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THE NATIONAL RESEARCH CENTER ON THE GIFTED AND TALENTED

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Teachers' Guide for the Explicit Teaching of Thinking Skills

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Overview of the *Teachers' Guide for the Explicit Teaching of Thinking Skills*

Cause and Effect

Making a Decision

Comparing and Contrasting

Classifying

Making Observations

Planning

Predicting

The *Teachers' Guide for the Explicit Teaching of Thinking Skills* provides a detailed approach to teaching and learning 7 discrete skills that can be applied to any content area. The skills are:

- cause and effect
- decision making
- comparing and contrasting
- classifying
- making observations
- planning
- predicting

Background information related to each thinking skill is presented to the teacher, including definition, purpose, examples, prerequisites, and a strategy for use. The 4-phase model follows:

Phase One: Introducing the Unit to Students
Phase Two: Teaching the Guided Practice Lessons With Familiar Content
Phase Three: Guided Practice, Single Skill, New Real World Content
Phase Four: Prompted Transfer to Current Academic Curriculum

The model moves students through a learning cycle from familiarity with the discrete skills to applications in familiar and unfamiliar content and ends with the transfer of the skills to current academic content. Several practice activities and examples accompany each phase. Graphic organizers help students practice the skills using a series of steps. Teachers are encouraged to use the practice activities as prototypes for creating their own activities to reflect their curriculum.

Appendix A: Instructional Methods provides additional information for teachers on the each phase of the thinking skills model. There are also sample debriefing questions and coaching and feedback tips to help students understand their thought processes, think about prior knowledge, and apply the thinking skill to new information.

I. Determining Cause and Effect: Background Information for the Teacher

Definition of the Skill

The activities in this unit have been designed to help students of all achievement levels improve their skill at determining cause and effect. For the purposes of this unit, determining cause and effect is defined as the ability to identify the varied and most powerful reasons for, or results of, a given event or previous action. It describes the relationship between two or more events in which one event is the reason another event occurred. Multiple causes and/or multiple effects may be identified for any situation. Some causes or effects are more important or more powerful than others.

Purposes for This Skill

The skill of determining cause and effect can be used in any academic area, career field, or in one's personal life. Usually people using this skill are trying to find out why something happened or what the consequences of a event may be. They are trying to determine the nature of the relationships between events in an effort to explain why something happened so they can make it happen again, or avoid a situation that is not desirable. Determining cause and effect requires the use of tacit knowledge and previously learned information. It can guide the thinker to specific types of research to help identify the most powerful causes or effects.

Examples of This Skill

Examples of this skill include the following:

1. homeowners who need to find the cause of a wet basement floor;
2. auto mechanics who are looking for the cause of an unusual sound in an engine;
3. students who are considering the effects of the use of microwave ovens in homes;
4. teachers who are looking for the effects of a new hands-on curriculum in science; or
5. store owners who have hired an advertising firm to evaluate the effects of a new advertising strategy.

Prerequisites for Using This Skill

For students to use the skill of determining cause and effect, they must do the following:

1. identify the event or action to be analyzed;
2. determine whether it is more important to find the causes or effects of this situation;

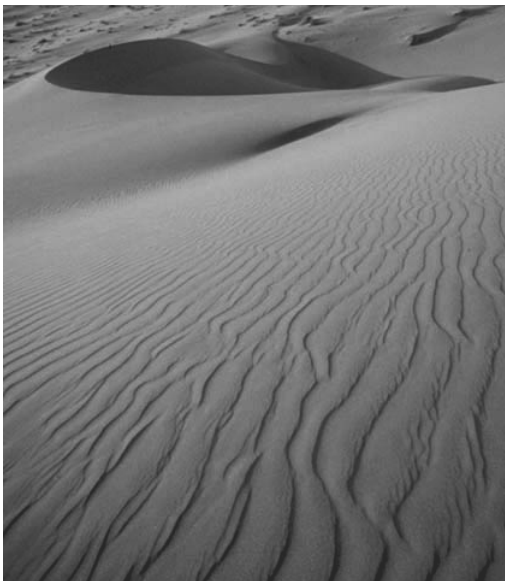
3. identify actions or events related to the event in question;
4. use appropriate information gathering techniques to consider all possible causes or effects; and
5. using the data as evidence, determine which causes or effects are the most likely or powerful.

If students have difficulty with any or all of these prerequisites, they are probably novices with this skill and it is likely that they will need explicit instruction from the teacher to improve their ability to determine cause and effect. It has been our experience that many students have difficulty with this skill, not because they cannot select possible causes and effects, but because they are unable to determine which of them are the most likely or most powerful, or are not aware of their purpose for determining cause and effect. When this happens, students do not attend to the most important factors, actions, or events that would normally guide the thinking process of a more expert thinker and their inferences or decisions suffer as a result. At other times, students may have difficulty with this skill because their thinking may be clouded by previous experience or by the shortsighted opinions of others.

Strategy for Determining Cause and Effect

To be good at determining causes and effects, one must identify the event or action to be analyzed and decide whether it is more important to determine the cause or the effect. The identification of related events or actions needs to be undertaken with an open mind. Important causes or effects can be overlooked if all aspects of the situation are not considered.

Effective determination of causes and effects also depends upon some prior knowledge of the content area that is the focus of the analysis. Further research may need to be conducted to fully understand a situation and identify a variety of possible causes or effects.



People who are good at determining cause and effect use a variety of techniques to develop a number of causes or effects. Physical examination of an object may be conducted, careful observations of events or actions carried out, and print material consulted. Surveys, interviews, conferences, repeated observations over time, or experiments or simulations are also excellent ways to gather data to help determine causes and effects.

People who are good at determining causes and effects should make detailed and systematic notes or records about the events, actions, or objects that may be related to the event under analysis. Charts or graphic organizers may be helpful to organize data about the events being classified.

Phase One:
Introducing the Unit to Students

Activity One
Focusing Activity: The Dog Ate It
(15-20 Minutes)

One way of bringing the skill of determining cause and effect to the attention of students is to do the following activity about homework. On the chalkboard write this sentence: Terry did not turn in his homework assignment. Ask students to think of all of the possible reasons for Terry not turning in his homework. Write down the reasons students give to the left of the first statement. When they cannot think of any more reasons, ask them to think of all of the things that might happen because Terry did not turn in his homework assignment. Write these to the right of the first statement.

Explain that the **reasons** Terry did not turn in his homework assignment are all possible **causes**. The things that **might happen** because he did not turn it in are all possible **effects**.

Have students choose one of the causes or effects, write it on the bottom of a sheet of drawing paper, and illustrate it. The papers can be collected and bound into a class book.

Activity Two
Helping Students Understand the Nature of the Skill
(5-10 Minutes)

For the Teacher: Definition for the Skill of Determining Cause and Effect

Determining cause and effect is defined as the ability to identify the varied and most powerful reasons for, or results of, a given event or previous action. It describes the relationship between two or more events in which one event is the reason another event occurred. Causes and effects are traceable and explainable. Multiple causes and/or multiple effects may be identified for any situation. Some causes or effects are more important or more powerful than others.

Student Definition for the Skill of Determining Cause and Effect

Cause and effect is a thinking skill that helps you find the answer to two questions:

1. Why did something happen? (cause)
2. What will be the result(s) if a particular event happens? (effect)

Synonyms for *cause* and *effect* include the following:

Cause:	*reason*	*origin*	*basis*
Effect:	*consequence*	*outcome*	*result*

The Following Examples May Be Shared

A variety of examples might be used by the teacher to explain cause and effect.

1. A grocery store owner wants to know why fewer customers are shopping at her store. (cause)
2. A doctor needs to find out the cause of a child's stomachaches. (cause)
3. A teacher analyzes the effects of a new seating arrangement. (effect)
4. A homeowner wants to know the cause of water dripping from the ceiling in the kitchen of the new house. (cause)
5. A bus driver wants to find out why a new tire is losing air. (cause)
6. A manager at McDonald's determines the effects of showing video movies in the restaurant. (effect)
7. A parent may want to know the cause of cookies disappearing from the cookie jar. (cause)

Activity Three
Skill Rationale
(5-10 Minutes)

Various Purposes for This Skill

The skill of determining cause and effect is used for a variety of purposes. Some of these include the following:

1. to know why an event or action occurred so you can make it happen again;
2. to know why an event or action occurred so you can make sure it does not happen again;
3. to evaluate an event or action;
4. to draw a conclusion;
5. to solve a problem;
6. to predict what may happen;
7. to aid in planning;
8. to understand relationships between events or actions;
9. to trace and analyze chains of events; or
10. to identify the source of a problem.

Relevance of This Skill

It is important to discuss the relevance of this skill to help students understand the benefits of using it effectively. If students are willing to work to improve their ability to determine cause and effect, they will achieve the following:

1. They will be able to make decisions based on observed events proven to be significant to the task at hand.
2. They will be able to avoid situations proven to be disadvantageous.
3. They will be able to understand the chain of related events that causes something to occur.
4. They will be able to make better plans based on related events that have occurred in the past and through experience in identifying effects.
5. They will be better able to see connections between related events.
6. They will be better able to explain the events occurring in their lives.

Consequences of Poor Ability With This Skill

To help students appreciate the negative consequences of poor use of the skill, the teacher can spend time asking students to recall instances when they have failed to use this skill. These stories demonstrate why these persons encountered difficulty when they failed to use the thinking skill. Students might share stories that describe what happened to them when their thinking is less effective.

1. They may base conclusions on events or actions that are unrelated.
   The person, Nasrudin, is a traditional character in the teaching stories of the Sufi tradition. One day he was throwing crumbs around his house.
   "What are you doing?" someone asked him.
   "Keeping the tigers away."
   "But there are no tigers in these parts."
   "That's right. Effective, isn't it?"
   [From Shah, I. (1972). *The exploits of the incomparable Mulla Nasrudin.* New York: Dutton.]
   Many superstitions in folk cultures are derived from believing that two unrelated events are, in fact, related. (For example, walking under a ladder and consequently experiencing "bad luck.")
2. They may repeat mistakes that could have been avoided if causes of the mistake had been effectively identified.
3. They may attribute causation to an event that is not a cause or is not among the most powerful causes because they did not gather enough information or consider different aspects of the situation.
4. Their plans failed because they did not effectively consider the effects of the events they set in motion.
5. They forgot to use measurement devices that would assist in making more accurate determinations of causes or effects.

6. They only looked at prominent events or actions and missed perhaps less prominent, but more significant events or actions.
7. They did not make use of information sources (books, articles, etc.) that could have given examples of similar situations to explain either causes or effects.
8. The cause or effect may not be identifiable.

