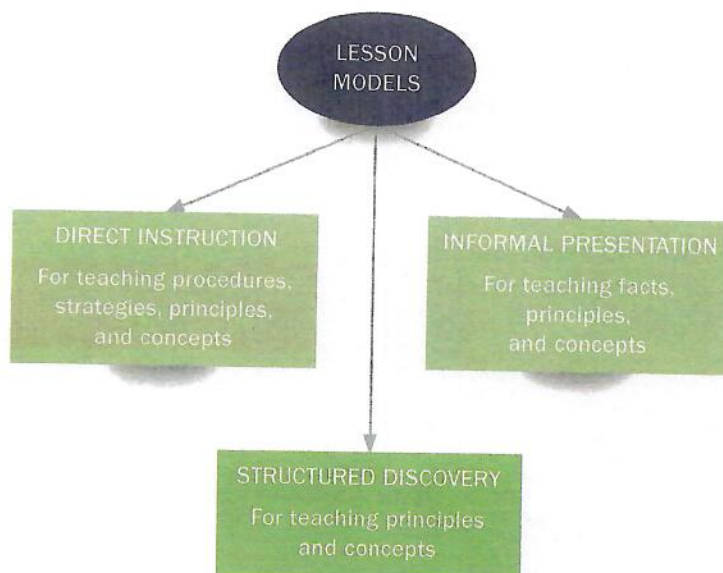
17-1 The Fundamentals of the Structured Discovery Lesson Model

The structured discovery model has similarities and differences with other models and methods of instruction. Examining each of these carefully will help you identify the essential attributes of structured discovery.

Structured discovery lessons are similar to direct instruction lessons in a number of ways. The purpose of both lesson models is for students to reach a specific learning objective. The major difference between them is the route that students take to reach the objective. The lesson body is where the most significant differences between the two models are

found. In the structured discovery lesson, the teacher prepares the students for the discovery by presenting examples, and perhaps nonexamples, for them to explore. In a direct instruction lesson body, the teacher is explaining and showing the information that the students need to know to reach the objective. The rest of the lesson body is quite similar in both types of lessons. In a structured discovery lesson, the teacher follows the students’ discovery by summarizing, reviewing, and providing additional practice with the new learning (supervised practice). These same methods also follow the show and tell (or explain and demonstrate) section in a direct instruction lesson (see the lesson body of Teaching Plan 10 in the Appendix to see how these approaches differ).

Figure 17.1 Types of Lesson Models



Structured discovery is often confused with the inquiry method or model. Students “discover” in both the structured discovery and inquiry models, but the purpose and outcome of the discovery vary significantly. The major goal of structured discovery is for students to learn academic content, whereas the major goal of inquiry is for students to experience and practice the actual process of making a discovery (Arends 2012). For example, students may conduct air-pressure experiments in order to discover facts about air pressure. On the other hand, the goal may be for students to practice making accurate scientific observations. In this case, magnetism, or some topic other than air pressure, might have been selected because the topic is solely a vehicle for having students practice observing. In the first example, the teacher would write a short-term objective that focuses on knowledge of air pressure. In the second case, the teacher would write a long-term objective for the skill of making observations. Therefore, inquiry fits our definition of an activity rather than a lesson.

An understanding of the intent of the structured discovery model lays the foundation for using it successfully. The previous paragraphs have described what structured discovery is and how it compares to other models. The following tells what structured discovery is not. It is not a lesson without purpose or focus. It does not create a setting where students randomly experiment with materials or information. It also is not a time when teachers encourage students to come up with any “creative” idea or conclusion that comes to mind. A teacher would not be successful if students had a great deal of fun “discovering” but did not discover the information needed for the next day’s lesson. Structured discovery is a model that teachers select when they want to teach content knowledge. The lesson process is an added benefit—a secondary objective—not the major one (see Teaching Plans 5 and 6 for examples of structured discovery lessons).

17-2 Teaching Events in Structured Discovery

There are specific teaching events that occur in a structured discovery lesson as teachers lead students toward the lesson objective. (Please see Figure 17.3 for a more detailed description of each component

of this type of lesson.) The following describes the general sequence of these teaching events:

- Teacher tells the students directly what they will be learning and why. When stating the lesson objective and the lesson purpose, the teacher is careful not to give away the discovery.
- Teacher typically presents carefully selected examples (and often nonexamples) of the content and tells students what he wants them to discover (e.g., a definition, a rule, a principle).
- Students, individually or in groups, examine the examples/nonexamples and try to discover the definition or rule while the teacher monitors and guides.
- Teacher involves the students in reviewing the discovery.
- Teacher provides students with supervised and extended practice opportunities in which they test the discovery with new examples.
- Teacher conducts an evaluation following successful practice in which students perform the objective independently and individually.
- The teacher ties the lesson together with a closing.
- During the lesson, the teacher:
 - Uses checks for understanding to make sure every student has discovered the correct information.
 - Keeps students actively engaged by including a variety of active participation strategies, which prevents students from being passive listeners.
 - Provides the students with supports and scaffolds as needed but withdraws those as soon as possible.

