

USING INSTRUCTIONAL STRATEGIES IN UNIT PLANNING

The strategies presented in Chapters 2 through 11 can be used at any time during a unit of instruction. However, in general some strategies are more useful at the beginning of a unit, while others are best used during a unit or at the end of a unit. One way, then, to think about using the strategies reviewed in this guidebook is to organize them into the following categories:

- Strategies to use at the beginning of a unit
- Strategies to use during a unit, including
 - strategies for monitoring and reaching learning goals
 - strategies for introducing new knowledge
 - strategies for knowledge being reviewed or applied
- Strategies to use at the end of a unit

This chapter exemplifies how a teacher might use these strategies during a unit on weather.

AT THE BEGINNING OF A UNIT OF INSTRUCTION

A unit of instruction should begin with at least two distinct activities:

- Identify clear learning goals. (See Chapter 8.)
- Allow students to identify and record personal learning goals. (See Chapter 8.)

To illustrate, consider Mrs. Becker, a sixth grade teacher who is teaching a unit on weather. She begins the unit by presenting students with six learning goals. Five of these deal with science; one deals with communication skills:

- *Learning Goal 1: Science* — We will learn that weather includes the elements of temperature, humidity, cloudiness, wind, pressure, and precipitation.
- *Learning Goal 2: Science* — We will learn that there are different types of weather systems that the Earth experiences (e.g., hurricanes, tornadoes, and monsoons). We also will learn how the elements of weather interact to cause each system.
- *Learning Goal 3: Science* — We will learn about the composition and structure of the Earth's atmosphere (e.g., the temperature and pressure in different layers of the atmosphere, the circulation of air masses).

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- *Learning Goal 4: Science* — We will learn about the ways in which clouds affect weather and climate (e.g., through precipitation, reflection of light from the sun, retention of heat energy emitted from the Earth’s surface).
- *Learning Goal 5: Scientific Inquiry* — We will learn how to keep systematic records of temperature, precipitation, cloud cover, and other weather information to formulate hypotheses.
- *Learning Goal 6: Communication* — We will learn how to write compositions that reflect your knowledge about a topic. We also will learn how to organize and present information in a logical way.

Mrs. Becker gives a copy of the goals to each student and posts them in the room in a place that is clearly visible to all students. She then asks students to write two or three *personal* learning goals based on the goals she gave them. She explains that these personal goals can be a bit more specific than the learning goals she identified, for example, “I want to know why there are hurricanes in Florida and not in California,” “I want to learn to write longer compositions,” or “I want to learn how to formulate hypotheses.” After students identify their personal goals, Mrs. Becker asks students to pair up to do the following:

- Share their goals with one another.
- Set up a learning journal in which to write questions about a lesson, areas of confusion, or assignments they are having difficulty completing.

DURING A UNIT OF INSTRUCTION

During a unit of instruction, three things typically occur: teachers introduce knowledge; teachers review and help students practice and apply knowledge; and students continually monitor how well they are progressing on identified learning goals. Specific instructional strategies are useful for each aspect of the unit:

- Introducing new knowledge
 - Have students identify what they already know about the topic. (See Chapter 10.)
 - Provide students with ways of thinking about the topic in advance. (See Chapter 10.)
 - Have students make inferences about new knowledge. (See Chapter 10.)
 - Have students keep notes as knowledge is introduced. (See Chapter 3.)
 - Have students represent the knowledge in their notebooks in linguistic and nonlinguistic ways. (See Chapters 3 and 6.)
 - Have students work in cooperative groups. (See Chapter 7.)
 - Have students identify similarities and differences between items. (See Chapter 2.)
- Reviewing, applying, and practicing knowledge
 - Assign homework that requires students to review, apply, and practice what they have

- learned. (See Chapter 5.)
- Engage students in projects that involve generating and testing hypotheses. (See Chapter 9.)
- Have students revise the linguistic and nonlinguistic representations of knowledge in their notebooks as they refine their understanding. (See Chapters 3 and 6.)
- Monitoring learning goals
 - Provide students with feedback and help them assess their progress. (See Chapter 8.)
 - Provide recognition of legitimate progress toward goals. (See Chapter 4.)