Activity Four
Explaining the Skill Strategy
(5-10 Minutes)

Skill Strategy for Determining Cause and Effect

To help students understand how to improve their ability to determine cause and effect, teachers might explain the following skill strategy.

1. **Identify** the event or action to be analyzed.
2. **Decide** whether it is more important to find the causes or the effects of this situation.
3. Through a review of the literature written (primary or secondary sources) about the topic and/or through data collection, **derive** multiple and alternative causes or effects.
4. When determining effects, **find** possible relationships and project immediate, short-term and long-term effects.
5. Use your knowledge of the topic to **select** the most likely or most powerful causes or effects.

Activity Five
Explaining the Graphic Organizer
(2-3 Minutes)

Using a Graphic Organizer to Accompany the Skill Strategy

The teacher should show students the relationship between the components of the skill strategy and the parts of the graphic organizer. For determining cause and effect, the event or action under analysis is written inside of a circle. If causes for the event are sought, possible causes are written in smaller circles on the left side of the main circle and connected to the large circle with a line. The effects are placed on the right side of the large circle containing the event under consideration. Causes or effects can be graphically linked to represent sequential relationships.

Explaining the Graphic Organizer

When the skill strategy is followed, students write the event to be analyzed in a circle. The causes or effects are then written in smaller circles that may graphically show the suspected relationships between the event and causes/effects or between several causes/effects.

DETERMINING CAUSE AND EFFECT

Definition: Determining cause and effect is defined as the ability to identify the varied and most powerful reasons for, or results of, a given event or previous action. It describes the relationship between two or more events in which one event is the reason another event occurred. Causes and effects are often logical, traceable and explainable. Multiple causes and/or multiple effects may be identified for any situation. Some causes or effects are more important or more powerful than others.

Steps:

1. Identify Event

Identify the event or action to be analyzed.

2. Decide Purpose

Decide whether it is more important to find the causes or the effects (or both) of this situation.

3. Derive Causes/Effects

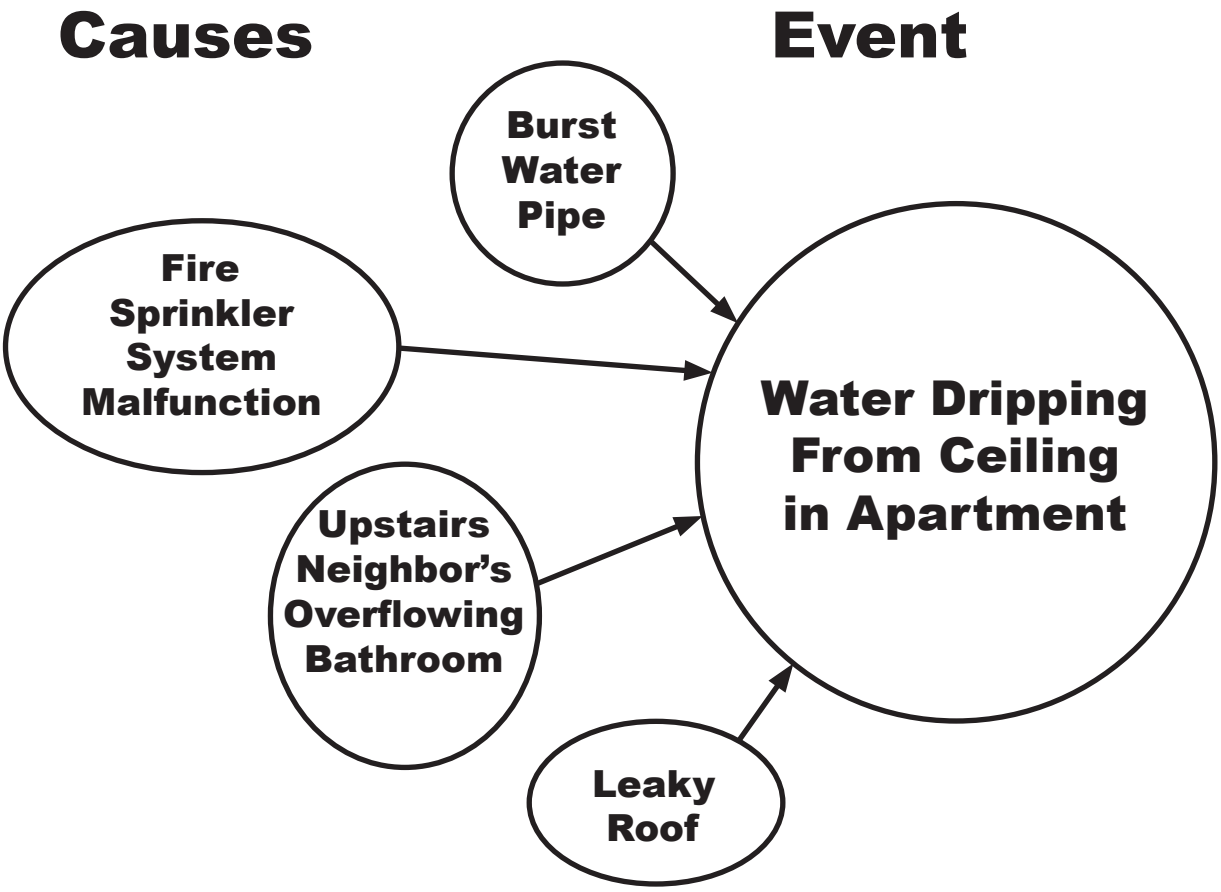
Through a review of the literature written about the topic and/or through data collection, **derive** multiple and alternative causes or effects.

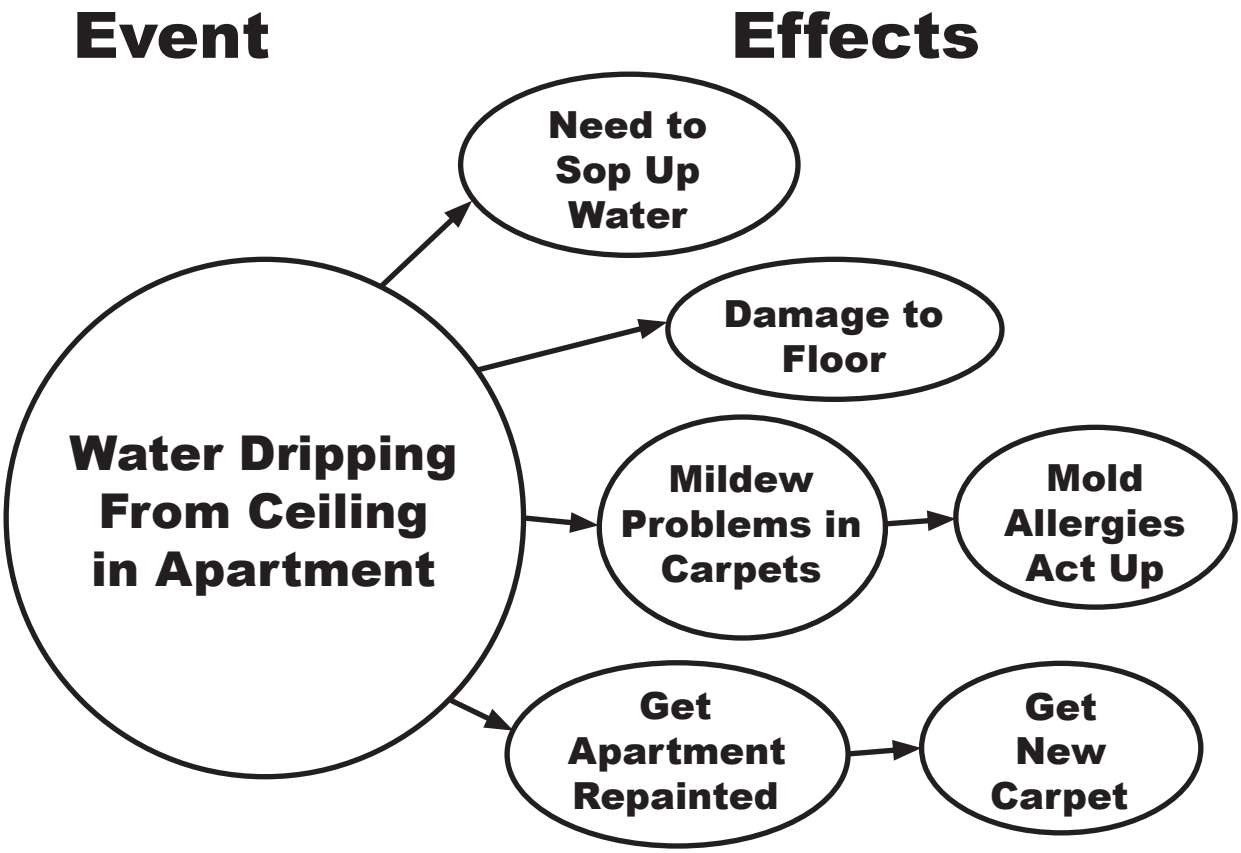
4. Find Relationships

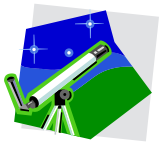
When determining effects, **find** possible relationships and trace them for immediate, short-term and long-term effects.

5. Select Causes/Effects

Use your knowledge of the topic to **select** the most likely or most powerful causes or effects.


Causes
Event
Burst Water Pipe
Fire Sprinkler System Malfunction
Upstairs Neighbor's Overflowing Bathroom
Leaky Roof
Water Dripping From Ceiling in Apartment


Event
Effects
Water Dripping From Ceiling in Apartment
Need to Sop Up Water
Damage to Floor
Mildew Problems in Carpets
Mold Allergies Act Up
Get Apartment Repainted
Get New Carpet



Activity Six
Modeling the Skill Strategy
(5-10 Minutes)

Sample Modeling Activity: Branching Out

Tell students that before they practice this skill and its strategy, you want to model it for them. Tell students that on the way to school you drove by a park and saw some people cutting down a tree and you have been wondering all day about the reasons for the tree to be cut down. On the chalkboard or on a large piece of paper, draw a thick-lined circle on the right side of the available space and label it "event." To the left of the main circle, start writing down the possible reasons why the tree was being cut down. Label this section "causes." Some possible causes could include the following:

1. The tree was diseased and was dying.
2. Something needs to be built for the park where the tree was standing.
3. The wood was going to be used for lumber.
4. It was a mistake.
5. New varieties of trees were going to be planted and replace the old varieties.
6. It really was just getting its branches pruned, not being cut down.