Example 17.1 shows a brief lesson outline highlighting examples of the main teaching events in a structured discovery lesson on rounding numbers.

EXAMPLE 17.1: USING STRUCTURED DISCOVERY TO TEACH ROUNDING

Teacher: “You’re going to learn how to round numbers to the nearest ten; this will help you in estimating...”

Teacher: Shows many examples of numbers rounded up and down to the nearest ten (such as 35 → 40, 34 → 30); “Can you

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figure out the rule for rounding to the nearest ten?"

Students: Study the examples and write the rule they discover (while teacher monitors and guides).

Teacher: Asks students to share their discoveries and makes sure everyone understands the correct rule. ("So we've discovered that when the digit in the ones place is 5 or higher...")

Students: Practice the rule by applying it to new example problems (such as $23 \rightarrow ?$).

Teacher: Evaluates by giving students still more example problems and having them solve them individually and independently.

Teacher: Closes by giving students an estimating (by rounding) problem to do in their heads.

EXAMPLE 17.2: TOPICS THAT COULD BE TAUGHT USING THE STRUCTURED DISCOVERY MODEL

- Definition of *peninsula*
- Rules for alphabetizing
- What makes a myth
- When you should call 9-1-1
- Typical locations of cities
- Order of operations in arithmetic

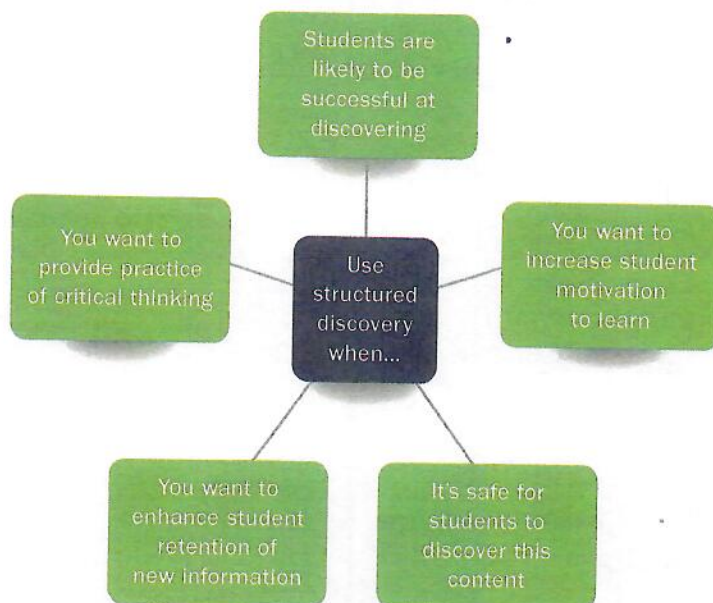
Teachers have several reasons for selecting a structured discovery lesson to teach particular academic content (see Figure 17.2). One reason is increased student motivation. The challenge of "making the discovery" can create an exciting situation for the students and, therefore, may hold their attention more readily and result in more participation. When preparing to teach a topic that students may find uninteresting (e.g., a grammar rule), consider using a structured discovery approach. It might provide just the right motivation.

Structured discovery lessons may also be selected because they promote higher-level or critical thinking skills. All students need opportunities to develop their ability to reason and solve problems. Structured discovery lessons are one way to provide this practice.

17-3 Uses of Structured Discovery

The primary objective in a structured discovery lesson is always a short-term objective. Teachers may choose to use this model for teaching principles or concepts in any content area. Some examples are found in Example 17.2.

Figure 17.2 When to Use Structured Discovery



Note that, in addition to the primary short-term academic objective in the lesson plan, you may wish to include a long-term objective that addresses critical thinking skills such as problem-solving, analyzing, asking relevant questions, or drawing conclusions.

A third reason to use a structured discovery lesson is to enhance retention. Students may be more apt to recall what they learned when they have been given the opportunity to figure out something for themselves. The active involvement in the learning can sometimes make an impression that will not soon be forgotten.

A structured discovery lesson is a valuable teaching tool, but it is not always appropriate. This type of lesson should obviously never be used when the safety of students is an issue. It would not make sense, for instance, to have students discover how to use a Bunsen burner safely or how to effectively break a fall from a balance beam. Additionally, this type of lesson would not be used when damage to materials or equipment may result. For example, it would be inappropriate for students to discover how to turn off a computer. Issues of safety must always be factored in when selecting topics for structured discovery lessons.