Introducing Knowledge

A number of instructional strategies are very effective when teachers are introducing students to knowledge:

- Have students identify what they already know about the topic. (See Chapter 10.)
- Provide students with ways of thinking about the topic in advance. (See Chapter 10.)
- Have students make inferences about new knowledge. (See Chapter 10.)
- Have students keep notes as knowledge is introduced. (See Chapter 3.)
- Have students represent the knowledge in their notebooks in linguistic and nonlinguistic ways. (See Chapters 3 and 6.)
- Have students work in cooperative groups. (See Chapter 7.)
- Have students identify similarities and differences between items. (See Chapter 2.)

As a way of introducing new information about hurricanes, Mrs. Becker distributes two 3 x 5 index cards to each student. She asks students to write a phrase or sentence on one card that describes something they already know about hurricanes and their effects. Mrs. Becker collects the completed cards and asks for two student volunteers to write the responses on the board.

After reviewing the responses as a class, students discover that collectively they know that hurricanes involve very strong winds, that they cause a lot of damage, and that they often are represented on weather maps as swirling circles. Then Mrs. Becker asks students to write a statement on the second card that describes what they would like to learn about hurricanes.

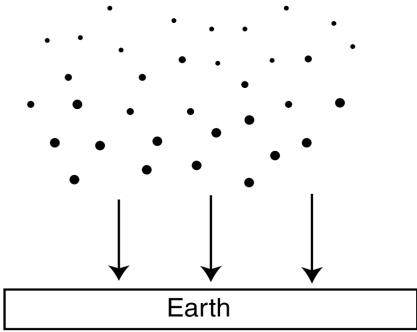
Mrs. Becker shows a videotape about Hurricane Andrew. The videotape covers new information about hurricanes in general and about Hurricane Andrew specifically. Before the videotape starts, Mrs. Becker asks students to make inferences about hurricanes based on what they already know. To stimulate students' thinking, Mrs. Becker asks them a series of questions, such as "During what season of the year do hurricanes usually happen?" "How long do they usually last?" "What changes usually occur as a result of a hurricane?" She also asks students to keep in mind what they want to learn about hurricanes as they watch the videotape.

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After students watch the videotape, Mrs. Becker asks them to reflect on what they have learned by making notes in their learning journals. At the end of class, she gives students a reading assignment that explains how weather elements interact to create hurricanes, tornadoes, and monsoons. She asks students to use their journals to record their observations, questions, and any new connections they have made from the reading.

Because new information is often very detailed, Mrs. Becker encourages students to use drawings, pictures, and other graphic representations to complement their written notes. For example, some students divide the page in half and draw symbols and pictures on the right-hand side of the page. A sample of a student's notes about air pressure appears in Illustration 1.

ILLUSTRATION 1: NOTE TAKING USING GRAPHIC REPRESENTATIONS *air pressure*

<p>Air pressure = the amount of force exerted on an area (Force of air ÷ area of surface)</p> <p>Weight of column of air ÷ area of column</p> <p>Gravity -</p> <ul style="list-style-type: none">• Holds air to the earth• A strong, invisible force - pulls air down. Gives the air molecules weight.• This weight exerts a force on the earth	<p>air + gravity = AP</p> 
<p>There would be no air pressure without gravity. Gravity causes the air to have weight and to press on the earth.</p>	

The next day, Mrs. Becker divides the class into teams of three. Each person is assigned a topic about either hurricanes, tornados, or monsoons. Using classroom resources, each person finds information about specific effects their phenomenon has on the environment. Together, the group of three creates a poster that shows the similarities and differences between and among the three phenomena. When the groups are finished, each group exchanges its poster with another group and gives feedback to one another. Finally, Mrs. Becker displays the completed posters on the walls of the classroom.