As you write down these possible causes, encourage students to continue brainstorming ideas.

The next step is to select the causes that are most likely or powerful. Tell students that you know that the parks department is really picky about the trees being cut down and that they always have a good reason for doing it. You could then put a diagonal line through the ideas that do not support this information (numbers 3, 5, and probably 2). Talk through an examination of the remaining options. Number 1 is still a possibility. You have heard about tree diseases that have killed many trees, which then need to be cut down. As for number 4, mistakes do happen, but you have never heard of the parks department making mistakes like this before. Number 6 is still a possibility. Tell students that because you were driving, you were not able to get a very close look. You will stop by the park on your way home to get a closer look and see if someone is there to answer some questions. For now, numbers 1 and 6 seem to be the most reasonable causes.

Phase Two:
Teaching the Guided Practice Lessons With Familiar Content

Sample Practice Activities
(10-50 Minutes Each)

1. **Science**
   Cause: Determine the cause for the cracks in the pavement in the parking lot or playground of the school.
   Effect: What are the effects of a much colder than average winter on the plants and trees around the school?

2. **Visual Arts**
   Cause: What are the causes for the different forms of art produced by Pablo Picasso?
   Effect: What would be the effects of not allowing students to use paintbrushes in their art classes?

3. **Math**
   Cause: What are the causes for the invention of the calculator?
   Effect: What are the effects of using thermometers that are able to measure changes in temperature to one thousandths of a degree?

4. **Social Studies**
   Cause: What caused people to move into cities?
   Effect: What are the effects of having a police department in our city?

5. **Language Arts**
   Cause: What are the causes for Karana's survival in *Island of the Blue Dolphin* by Scott O'Dell?
   Effect: What effect did the penguins have on Mr. Popper's family in *Mr. Popper's Penguins* by Richard Atwater & Florence Atwater?

6. **Recreation**
   Cause: What are the causes for changes in basketball rules over the years?
   Effect: For the members of a sports team, what are the effects of winning or losing?

7. **Vocational**
   Cause: What are the reasons a person would want to look for a new job?
   Effect: Determine the effects of robots taking the jobs of people in a factory.

8. **Community**
   Cause: What caused your school to be built where it is?
   Effect: What effects would a new amusement park have on your community?

9. **Consumer**
   Cause: You have eaten the same kind of cereal for your whole life. What would cause you to change?
   Effect: What effects do friendly store clerks have on the customers?

10. **Science**
    Cause: Thunderstorms often occur in the summer. What causes them to happen?
    Effect: What are the effects of a volcanic eruption?

11. **Social Studies**
    Cause: Why did the early settlers of Hartford, Connecticut, choose that particular spot to make a settlement?
    Effect: What are the effects of Interstates 84 and 91 intersecting in downtown Hartford?

12. **Math**
    Cause: What are the causes for an error in someone's mathematical calculation?
    Effect: What are the effects of increased interest rates on a savings account?

13. **Music**
    Cause: What are the causes of the piano having 88 keys?
    Effect: Eighty years ago, if people wanted to hear a band or orchestra play, they had to go to a concert; there were no CDs, tapes, or records. What effects have the inventions of the record player, tape player, and CD player had on how people think about music?

14. **Language Arts**
    Cause: After reading *Nimby* by Jasper Thomkins, determine the causes of Nimby leaving the cloud family.
    Effect: What are the effects of the teacher's new requirement that each student give a book talk every month?

Phase Three:
Guided Practice, Single Skill, New Real World Content

Sample Practice Activities
(10-50 Minutes Each)

1. **Recreation**
   Cause: Many students enjoy collecting baseball or other sport cards. Determine the causes for this popular hobby.
   Effect: Why does your school have a physical education program? What effects do you think the principal and the teachers expect to see because of the physical education program?

2. **Vocational**
   Cause: What reasons do you think teachers have for being a teacher? (or store owner, architect, doctor)
   Effect: Employers often try to make the work place a pleasant place to be. What effects do you think that will have on the employees?

3. **Community**
   Cause: What would cause a community to want to build more recreational facilities?
   Effect: A town decides to keep the public library open every night until 10:00 P.M. What are some of the effects that might occur?

4. **Consumer**
   Cause: Often when someone is going to buy a new car, he/she reads consumer guides and reports. What would cause someone to read the consumer guides?
   Effect: A store in your neighborhood always advertises that they have the lowest prices around. When you shop there, though, they are always out of the items that are supposed to be on sale. What will the effects of your experience be on your shopping habits and the shopping habits of others?

Phase Four:
Prompted Transfer to Current Academic Curriculum

Language Arts

Cause: What might be the causes for Robert O'Brien to have written *Mrs. Frisby and Rats of NIMH*?
Effect: After a unit on biographies of famous people, determine how reading the biographies affected students.

Science

Cause: Determine the most common causes for a species to become endangered.
Effect: What is the effect of shopping centers or housing developments being built on wetlands?

Social Studies

Cause: Why did people leave Connecticut to move west during the middle of the 1800s?
Effect: By the middle of the 1800s, most of the forests in Connecticut were cut down. What were the effects of not having trees for the people of that time?

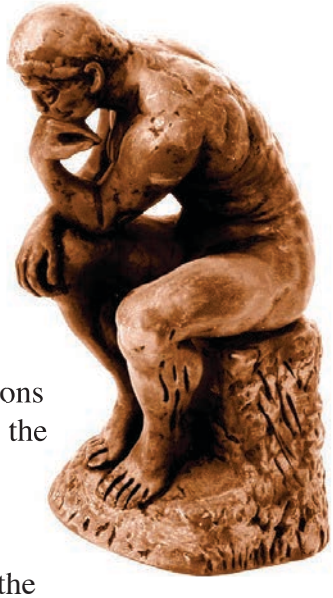
Math

Cause: Why does the United States limit imports from other countries?
Effect: What would be the effect of adding an additional tax of $2.00 to each package of cigarettes sold in the United States?

II. Decision Making: Background Information for the Teacher

Definition of the Skill

The activities in this unit have been designed to help students of all ability levels improve their skill at decision making. For the purposes of this unit, decision making is defined as the ability to arrive at a conclusion after careful consideration of facts or ideas, possible alternatives and criteria, probable consequences, and personal values. Although decision making starts with the awareness that a need exists, it differs from problem solving in that there is no single correct solution.



There are many types of decisions that we face on daily basis. These include personal decisions, professional decisions, and business decisions. A decision always involves two or more competing alternatives of action. One of the more difficult aspects of decision making is that we often have to make decisions with missing data. When this occurs, decision makers must be prepared to make predictions about future events and decide how these future events may influence the decision.

The decision making process begins by identifying a goal and finding the alternatives for reaching this goal. Next, the decision maker lists the considerations or criteria that will be used to evaluate each alternative. Often these considerations will not be of equal importance to the decision maker and therefore should be weighed accordingly. Using these criteria, the decision maker will think carefully about each alternative and determine how well each alternative satisfies the considerations listed. Finally, an overall ranking is determined and the best alternative is identified.

Purposes for This Skill

Decision making can be used in any academic area or career field. The purposes for decision making can be just as varied. Usually, decision makers try to do one of the following:

1. decide between competing alternatives;
2. assess a risk associated with various decisions;
3. select an appropriate action;
4. decide whether or not to pursue a single alternative;
5. compare alternatives; and
6. decide on a future action.

Examples of This Skill

This skill is usually used in conjunction with other thinking skills to arrive at a solution to a problem or to find the best alternative to reach a goal. Examples of this skill include the following:

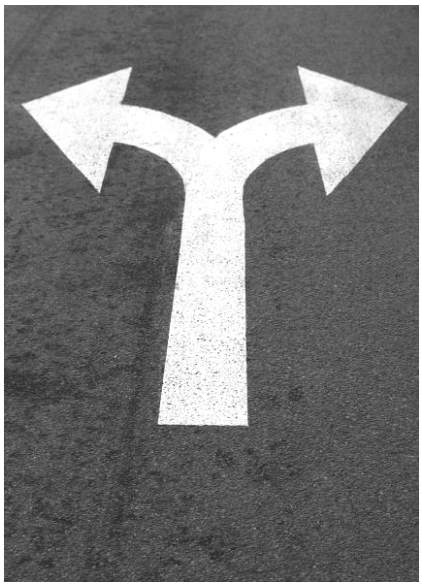
1. students who are selecting a science fair project;
2. parents who are purchasing a new car;
3. businesses that are considering whether to extend their inventory;
4. teachers who are selecting instructional materials to use in their classroom; and
5. college students who are choosing an occupation or field of study.

Prerequisites for Using This Skill

For students to use the skill of decision making, they must do these things:

1. recognize that a need exists;
2. realize that there are several ways to meet this need;
3. identify several alternatives;
4. select objective criteria that will help to select the alternative;
5. rank each alternative and determine how well each alternative satisfies the criteria; and
6. justify the reasons for the choice based on sound criteria.

If students have difficulty with any or all of these prerequisites, it is likely that they will need explicit instruction from the teacher to improve their ability to make a decision. It has been our experience that many students have difficulty with this skill, not because they cannot arrive at a decision, but because they make minor decisions without much thought, such as what to wear, what to eat for breakfast, which pair of jeans to wear to school, or what movie to rent. They often believe that similar thinking can be used to solve complex problems. Rarely do we spend the time discussing with children the process that is used in arriving at these minor decisions and as they move toward making more complex decisions, they lack the understanding of how the decision making process is employed.



At other times, students may have difficulty with this skill because they have incorrectly identified the goal or have formulated the decision in such a narrow fashion that they are not able to brainstorm many solutions or alternatives. When this happens, students may need to be directed in seeking alternative ways of stating the goal and in understanding that different decisions will lead to different solutions.

Another common difficulty with the use of this skill is that students may prematurely select a solution or an alternative idea and consequently refuse to examine data that are inconsistent

with the ideas or solutions they are considering. They must be encouraged to think of the benefits and drawbacks associated with each solution before they make their final decision.

Lastly, decision making always involves uncertainty. Students must carefully consider how their decision will affect other decisions. To do this, students should be encouraged to conduct additional research. Thus, the good decision maker must be able to resist premature closure, research the problem under investigation to understand the benefits and drawbacks of the issue, identify alternatives that seek to answer the need, be willing to remain objective during the ranking of solutions, and consider possible effects of the decision.

Strategy for Making a Decision

To be a good decision maker, one must first realize that a decision needs to be made. This perceptual stage requires students to make a succinct statement of the goal or need that will guide the subsequent brainstorming session to identify all possible alternatives that might answer the need. It is important that students keep an open mind during this alternatives generation stage and refrain from evaluating the alternatives.