A structured discovery lesson should also not be used when it is likely that students will fail. It would not make much sense, for example, to have students discover how to solve long division problems. It is fairly predictable that they would flounder in failure as they repeatedly practiced the wrong way to compute the long division problems. It may make sense, however, to have them discover math concepts such as “division.” A structured discovery lesson also would not be a good choice when the time involved in making the discovery outweighs the benefit of the discovery itself. It may be possible, for instance, for students to eventually discover how to solve long division problems. However, the time it would take to make such a discovery would decrease the value of making the discovery. A thorough content analysis can help determine when a structured discovery lesson would be a good choice. Using some good common sense will help here as well.

17-4 Key Planning Considerations

Figure 17.3 provides a summary of the components and key content to be included in a structured discovery lesson. Some of the components are discussed in more detail here. Structured discovery

lessons require very careful planning to help ensure that students will learn accurate information. These lessons have a good possibility of resulting in student confusion so more planning, rather than less, is the standard. It is especially important to consider the components detailed in Sections 17-4a through 17-4h.

17-4a Content Analysis

Structured discovery lessons can be used to teach a variety of types of content. Therefore, the content analysis of this lesson will vary. If the objective is for students to discover a concept, write a concept analysis. If students are to discover a principle, include a clearly stated principle statement. See Figure 17.4. Clear, complete planning of the content analysis to be used will help ensure that students reach the objective planned. This component is key in a structured discovery lesson.

Assessing Prerequisite Skills and Knowledge

Lesson readiness can be determined in two steps. First, it is necessary to analyze the prerequisite skills or knowledge needed to be successful in the current lesson. Second, there must be an assessment as to whether the students have the prerequisite skills or knowledge. For example, you plan a structured discovery lesson on adjectives. You know that students must be able to identify nouns in order to understand adjectives. Therefore, you test your students on noun identification.

Gathering preassessment information can be either fairly simple (correcting papers from yesterday’s assignment) or more complicated (writing and administering a formal pretest). However, individual student understanding must be assessed regardless.

17-4b Writing the Objective

The short-term objective written for the structured discovery lesson is no different from an objective written for lessons using other models. The important thing to remember about structured discovery objectives is how they should *not* be written. They should not, for example, say something like, “Students will discover. . .” or “Students will gain experience. . .” Objectives for all lessons must state

Figure 17.5 In the Body of a Structured Discovery Lesson

17-4f Reviewing the Discovery

One of the tricky parts of a structured discovery lesson is determining whether all of the students have really discovered what you had intended. The teacher must take an active role in helping students draw correct conclusions before the end of the discovery part of the lesson. When it appears that the majority of the students have made the desired discovery, the teacher hears from the students about the discovery they made. She typically involves students in discussing and comparing results and coming up with a rule, principle, or concept definition that works and that all can agree on. By **reviewing the discovery** in this way, the teacher can see if each student “gets it.” If not, the teacher will need to correct any misapprehensions. Be sure to use effective checks for understanding that will allow you to tell if *every* student understands (such as asking students to identify or produce new examples).

17-4g Supervised Practice

Testing the discovery and applying it accurately is the students’ next task. Students need to practice the new learning with the teacher’s guidance. The teacher provides new examples so students can try out the discovery, check that it does in fact work, and become skilled at using it correctly. It is very important to remember that the part of the

lesson where the students “discover” is not supervised practice. For example, after the students have discovered principles of air pressure, you would want to provide new problems or demonstrations that would allow them to apply the principles they have learned. This application is the supervised practice portion of the lesson. As students practice, you must monitor to be sure they are using the discovered information accurately. Figure 17.5 summarizes the parts of the body of a structured discovery lesson.

17-4h Behavior Expectations

Students often work together with partners or in small groups during the discovery portion of the structured discovery lesson. Remember that students may need to be taught or reminded of specific behaviors necessary for working successfully with others. When lessons involve using or sharing materials or equipment, you must address behavioral expectations as well. This will help ensure that everyone is able to participate and can do so safely. You may also need to consider students’ tolerance for working through feelings of frustration and confusion because the probability of this happening is greater in this type of lesson. (See Chapter 8 for more information on planning partner and small-group work.)

Summary

The structured discovery model is another useful tool for teachers to have in their repertoire of methods and strategies. In this instructional approach, the teacher leads the students to a preplanned discovery described in the lesson objective. In the direct instruction and the informal presentation models, the teacher begins by telling the students

the lesson content (e.g., the definition of *proper noun*). In the structured discovery model, the teacher begins by showing examples and nonexamples and asks students to figure out the definition, rule, principle, and so on. This model doesn’t work for all content, but it can be motivating for students and can promote critical thinking skills.