Reviewing, Applying, and Practicing Knowledge

Once knowledge has been introduced, declarative knowledge must be reviewed and applied, and procedural knowledge must be practiced. There are a number of instructional strategies that a teacher might engage students in to help them deepen their knowledge:

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- Assign homework that requires students to review, apply, and practice what they have learned. (See Chapter 5.)
- Engage students in projects that involve generating and testing hypotheses. (See Chapter 9.)
- Have students revise the linguistic and nonlinguistic representations of knowledge in their notebooks as they refine their understanding. (See Chapters 3 and 6.)

As the unit progresses, Mrs. Becker assigns different types of homework assignments, depending on the type of knowledge being reinforced. For example, she asks students to use the Internet to keep a daily record for two weeks of temperature, precipitation, cloud cover, and other weather information for a city of their choice. Using this skill each day gives students the practice they need to become proficient in keeping clear, organized, and complete records. They also become more skilled at using the Internet as a resource for finding information.

After students have kept records for the two-week period, Mrs. Becker assigns a short project to help them apply their knowledge by making and testing hypotheses. She asks students to predict what the weather will be the next day in the city for which they kept records. Students write an explanation of the basis for their prediction. The next day they use the Internet to check their predictions, then write an explanation of how close their prediction was, including any reasons for inaccuracies in their prediction.

Near the end of the unit, Mrs. Becker assigns a project in which students further apply and review their knowledge about the various weather systems studied during the unit. This application of knowledge is time consuming, so Mrs. Becker structures opportunities for cooperative learning, as well as time for students to work alone or conference with her. She asks students to work in groups and choose one of the weather systems (hurricane, tornado, monsoon) and use historical data about the system available on the Internet (e.g., Hurricane Agnes of 1972) to track its progress for several days. As students work on the assignment, they periodically review the notes they made earlier in the unit and make revisions, if necessary, to reflect their new understanding of the topic.

After students are familiar with the system they have been studying, Mrs. Becker asks them to consider how changing one element of the system — for example, ocean's temperature near the Florida coast or the approach of a strong cold front — might have affected the amount of damage done by the storm. Individually, students write an hypothesis about what might have happened as a result of the change. They then work in groups and discuss their hypotheses, "testing" them by considering the effects of the change on the system. Students modify their hypotheses when necessary and make suggestions to one another about the "testing" phase of the systems analysis. To fulfill the communication aspect of the project, Mrs. Becker asked students to complete the following writing assignment:

Write a weather report for the evening news that describes the new scenario. Include all the parts of your system, and explain how those parts are interacting. Use the correct weather terms, such as "cold front" or "low pressure system," but also be sure that people watching the news will be able to understand your weather report.

Monitoring Learning Goals

Monitoring progress toward goals happens throughout the course of introducing and reviewing knowledge. Monitoring progress reinforces the importance of setting goals, students' sense of accomplishment, and the goal itself. The following strategies give students more information about their learning and contribute to their development as lifelong learners:

- Provide students with feedback and help them assess their progress. (See Chapter 8.)
- Provide recognition of legitimate progress toward goals. (See Chapter 4.)

Periodically throughout the unit, Mrs. Becker asks students to make notes of their progress on the six learning goals, using a worksheet like that in Illustration 2. The worksheet is designed so students can make rate their progress on each goal and make comments. To help students do this, Mrs. Becker gives them rubrics to assess their understanding and skill, explaining that the rubrics are a means of giving them feedback about their progress. As she reviews the rubrics with students, she clarifies what each score means in terms of the six learning goals. She periodically meets with students to give them individualized feedback, recognize specific accomplishments, and clarify misconceptions.