The ability to recognize the need to make a decision also depends upon some prior knowledge with the content area that is the focus of the decision. When little information is known about the goal that is under investigation, students may incorrectly identify the need or limit the alternatives they consider because of prejudices or inaccurate data. Since most decisions are multifaceted, there are several alternatives to evaluate, each with advantages and disadvantages. Therefore, an understanding of the content underlying the decision will help students brainstorm possible alternatives, generate considerations or criteria that will help guide the decision making process, and identify relationships among the variables that are related to the decision.

Good decision makers also realize that using criteria to make a decision is a process that enhances a fair-minded evaluation. Therefore, a criterion becomes the standard, rule, test, or means upon which a judgment or decision can be based. Good criteria come from many sources, including accumulated knowledge, values and attitudes, perceptions, feelings, and observations. A good decision maker relies on the criteria for many, varied reasons:

1. to screen ideas or options that may not be worth considering;
2. to help compare all the alternatives;
3. to support selected options;
4. to contrast desires (wants) with demands (needs);
5. to determine the relative strengths and weaknesses of all alternatives using a set of attributes that are common to all options; and
6. to reject options the decision maker does not wish to consider.

Good decision makers will learn to rely on criteria or considerations to help guide the decision or the selection of an alternative. They will recognize that because some important decisions may have an effect on other people, the decision maker will need to carefully consider the outcomes of their decisions prior to taking action. The purpose of using criteria

is to help a decision maker compare and analyze the alternatives, possibilities, or choices and select or modify one option for future development and use. The purpose of criteria selection is not to "kill" ideas, but to look closely and critically at the ideas.

There are many different types of criteria that can be used. The choice of criteria depends on the decision, the quality and quantity of alternatives under consideration, and the consequences or importance of the decision. Good decision makers will consider using criteria that may deal with the following:

1. COST - "Which alternative will cost the least?"
2. TIME - "Which alternative will take the least amount of time to implement?"
3. FEASIBILITY - "Which alternative is most likely to be implemented?"
4. ACCEPTABILITY - "Which alternative is most likely to be accepted by people?"
5. USEFULNESS - "Which alternative is most beneficial in helping us meet our goal?"

Phase One:
Introducing the Unit to Students

Activity One
Focusing Activity: Selecting a New Car
(15-20 Minutes)

One way of impressing on students the importance of making careful decisions is to arrange an opportunity for students to help the teacher "think out loud" through a decision that the teacher is trying to make. The focus of this lesson will be on the introduction of the decision making skill. During this introductory lesson, discuss with students the importance of this skill and how it is used on a daily basis. Emphasize that minor decisions are made without much thought, such as what to wear, what to eat for breakfast, or what movie to rent at the video store. Other decisions are major and have far-reaching effects based on what kind of action is taken. These major decisions might include medical decisions, what kind of career to choose, and where to live. Ask students to share some of the types of decisions that they have recently made.

Tell students that the decision making skill unit will help them increase their ability to make decisions that are defensible, based on what is important to them. Explain that the objective of today's lesson is to participate in a whole-group activity that will help them to work

through the steps in the decision making process. Use the sample focusing lesson below to introduce decision making to your students. Explain to the class that your family has decided to purchase a new vehicle and you would like to have their help in thinking about this decision. Their job or goal is to help you make a decision about the type of vehicle that you might purchase. On the chalkboard or posterboard record the following statement:

Step 1: Identify the goal to be achieved.

I want to make a decision about the type of car to purchase.

Next, have students look at the poster containing several car advertisements you have gathered to help you make the decision. Discuss with them that these are the choices or the alternatives that you wish to select from. On the chalkboard or poster board hang this poster beside the following statement:

Step 2: Identify alternatives for achieving this goal.

Ford Mustang	Jeep Cherokee	Honda Civic	Plymouth Town & Country

Discuss with students that to select one of these vehicles, you need to think carefully about each selection and ask yourself some important questions to arrive at a decision. Ask students for their help in brainstorming questions that might help you make the decision of which vehicle to purchase. Tell students that these questions are called criteria and list them on the chalkboard or poster board under the following statement:

Step 3: Generate criteria or considerations to evaluate each alternative.

1. Which vehicle is large enough for my family?
2. Which vehicle is most comfortable for long distance driving?
3. Which vehicle has enough space to carry large supplies?
4. Which vehicle is the least expensive?

Ask students if there are any other questions or criteria that you should consider to be more important than the others and place a star or number next to these. Indicate the criteria that are most important by listing them under the following statement:

Step 4: Weigh the importance of each criterion.

I need a vehicle that can accommodate my family of 5. "Is this vehicle large enough for my family?" is a very important criterion to consider.

At this next step, share your thinking out loud as you begin numerically ranking the alternatives against the criteria. After you have completed the ranking, sum each row to determine which of the options best meets the generated criteria by circling the highest score.

The grid can be used to record your rankings.

Step 5: Rank the alternatives in terms of the criteria.

	Q1	Q2	Q3	Q4	Total
Ford Mustang	3	4	2	3	12
Jeep Cherokee	2	2	3	1	8
Honda Civic	1	1	1	4	7
Plymouth Town & Country	4	3	4	2	13

1 = bad
2 = average
3 = above average
4 = excellent

Step 6: Identify the best alternative.

The best alternative that will complete the goal is to buy the Plymouth Town & Country.

Once the decision is made, have students generate a series of reasons that could be used to explain why the Plymouth Town & Country was the best decision that could have been made. List their thoughts under the following statement:

Step 7: Be able to explain the reasons for choosing the alternative.

I chose the Plymouth Town & Country because it has enough room for my family. It is also comfortable.

Activity Two
Helping Students Understand the Nature of the Skill
(5-10 Minutes)

For the Teacher: Definition for the Skill of Decision Making

Decision making is the ability to arrive at a solution or select an alternative that will accomplish a goal or answer a need. The purpose of the decision making process is to select the "best alternative" for accomplishing our stated goal. The decision making process begins with the identification of a goal. Then, the thinker generates alternatives for reaching this goal. Next, the decision maker lists the considerations or criteria that will be used to evaluate each alternative. Often these considerations will not be of equal importance to the decision maker and should be weighted accordingly. Next, the decision maker thinks carefully about each alternative and determines how well each alternative satisfies the criteria. An overall ranking is calculated and the best alternative is identified.

One of the more difficult aspects of decision making is that we often have to make decisions with missing information. This fact suggests that the decision maker should also predict future events and consider how the alternative may be affected by these events. Lastly,

effective decision makers also will be prepared to explain the reasons for choosing a particular solution or alternative.

Student Definition for the Skill of Decision Making

Decision making is the ability to choose the best alternative from several choices. To be a good decision maker, you must know how to select the "best alternative" solution by carefully evaluating each option to determine if it will solve a particular problem or help you reach your goal. Good decision makers must be able to identify alternatives, create and weigh criteria, and determine how well each choice, solution, or alternative satisfies the criteria.

Synonyms for *decision making* include the following:

Judging *Determining* *Choosing* *Evaluating*

The Following Examples May Be Shared

Decision making is a skill that we use everyday. Some of our decisions are called "yes or no" decisions. Trying to decide whether or not to attend college is a "yes or no" decision. Deciding if wolves should live in the national parks is a "yes or no" decision. When we make these types of decisions, we need to consider the consequences of what would happen if we decided to go ahead with one of the two choices. It becomes important to look at the good and bad sides of the two choices before a decision is determined. Examples of this type of decision making might include the following:

1. Should we fine people who fail to recycle cans and paper?
2. Should students be allowed to participate in sports activities if their grades are low?
3. Should I purchase a new pair of tennis shoes that are being offered at a discount price?

A second type of decision that people need to learn how to make is called an "options" decision. We make this type of decision when we have lots of choices or alternatives and do not know which choice is the best one. These decisions require us to learn how to judge all of our options to find the best one and to locate information that will help us determine which option will answer a particular need or help us reach a goal. Examples of this type of decision making might include these choices:

1. Which pair of sneakers should you buy?
2. Which college should you attend?
3. What kind of gift will you make or purchase for a family member?
4. How can we decrease vandalism in the neighborhood?
5. How might we decrease the amount of food waste in the cafeteria?

The third type of decision might be called "risky" decisions. These decisions are often made when we do not know all the facts. Doctors often have to make "risky" decisions when they decide the type of medicine to give to a patient when they are not sure what is causing a patient's illness. Jury members have to make "risky" decisions when they decide whether a suspect is guilty or innocent because they may not have all the facts that are necessary, or someone may not be telling the truth during the trial. When you must make a "risky" decision, you need to find out which information is the most reliable and the most important. It is important that you try to make the safest decision possible using valid and reliable data. Examples of this type of decision making might include these questions:

1. Should I lend money to a friend who hopes to purchase a new CD player?
2. Should I befriend someone who has a reputation for selling drugs?
3. What career will help me support my family?
4. What types of medicine should be sold over the counter to stop headache pain?
5. How can we create a safer environment in our neighborhoods?

Activity Three
Skill Rationale
(5-10 Minutes)

Various Purposes for This Skill

We use the skill of decision making for a variety of purposes. The following purposes for decision making can be shared with students (or generated by students during a discussion period):

1. arriving at a solution to a problem;
2. determining a better strategy;
3. selecting from a variety of options;
4. deciding on a future action; and
5. accomplishing a goal.

Relevance of This Skill

To help students appreciate that the skill of decision making is relevant for them, the teacher might discuss the benefits of using this skill. Students can brainstorm in small groups additional reasons why this skill is useful.

If students are willing to work to improve their ability to make decisions, they will accomplish the following:

1. They are likely to use relevant information that may make a decision less risky.
2. They will be more satisfied with their decisions after they have implemented them.
3. They will be more likely to use multiple resources to seek information about a particular alternative or option.
4. They will be more critical and reflective about their choices.
5. They will improve in the ability to analyze and evaluate solutions or options based on sound criteria.
6. They will be more convincing when "selling" a possible solution to a problem because they have carefully considered the consequences of the decision.
7. They will be more effective in stating their reasons for the decision.
8. They will save money and time by not making poor choices.
9. They will not regret their decisions.
10. They will not get in trouble because they made a bad decision.
11. They will be more independent and mature because they can make some decisions without an adult's help.
12. Good decision making will help them take fewer risks.

Consequences of Poor Ability With This Skill

Some students will have difficulty with this skill, while others may be accomplished decision makers, but they lack the disposition to use the skill. To help students appreciate the negative consequences of poor use (or lack of use) of this skill, the teacher can share anecdotes that provide concrete examples of the misuse of this skill. The teacher, as well as students, should be encouraged to share stories that describe what happened to them when these things happened:

1. They failed to consider how the decision would affect other friends.
2. They made a decision based on a "want," not a "need."
3. The choice they made was based on inaccurate information.
4. The decision was made without careful thought as to other options or solutions that might have been possible.
5. They made a decision, but could not explain the reasoning behind the decision.
6. They were dissatisfied with the decision they made.
7. They made a decision that created a larger problem.

Activity Four
Explaining the Skill Strategy
(5-10 Minutes)

Skill Strategy for Making a Decision

To help students understand how to improve their ability to make decisions, teachers might explain the following skill strategy.

1. Identify the **goal** to be achieved.
2. Identify **alternatives** for achieving this goal.

3. Generate **criteria** or considerations to evaluate each alternative. (Criteria should be directional and may deal with consequences.)
4. **Weigh** the importance of each criterion.
5. **Rank** the alternatives in terms of the criteria.
6. Identify the **best** alternative.
7. Explain the **reasons** for choosing the alternative.

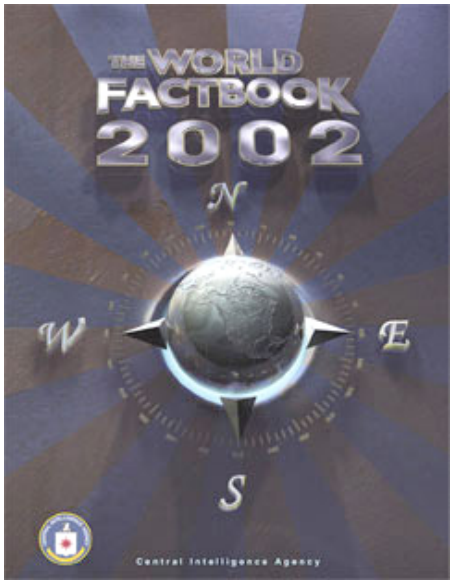
Activity Five
Explaining the Graphic Organizer
(2-3 Minutes)

Using a Graphic Organizer to Accompany the Skill Strategy

The teacher should show students the relationship between the various components of the skill strategy and the various parts of the graphic organizer. The graphic organizer for the decision making process is reprinted on the following page.

Explaining the Graphic Organizer

When used correctly, students will identify the goal to be accomplished or state the decision that has to be made. This action will determine the type of alternatives that will be generated in the second box. Students should be encouraged to seek outside information that will help them generate new solutions and to seek the opinions of others (when appropriate) to generate all possible options. As students reach the third step of the decision making process, they should be encouraged to generate criteria to evaluate the worth of the alternatives they have suggested. A criterion becomes the standard, rule, test, or means upon which the judgment or decision will be based. The criteria will help students decide whether certain alternatives or ideas should be used, modified, or rejected. The criteria may come from many sources, including prior experience, print or human resources, personal values and attitudes, perceptions, feelings, and observations. As students begin to rank the degree to which the alternatives best satisfy the criteria, they will find a grid most useful. In the last box of the graphic organizer, students should be encouraged to justify their selection with written statements that describe how the selected alternative accomplishes the goal or supports the criteria that was used to facilitate our decision.



DECISION MAKING

Definition: Decision making is the ability to choose the best alternative from several choices.

Steps:

1. Identify the Goal

Decide which **goal** you wish to achieve. State the problem you are trying to solve. Identify the decision you are trying to make.

2. Identify Alternatives

Brainstorm options to reach this goal. Identify your **alternatives**.

3. Generate Criteria

Brainstorm **criteria** or considerations to evaluate each choice.

4. Weigh the Criteria

Weigh your considerations to find the most important criteria.

5. Rank the Alternatives

Rank the choice using the criteria. Repeat this ranking for each criteria that is listed.

6. State the Choice

Find the "**best**" choice by adding the ratings.

7. Explain the Reasons

Explain the **reasons** for choosing the alternatives. Explain how the choice meets the criteria.

Graphic Organizer
Decision Making

Identify the **goal** to be achieved.

_____

_____

_____

_____

_____

List the **alternatives**.

_____

_____

_____

_____

_____

Generate questions to help you make a decision.

1. _____
2. _____
3. _____
4. _____
5. _____

Star (*) those that are most important to you.

Weigh the alternative against each criterion.

	Q1	Q2	Q3	Q4	Q5	
Alternative						Total
1						
2						
3						
4						
5						

State the reasons for your choice.

1 _____

2 _____

3 _____

4 _____

5 _____

Activity Six

Modeling the Skill Strategy

(5-10 Minutes)

Sample Modeling Activity: Purchasing a Gift for a Relative

Tell students that before they practice this skill and its strategy, you want to model it for them. To model the appropriate use of this skill, bring several gift items that might be given to a nephew or niece for his/her birthday. Determining which gift to give your relative will be the focus of the discussion.

Explain to students that you are interested in selecting a gift for your relative, but you must select only one of the items that you have brought to school. Record on the board the goal of your decision and the possible alternatives from which you must select. Ask students if they have ever experienced the difficulty of purchasing a gift for one of their friends and share these stories. Continue the lesson by suggesting that students assist you in making this decision by thinking about what questions or criteria could be used to select that one perfect gift. Identify some of the criteria that you have thought about by listing them on the board. (e.g., Which gift would be most useful to my niece? Which gift can I afford? Which gift would last the longest?)

After you have identified the goal you wish to accomplish (to select a gift for your niece) and displayed all of the alternative gifts that you are considering, use a grid system to organize your decision. You should list the criteria horizontally across the top of the grid and you can record the alternatives vertically along the side of the grid. Show students how you will begin to evaluate each alternative against each criterion and numerically rank each alternative based on how well it satisfies each of the criterion you believed was important. When the ranking is complete, have students add each row to record the number of points each gift received. Identify the gift that has the most points and indicate that after careful consideration, this gift should be given to your niece. Think "out loud" and justify your choice by reviewing with students that the gift you chose was selected after carefully considering some important factors that you believed were important. Review how you used the decision making skill strategy to help you select the "best" gift.

Phase Two: Teaching the Guided Practice Lessons With Familiar Content

Sample Practice Activities
(10-50 Minutes Each)

1. Recycling Awareness Workshop: (Science)
The amount of trash that is created in the school has increased with the use of computer printouts, worksheets, and the amount of wrappers that cover the food brought to school in lunch boxes. Have students use the decision making skill to identify ways your school could reduce the amount of garbage it produces. Select one of these alternatives to begin a "recycling awareness" workshop to implement the most effective solution.

2. A Reflection of the Month: (Fine Arts)
Using an empty bulletin board as a motivational device, suggest to students that you would like to have them create and design the board for each month of the school year. Your only criterion is that they incorporate what they know about each month into the total theme. Students might want to consider artists' work that complements the month and how their classmates might contribute to the creation of the bulletin board.

3. Paper Towel Tests: (Math)
Using various brands of paper towels purchased from the grocery store, have students decide which brand is the "best" buy. In teams, students will use the decision making process to identify criteria that will be used to guide their selection. Students will have to design experiments to see which brand meets the criteria established by the team. Selection of the "best" brand should be determined by the testing that is conducted.

4. Halloween Treats: (Social Studies)
Many students still participate in the tradition of "trick or treating" on Halloween. Have students brainstorm solutions to the following problem: "In what ways might we protect children from dangerous treats received during Halloween trick or treating?" Use these solutions to generate a discussion about which solution would be the most effective, easily accepted, and most helpful in terms of student safety. Students can then use the "best" solutions to create some form of visual or auditory presentation to give to other students in the school.

5. Personal Presentations: (Language Arts)
To gather more information about students you are teaching, have students prepare 10-minute presentations about themselves to the class. Students can share books that are personally meaningful to them, read poems that express some personal characteristic, demonstrate a skill, share a personal story, or show an artifact from home that is valued. Have students develop criteria that will help them select these items. Students can write journal entries about these items and state why they chose particular items to share with the class. The

teacher should also be involved in this activity. This activity can be complemented with the reading of Dr. Suess' book *Oh, The Places You'll Go*.

6. Games for Tots: (Recreational)
Tell students that they have been asked to create a new game that could be used on the playground by the younger students in the school. What type of game would this be? Have students work in small groups to decide what type of game they would create. Students will need to brainstorm several possible games, identify criteria to help them select the one best game that they would like to create (e.g., Does the game have rules that could be easily understood by the younger students? Would the game be something this age group would enjoy participating in? Can the game be easily implemented on the school playground?), and include statements as to why this game would be the best one to create for the younger students. Since this practice activity requires a lot of student thought and consideration, the teacher should make every effort to have students actually create these games and teach them to a younger group of students.

7. The Better Butter: (Consumer)
Have students determine which peanut butter they would purchase for their family by evaluating five different brands that are available at the grocery store. Students can be paired or work independently to generate the criteria which will be used to determine the "best" brand of peanut butter for their family. Students might consider conducting taste tests, spreadability tests, or even tests that evaluate the nutritional content in each brand. The teacher may obtain small containers and plastic spoons from a yogurt or ice cream shop to provide the necessary materials. During the debriefing session, stress the fact that different groups chose different brands as their favorites because of the criteria they used to evaluate the brands.

8. Famous School Statue: (Civics)
Pretend that a large amount of money has just been donated to the school with the stipulation that it must be spent on a statue of a famous person. Have students brainstorm all the famous people who might be considered as a possible candidate for the statue. In a large group, brainstorm criteria for evaluating the alternatives. Use the grid format and evaluate the alternatives.

9. Sharing Your Talents: (Personal)
Tell students that they have been asked to share their talents with a younger student twice each month during the school year. What type of activities will they choose to share with these students? Some options might include reading books, helping students write a story, helping a student use the computer, helping a student research a subject. Their task is to generate a list of options, develop a list of criteria for judging the choices, and selecting the one activity that they would like to try. Students should be encouraged to consider those activities that are personally meaningful to them as well as to younger students.

10. School Store: (Vocational)
Tell students that they are going to be responsible for establishing and running the school store. Tell them they must use their decision making skill to determine which school related

items should be sold in the store. Have students survey various grade levels to gather information about the type of items they would like to have available to them. Use this list and then generate criteria to select the best products to sell.