Sample Rubric for Assessing Understanding (Goals 1–4)

- | | |
|---|---|
| 4 | Advanced performance: I completely understand the important information related to the topic. I give detailed examples that show I understand the information. I also explain complex relationships and distinctions between concepts. |
| 3 | Proficient performance: I completely understand the important information related to the topic. I give detailed examples that show I understand the information. |
| 2 | Basic performance: I understand some of the important information related to the topic, but I can't give detailed examples that show I understand the information. |
| 1 | Novice performance: I understand very little of the important information related to the topic. |

Sample Rubric for Assessing Skill Development (Goals 5 and 6)

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|---|--|
| 4 | Advanced performance: I do the major processes and skills that are important to the procedure easily and automatically. |
| 3 | Proficient performance: I do the major processes and skills that are important to the procedure without making any significant errors, but I don't necessarily do them automatically. |
| 2 | Basic performance: I make a number of errors when I do the major processes and skills that are important to the procedure, but I accomplish the purpose of the procedure. |
| 1 | Novice performance: I make so many errors when I do the major process and skills that are important to the procedure that I don't accomplish the purpose of the procedure. |

ILLUSTRATION 2: STUDENT SELF-ASSESSMENT WORKSHEET

Student: <i>Brian Bahney</i>	Self-Assessment			Unit: <i>Weather</i>
PERSONAL GOALS <i>(A) Learn whether hurricanes are really just big, wide tornadoes.</i> <i>(B) Learn what caused the big floods in the Midwest in the recent past.</i>	1	2	3	
1 - Comments: <i>Hurricanes & tornadoes are dangerous, but how they're formed is exciting.</i>				
2 - Comments:				
3 - Comments:				
Goal 1: ELEMENTS OF WEATHER	3			
1 - Comments: <i>One element I know about is "precipitation." Others I'm not sure about. What about frost?</i>				
2 - Comments:				
3 - Comments:				
Goal 2: WEATHER SYSTEMS	2			
1 - Comments: <i>I don't fully understand the role that temperature plays in forming tornadoes.</i>				
2 - Comments:				
3 - Comments:				
Goal 3: EARTH'S ATMOSPHERE	4			
1 - Comments: <i>I thought this was easy.</i>				
2 - Comments:				
3 - Comments:				
Goal 4: CLOUDS	3			
1 - Comments: <i>I see clouds much differently now!</i>				
2 - Comments:				
3 - Comments:				
Goal 5: SCIENTIFIC INQUIRY	3			
1 - Comments: <i>Keeping records is easy, but I have trouble identifying a hypothesis to test.</i>				
2 - Comments:				
3 - Comments:				
Goal 6: COMMUNICATION	4			
1 - Comments: <i>I feel good about my writing and how it's improved.</i>				
2 - Comments:				
3 - Comments:				

AT THE END OF A UNIT OF INSTRUCTION

Teachers can use specific strategies and activities to bring a unit to completion in a way that enhances the learning process for every student:

- Provide students with clear assessments of their progress on each learning goal. (See Chapters 4 and 8.)
- Have students assess themselves on each learning goal and compare these assessments with those of the teacher. (See Chapter 8.)
- Have students articulate what they have learned about the content and about themselves as learners. (See Chapter 8.)

Mrs. Becker has provided multiple and varied opportunities to assess students on their progress toward each of the learning goals. In addition, Mrs. Becker schedules an assessment conference with each student toward the end of the weather unit. During the conference, students give Mrs. Becker their own assessments of how well they think they have met each of the learning goals. Mrs. Becker compares students' self-assessments to her assessment of their progress, which she recorded in her grade book over the course of the unit. Mrs. Becker and each student thoroughly discuss any gaps between her evaluation and the student's self-assessment. She asks students to review the concepts and information they understand and talk about what they have learned about themselves as learners. She validates each student's performance of skills and offers positive comments or specific suggestions that might enhance the student's learning in the future. In short, Mrs. Becker uses the assessment conference at the end of the unit as an opportunity to reinforce each student's efforts during the unit and to validate his or her achievements and sense of accomplishment.