Phase Three:
Guided Practice, Single Skill, New Real World Content

Sample Practice Activities
(10-50 Minutes Each)

1. What Are Our Options?: (Science)
Have students gather information to help them generate alternative energy sources that might be used in the future to supply our heat and energy. Students should be encouraged to use multiple resources to gather evidence on the advantages and disadvantages of using various energy sources. In small groups, students can discuss why these alternative sources may or may not be accepted. The pros and cons of each option will provide a way for students to see that their investigations have actually created criteria that would be used to judge the merits of each option.

2. Travel Brochures: (Social Studies)
Have students explore what makes a state an interesting place to visit. Divide students into small groups to investigate one of the fifty states to gather information that could be used on a travel brochure. Criteria should be generated prior to the gathering of this information to guide their investigation. Students should keep in mind those state features that would be attractive to out-of-state visitors.

3. What Do People Think?: (Math)
Tell students that they will be asked to conduct a survey to gather some information about a topic that is interesting to them. Ask students to design an opinion poll. Opinion polls are used to find out what people think about certain issues. The data gathered from these surveys are useful when they are organized and placed in a visual form. Graphs are often used to communicate the results of the findings and help the researcher draw conclusions. Ask students to select two topics, make a list of specific questions to gather the opinions about the issues, and interview a number of people. After collecting these data, they will organize it, calculate percentages, produce graphs, and try to draw some conclusions. Students will use the decision making skill to decide on two topics to cover in this poll, choose a polling population, write questions, and select a way in which to present their findings.

4. And the Beat Goes On: (Music)
Explain to students that many businesses now play music over their intercom systems to enhance the atmosphere of their environment. Ask students to consider how these businesses determine which music will be played. If students were to select music that would be played in the classroom during a specific time of day, what criteria would they use to select the most appropriate form of music?

5. Picture Perfect: (Language Arts)
Graphic artists often illustrate an author's words by creating illustrations that enhance or visually describe the event that an author has communicated through words. Awards are given every year to illustrators whose works are deemed to be outstanding. Have students host their own award winning ceremony by generating criteria to judge the best illustrator of children's stories.

6. Employment Decisions: (Vocational)
Tell students to assume that they are the owners of a grocery store and they have to select 10 new employees to work at the store. How would they make this decision if 35 people applied for the same position? How would they organize this decision? What criteria should the storeowner use to guide the decision?

7. Bikes For Sale: (Consumer)
Ask students to explain how they would use the decision making process to purchase a new bike. How would they go about making their selections? What criteria would they generate to evaluate these options? How would they organize this decision?

8. Advice From Above: (Civics)
Tell students that they have been asked to speak to the third graders about what to prepare for when they come to fourth grade. After brainstorming several suggestions, ask students to select the criteria that would guide their decisions. What criteria would they use? How would they determine which suggestions are most appropriate to share with third graders?

9. Positive Profile Portfolios: (Personal)

Tell students that you would like to have them develop a personal positive profile portfolio that would describe their best character traits. After students have generated these traits, have them select the top 5 characteristics that they feel best describe themselves and create a descriptive written profile to be placed in the portfolio. Have students describe how the decision making process would help them complete this activity. What criteria did they choose to help them select their outstanding characteristics? (Teacher Note: Keep a camera handy during the school year to collect records of students' products, interactions with other students, and unusual statements made during the year. This information can be used to further develop a child's understanding of who he/she is as an individual and identify positive personality characteristics that may need

to be brought to the attention of the child. Many colleges and employment agencies require prospective candidates to write descriptive paragraphs about their strengths and weaknesses, and this activity can prepare students for the future event.)

10. Let's Get Physical: (Recreational)
Ask students to assume that they are your personal exercise trainer. They have been hired to design an exercise program that would improve your health. How would they use the decision making skill to plan this program? What criteria would they use to select the correct exercise program for you? Why would it be important to consider the criteria before they developed this exercise program?

Phase Four:
Prompted Transfer to Current Academic Curriculum

Language Arts

1. During the reading of a novel, ask students to analyze a decision that a character made in the story. Would they have made the same decision? What did the character have to consider before he/she made that decision?
2. During a writing session, ask students to generate the criteria by which a particular writing sample should be evaluated. Students can use the decision making process to evaluate their own writing and decide if improvements need to be made.

Science

1. During a unit on scientific ethics, have students explore the statement "Should animals be used for medical research?"
2. Have students use their decision making skill to select a problem to solve for the annual Inventor's Fair.

Social Studies

1. Have students decide on the best solution to the problem of drinking and driving. Have them investigate the issues surrounding this problem.
2. Have students select a historical character that they would like to bring back to life as a teacher for a week. Who would this character be? What criteria was used to make their selection? How would they justify the selection?

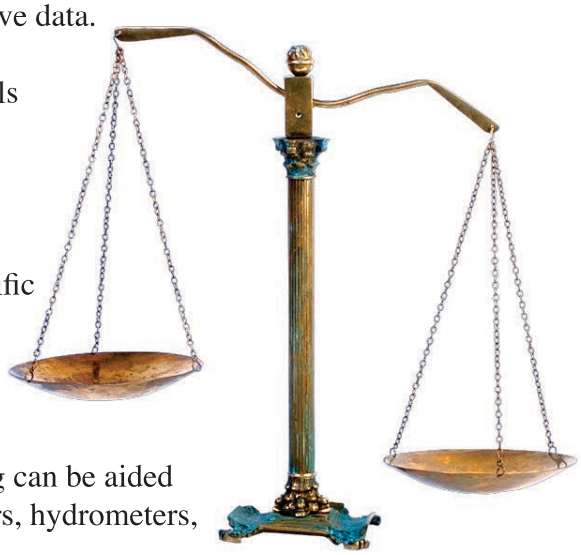
Math

1. Students can bring in grocery flyers and compare prices per pound on many items. After carefully studying the flyers, they could make a decision as to which store they would choose for their own shopping.
2. During a unit on fractions, have students decide on a presentation that helps other students understand the use of fractions in nature. Students can use overhead projectors, photo essays, poetry, demonstrations, and PowerPoint presentations as ways to explain how fractions are used in nature. Encourage students to choose the best way to communicate their idea by generating criteria to guide their selection.

III. Comparing and Contrasting: Background Information for the Teacher

Definition of the Skill

The activities in this unit have been designed to help students improve their skill in comparing and contrasting. For the purposes of this unit, comparing is defined as the ability to look for similarities in a set of objects or concepts. To contrast is to look at a set of objects or concepts and emphasize their differences. Comparing and contrasting can yield either qualitative or quantitative data.



Prior skills helpful in the development of these skills would include perceiving and naming the qualities present in an object, such as color, length, and thickness. You can also compare and contrast by determining which elements in any two objects are comparable or sufficiently equivalent to make specific statements regarding degree of similarity. At the conceptual level, understanding and being able to distinguish between the concepts of similarity and difference are prerequisite to noting these differences. In addition, comparing and contrasting can be aided by the use of any measurement device such as rulers, hydrometers, thermometers, etc.

Purposes for This Skill

Comparing and contrasting can be used in any subject area. The purposes for making comparisons and contrasts are:

1. to facilitate effective interaction with the environment;
2. to be more precise in describing a particular object or concept;
3. to discriminate between two objects or concepts; and
4. to help individuals organize new and known information by establishing how things might be related.

Examples of This Skill

This skill is usually used in conjunction with other skills to make an inference, a comparison, or a decision. Examples of these skills include the following:

1. consumers who compare and contrast prices on grocery items;
2. parents comparing a child's behavior over time to implement a reward system;
3. a buyer for a department store who compares and contrasts different brands of jeans to decide which jeans to purchase for the store; and

4. a student learning about geology who compares and contrasts two rock samples to determine which rock is igneous.

Prerequisites for Using This Skill

For students to use the skill of comparing and contrasting, they must be able to do the following things:

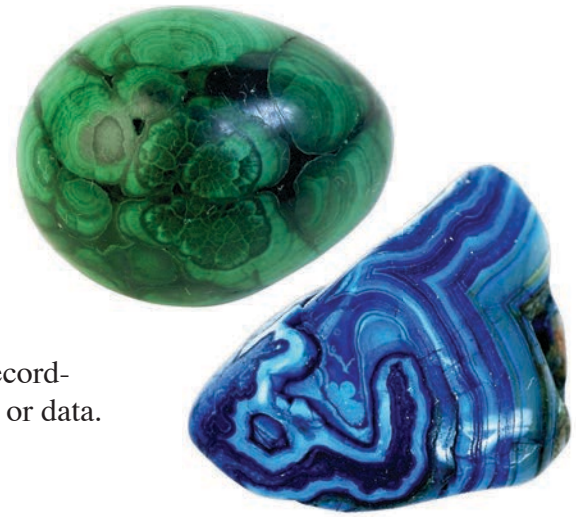
1. understand the difference between similar and different;
2. identify a purpose for comparing and contrasting;
3. identify relevant attributes and characteristics;
4. note likenesses and differences;
5. conduct observations; and
6. formulate statements which summarize findings.

Making simple comparisons is fairly easy. Students often have difficulty with these skills when making multiple comparisons. The difficulty may be that they do not align the information for each comparison and may fail to formulate a statement regarding similarities and differences in an object or concept. Students may also experience difficulty when they begin to mix strategies for doing comparative summaries. For example, a student may describe the similarities and differences of one item first, then all of the second; a student may decide to compare part of one item, then part of another; or he/she may choose to mix the comparisons and differences. In any case, some students may experience failure due to faulty organization. Another problem area might be forming statements in their own words to develop understanding and consolidate information.

Strategy for Making Comparisons and Contrasts

To be good at the skill of comparing and contrasting, one must determine the purpose for comparing and contrasting, decide how many items or events should be compared and contrasted, and identify important attributes to observe.

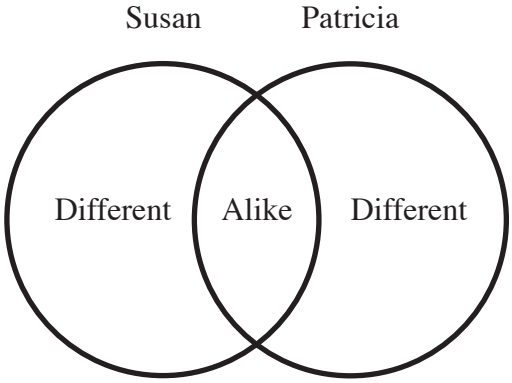
The extent of these comparisons and contrasts depends on the amount of information that students know about the object or concept under consideration. People who are good at making comparisons and contrasts are also able to select the pertinent attributes that will guide the investigation. Also, those who are good at comparisons and contrasts will be able to organize the data that are collected, which will allow for a student to compare and contrast efficiently the attributes under consideration. Some students will prefer to design record-keeping charts or graphs to organize this information or data.



Phase One:
Introducing the Unit to students

Activity One
Focusing Activity: Buddy Study
(15-20 Minutes)

One way to bring the skills of comparing and contrasting to the attention of students is to arrange an opportunity for students to use each other as the object of comparison. One popular activity is to ask students to select a partner, then ask them to generate similarities and differences between them. As students collect a variety of responses, the teacher should prompt students with other attributes to consider. Examples of attributes that might be included are as follows: height, color of hair, arm span, size of hands and length of fingers, color of eyes, clothing, ear lobes detached or attached, teeth, distance between their eyes. As the lesson progresses, students should realize that the quantity of their responses depends on the number of attributes they can compare. To assist students in this activity, the following graphic organizer (Venn Diagram) may be helpful.



Activity Two
Helping Students Understand the Nature of the Skill
(5-10 Minutes)

For the Teacher: Definition for the Skills of Comparing and Contrasting

Comparing and contrasting involves an analysis of two or more ideas or variables to find similarities and differences. Conclusions about the similarities and differences are usually drawn after comparisons and contrasts are noted. Like the ability to sequence, classify, categorize, analyze, or evaluate, the ability to compare and contrast objects or ideas is a preliminary skill that helps students master more complex thinking skills. At its most basic level, comparing and contrasting helps thinkers to note similarities and differences between objects. At a more abstract level, this skill can be used to detect likenesses and differences between concepts, philosophies, and personalities. The ability to detect these

similarities and differences is the foundation of well-grounded conclusions. A major component in the compare and contrast process is the ability to identify relevant factors that will become the basis of the comparison prior to beginning the process.

Student Definition for the Skill of Comparing and Contrasting

To compare means to look for similarities. To contrast means to look for differences. When you compare and contrast, you are trying to decide whether ideas or objects are mostly the same or mostly different. It is important to know what attributes or factors you will use before you begin to compare and contrast your ideas or items.

Synonyms for *comparing and contrasting* include these words:

same and different *equivalent and nonequivalent* *presence and absence*

The Following Examples May Be Shared

Following is a variety of lessons that might be used by the teacher to emphasize comparing and contrasting:

1. A gardener compares and contrasts the health of his or her seedlings to diagnose disease.
2. An art critic compares and contrasts the work of an artist through various time periods to understand the artist's growth and development.
3. A new student compares and contrasts the rules at his or her new school with those of his or her old school.
4. We compare and contrast the durability of our new sneakers with those of our friends' to see if their brand holds up better.
5. We compare and contrast prices and qualities of foods, automobiles, clothing, and electronic products to ascertain the best buy.
6. In science, we compare and contrast attributes of leaves to classify them.
7. In math, we compare and contrast fractional parts to arrange them in order from largest to smallest.

Activity Three
Skill Rationale
(5-10 Minutes)

Various Purposes for This Skill

The skills of comparing and contrasting are used for a variety of purposes. Some of these include the following:

1. to organize new and known information;
2. to establish how two or more ideas or objects might be related;
3. to discriminate between objects or ideas;
4. to draw a conclusion;
5. to evaluate or assess ideas or things; and
6. to aid in the long-term retention of information.

Relevance of This Skill

It is important to discuss the relevance of this skill to help students understand the benefits of using it effectively. If students are willing to work to improve their ability to make comparisons and contrasts, they will achieve the following:

1. They will be happier with their decisions.
2. They will be able to learn new concepts more efficiently.
3. They will be able to make new discoveries by paying attention to the attributes of ideas and objects.
4. They will be able to analyze information in a more systematic fashion.
5. They will be better able to consolidate information.
6. Their descriptions will be richer and more complete.

Consequences of Poor Ability With This Skill

To help students appreciate the negative consequences of poor use of the skill, the teacher can spend time asking students to recall instances when they have failed to use this skill. These stories demonstrate why students encountered difficulty when they failed to use the thinking skill. Students might share stories that describe what happened to them when these situations occurred:

1. They failed to identify the attributes used to distinguish how two ideas or concepts were alike or different and arrived at the wrong conclusion.
2. They identified the correct attributes for the comparison and contrast, but did not know how to communicate the findings.
3. They did not gather enough information about the ideas and concepts under consideration and made comparisons and contrasts based on insufficient data.
4. The information that was used to compare and contrast was dated and lead to erroneous conclusions.
5. They forgot to use measurement devices that would assist in making more accurate descriptions of how two or more objects are alike and different.
6. They only looked at superficial attributes and were not willing to spend the time to generate alternative attributes to compare and contrast, so the comparison lacked depth.

Activity Four
Explaining the Skill Strategy
(5-10 Minutes)

Skill Strategy for Making Comparisons and Contrasts

To help students understand how to improve their ability to make comparisons and contrasts, teachers might explain the following skill strategy.

1. Decide on the **purpose** for comparing and contrasting.
2. Decide which **ideas, events, or objects** are being compared or contrasted.
3. Identify important **attributes** related to the purpose.
4. Use a **graphic organizer** to organize information about the similarities and differences of the objects, events, or ideas.
5. Observe and note the **characteristics** of each item with respect to each stated attribute.
6. Note whether the characteristics are the **same or different**.
7. Draw a **conclusion** about these findings with respect to the stated purpose.

Activity Five
Explaining the Graphic Organizer
(2-3 Minutes)

Using a Graphic Organizer to Accompany the Skill Strategy

The teacher should show students the relationship between the components of the skill strategy and the parts of the graphic organizer. The graphic organizer used to accompany this skill strategy might be drawn as a chart with several columns. The first column lists the attributes under consideration. The next several columns list the different objects or ideas being compared and contrasted. The last two columns are for noting the particular similarities and differences. An example is printed on the following page.

COMPARE AND CONTRAST

Definition: To compare means to look for similarities. To contrast means to look for differences. When you compare and contrast you are trying to decide whether ideas or objects are mostly the same or mostly different.

Steps:

1. **Set Purpose**

   Decide on the **purpose** for comparing and contrasting.

2. **Decide on Objects**

   Decide which **objects, ideas, or events** are being compared or contrasted.

3. **Identify Attributes**

   Identify important **attributes** related to the purpose.

4. **Use Graphic Organizer**

   Use a **graphic organizer** to organize information about the similarities and differences of the objects, ideas, or events.

5. **Note Characteristics**

   Observe and note the **characteristics** of each item with respect to each stated attribute.

6. **Note Similarities and Differences**

   Note whether the characteristics are the **same** or **different**.

7. **Draw Conclusions**

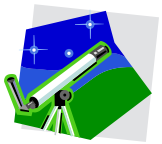
   Draw a **conclusion** about these findings with respect to the stated purpose.

Graphic Organizer
Compare and Contrast

Purpose

Attribute	Item A	Item B	Similarities	Differences

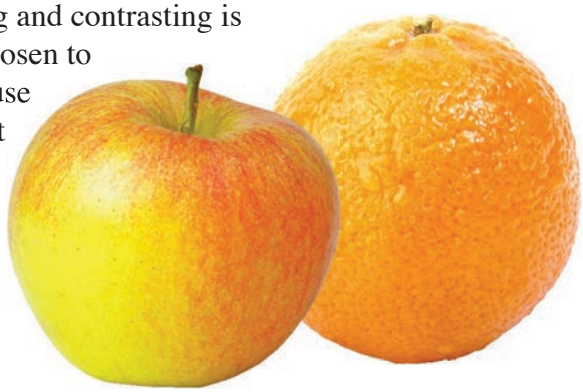
Summary



Activity Six
Modeling the Skill Strategy
(5-10 Minutes)

Sample Modeling Activity: You *Can* Compare Apples and Oranges

Tell students that before they practice this skill and its strategy, you want to model it for them. To model the appropriate use of this skill, bring in an apple and an orange. Tell students that your purpose for comparing and contrasting is to learn more about fruit. Explain that you have chosen to compare and contrast an apple and an orange because they were what you had at home and you like to eat them.



Write down the attributes about fruit that you are going to consider on the graphic organizer. You might choose color, shape, peel or skin, seeds, pulp, and taste. Tell students what you observe about each of the attributes, and record the characteristics on the graphic organizer. Write down all details as they are observed. Note whether the characteristics are the same or different. Draw a conclusion regarding your findings. Think "out loud" as you explain how you use each step in the skill strategy to compare and contrast the apple and orange.

Phase Two:
Teaching the Guided Practice Lessons With Familiar Content

Sample Practice Activities
(10-50 Minutes Each)

1. My Favorite Rock Group: (Science)
As part of the science unit on rocks and minerals, students will start their own rock collection in an empty egg carton. Before learning the names of the rocks, students will compare and contrast several of their rocks. You may suggest that they use the attributes of color, size, hardness (can they scratch it with their fingernail?), texture, and weight.

2. Van Gogh for It: (Visual Arts)
After students have learned about art criticism and have been introduced to the art of Vincent Van Gogh, they will compare and contrast two of his works: Sunflowers and Starry Night. Attributes they may use are line, shape, color, balance, foreground, or background.

3. Room to Room: (Math)
Assuming students have been introduced to linear measurement, area, and volume, students will compare and contrast the physical attributes of their bedroom with the classroom. The

attributes they may choose to use are square footage, wall height, room volume, or amount of wall space.

4. Points of View: (Social Studies)
After learning about the Battle of Atlanta in the Civil War unit, students will compare and contrast two historical newspaper articles reporting on the battle. One of the articles will be from a Northern newspaper, the other from a Southern newspaper.

5. Character Comparison: (Language Arts)
After reading *Where the Red Fern Grows* by Wilson Rawls, students will compare and contrast two of the characters in the book. Students can look for similarities and differences in values, abilities, interests, attitudes, and relationships with others.

6. Playing Games: (Recreation)
Students will compare and contrast two recreational physical activities. Attributes that may be considered are equipment, rules, number of people needed to play, amount of training needed, and skills needed.

7. Jobs at School: (Vocational)
The jobs of teachers and maintenance personnel will be compared and contrasted by students. They may choose to consider job preparation, duties, equipment, and schedules.

8. Main Street: (Community)
Students will compare and contrast two community photographs of the main street taken at different times. Attributes for consideration may be styles of buildings, types of businesses, cars, and people.

9. Hamburgers: (Personal)
Hamburgers from two or more fast food restaurants will be examined in one or two ways. Real burgers could be purchased and taken apart item by item, which could then become the attributes considered (bun, meat, lettuce, condiments). Nutritional lists could also be compared and contrasted for fat, cholesterol, calories, and nutrients. Again, the purpose of the comparison determines which data need to be examined.

10. Rocks and Roles: (Science)
After individual introductions to the characteristics of igneous, metamorphic, and sedimentary rocks, students will compare and contrast these different types of rocks. Rock samples should be available to students for close observation.

11. Before and After: (Social Studies)
Near the end of a unit on the Civil War, students will compare and contrast life on a Southern plantation before and after the war. They may choose to consider the changes of lifestyle for the different people on the plantation and the changes in the way work was done.

12. Shaping Up: (Math)
The shape of a bottle greatly influences the amount of liquid it can hold. Students will compare and contrast the capacities of bottles of various shapes.

13. Musical Families: (Music)
After gaining knowledge about the different types of instruments in an orchestra, students will compare and contrast the instruments in the brass and woodwind families. Students may examine instruments, listen to the sounds they produce, and consider the materials of which they are made.

14. Critic's Choice: (Language Arts)
After reading *Where the Red Fern Grows* by Wilson Rawls, students will view the film version. They may choose to compare and contrast the attributes of characters, plotline, setting, or themes.

Phase Three:
Guided Practice, Single Skill, New Real World Content

Sample Practice Activities
(10-50 Minutes Each)

1. Recreational Recommendations: (Recreation)
Comparing and contrasting the favorite recreational activities of first, second, third, and fourth graders will help students identify the reasons students have for choosing particular activities. By collecting information through surveys and interviews, students can begin to find similarities and differences in the pattern of responses.

2. Measuring Up: (Vocational)
Students will compare and contrast the measuring tools used by mechanics, dress designers, and nurse practitioners after investigating the tools used in their jobs. Students should be particularly encouraged to consider the functions of the tools in their comparisons.

3. Pro and Con: (Community)
Compare and contrast the arguments of both sides of a current community controversy. Students may need to gather information from several sources in order to discover the opinions of both sides.

4. It's in the Bag!: (Personal)
Students will compare and contrast four different brands of potato chips. They may choose to consider packaging, price, taste, crispness, ingredients, nutritional statements, and dipping strength.

Phase Four:
Prompted Transfer to Current Academic Curriculum

Language Arts

1. During a unit on World War II, students will compare and contrast *The Diary of Anne Frank* by Anne Frank, H. J. J. Hardy, David Barnouw, and others with *Number the Stars* by Lois Lowry.
2. Students will compare and contrast two authors of young readers' literature.

Science

1. When learning about plant growth, students might be asked to compare and contrast two different brands of fertilizer and their effect on the plants.
2. A variety of objects may be compared and contrasted so that students can identify the best conductors of electricity.

Social Studies

1. Students will compare and contrast the first 100 days of 2 different presidents.
2. Compare and contrast various geographic features from different regions of the United States.

Math

1. Students will compare and contrast the height, weight, and arm span of first, second, and third graders.
2. The operations of addition and multiplication will be compared and contrasted.

IV. Classifying: Background Information for the Teacher

Definition of the Skill

The activities in this unit have been designed to help students of all achievement levels improve their skill at classifying. For the purposes of this unit, classifying is defined as the process of sorting data into groups based on relevant characteristics or attributes. Groups or categories for classifying are created by the thinker according to the purpose for the task. To classify means to group objects, people, or ideas according to rules that the thinker creates.

Purposes for This Skill

Classifying can be used in any academic area or career field and is not confined to the sciences. People who use this skill are often trying to bring order to unorganized data, understand large amounts of data, or establish a structure.

Examples of This Skill

Examples of this skill include the following:

1. Homeowners who need to organize their garage, kitchen, or bathroom.
2. Writers who classify events and ideas for their stories.
3. Children who classify toys to find them more easily on their toy shelves.
4. Researchers who organize survey responses into groups to better understand the different responses.
5. Store owners who have to organize the products in their store.

Prerequisites for Using This Skill

For students to use the skill of classifying, they must be able to do the following:

1. be familiar with the objects, people, or ideas in the data set;
2. decide on the purpose for classifying the data or objects;
3. observe the data set;
4. find the most relevant attributes for classification;
5. sort the items according to these attributes;
6. regroup or make subsets if necessary; and
7. be positively disposed toward using this skill.

If students have difficulty with any or all of these prerequisites, they are probably novices with this skill and

it is likely that they will need explicit instruction from the teacher to improve their ability to classify. It has been our experience that many students have difficulty with this skill, not because they cannot sort the objects or ideas under consideration, but because they often have difficulty deciding which key features should be considered in forming the groups. Although most students have no difficulty categorizing objects when someone else creates or names the groups, the same students are often uncomfortable and uneasy when they are asked to decide which and how many groups should be used to classify a new data set.

At other times, students may have difficulty with this skill because they are not considering the most important attributes of the objects that should be used for classifying. This thinking may be clouded by lack of experience or by short-sightedness. For example, if a homeowner is organizing the tools in his or her garage, classifying the tools by color or size may prove to be an easy way to sort them out. However, the homeowner would probably find it more useful to classify them by function or by the season of the year in which they are usually used.

Strategy for Classifying

To be a good classifier, one must decide what the purpose is for the classifying activity and which attributes should be used to organize the groups. Keeping an open mind during the classification activity allows us to find additional and valuable data that were not considered during the initial stages of setting attributes and listing data may be used to form new groups midway through the process.

Good classification also depends upon some prior knowledge with the content area that is the focus of the classification. If we have little information about textiles, for example, it would be difficult for us to be able to identify the common attributes that would direct our classifying activities attributes such as type of fabric, weave, texture, and color. Once we can identify these attributes, they can be used to direct our classification and improve the quality of our grouping decisions.

Third, people who are good classifiers will use the purpose and attributes to guide the data sorting procedures. After the groups are established, each item in the data set should be examined for characteristics and attributes to place the object in the appropriate group.

Phase One:
Introducing the Unit to Students

Activity One
Focusing Activity: Classifying Game: What's My Class?
(15-20 Minutes)

One way to bring the skill of classifying to the attention of students is to engage them in the following activity about the shirts they are wearing. Brainstorm the attributes of shirts with students. Possibilities may be pattern, color, style (buttons or pullover), collar style,

and fabric. The teacher demonstrates the skill by asking particular students to come to the front of the room based on one of the attributes of their shirts or tops. This attribute should be selected by the teacher and kept a secret from students. The other students in the class take turns guessing the attributes used to classify students' shirts. After they have mastered the ability to identify a group that was formed on the basis of a single attribute, the teacher can extend the activity by using two attributes to select the shirts for an additional group. For example, students wearing shirts that are both striped and tee are called forward. Based on the student responses, continue to add more attributes until they are stumped.

Then, give students the opportunity to be the attribute selectors. They should write down the names of students according to the attributes of their shirts. Continue the game with students, calling out the names of students who should form a group. This gives you the opportunity to assess the level of their ability to form groups based on attributes.

In the event that the class has an insufficient variety of shirts, shoes, backpacks, or lunch boxes could be used instead.

Activity Two
Helping Students Understand the Nature of the Skill
(5-10 Minutes)

For the Teacher: Definition for the Skill of Classifying

Classifying is defined as the process of sorting data into groups based on relevant characteristics or attributes. Groups or categories for classification are created by the thinker according to the purpose of the task. The classification may be discrete (people who ate beef yesterday and those who did not), two or more classifications may overlap (cars with air bags and cars that are imported), or a group may be a subset within one or more groups. The person doing the classification may realize the need to further classify the objects or data beyond the initial classification. Depending on the type of data, this may involve other thinking skills such as ranking, prioritizing, sequencing, and seeing relationships.

Student Definition for the Skill of Classifying

Classifying means to group objects, people, or ideas according to rules that you create. You create the rules according to your purpose for making the classification and according to the attributes of the objects, people, or ideas.

Synonyms for *classifying* include these words:

grouping *sorting* *arranging* *organizing*

The Following Examples May Be Shared

These examples may be used by the teacher to further illustrate the skill of classifying.

1. When a pet store owner is ordering supplies, he/she classifies the animals in the store according to the kind of food they need.
2. An art gallery owner classifies new paintings according to style and how they complement other works in the gallery. The classification is used to place the painting in various rooms.
3. Students classify different kinds of leaves in a science class to gain knowledge about them.
4. People classify their clothes and store them accordingly to make them easier to find.
5. City planners might classify suggestions for new city parks according to the source of the suggestions.
6. Sports equipment is classified by the physical education teacher by the season in which the sport is played and by the type of equipment.
7. A homeowner may classify the kinds of repairs needed on the house according to location, ability to do the repair, or cost.
8. Collectors classify the objects in their collections to make them easier to display and explain.

Activity Three
Skill Rationale
(5-10 Minutes)

Various Purposes for This Skill

The skill of classifying is used for a variety of purposes. Some of these include the following:

1. to organize new and known information;
2. to establish how two or more ideas or objects might be related;
3. to discriminate between objects or ideas;
4. to establish a structure;
5. to understand a new structure or classification; and
6. to aid in the long-term retention of information.

Relevance of This Skill

It is important to discuss the relevance of this skill to help students understand the benefits of using it effectively. If students are willing to work to improve their ability to classify, they will accomplish the following:

1. They will be able to handle, organize, and understand larger amounts of information.
2. They will be able to learn new concepts more efficiently by classifying examples of these concepts into groups or categories.

3. They will be able to make new discoveries by grouping new information and comparing it to what they already know.
4. They will be able to analyze information in a more systematic way.
5. They will be able to develop their own outlines for stories or reports by grouping common ideas or information.
6. They will be able to sort their belongings in a more organized fashion.

Consequences of Poor Ability With This Skill

To help students appreciate the negative consequences of poor use of the skill, the teacher can spend time asking students to recall instances when they have failed to use this skill. These stories demonstrate why these persons encountered difficulty when they failed to use the thinking skill. Students might share stories that describe what happened to them when these situations occurred:

1. They failed to classify information and had to deal with unorganized ideas or objects.
2. They misidentified the attributes and incorrectly grouped objects together that did not belong together.
3. They did not gather enough information about the ideas or items under consideration and made classifications based on insufficient data.
4. They did not consider all facets of the objects or data and chose attributes that did not reflect the significant dimensions of the objects.
5. They did not realize that items could be placed in more than one group and became frustrated.
6. They could not find the structure, main idea, or theme because they did not realize how or why things are grouped together.

Activity Four
Explaining the Skill Strategy
(5-10 Minutes)

Skill Strategy for Classifying

To help students understand how to improve their ability to classify, teachers might explain the following skill strategy.

1. Decide the **purpose** for classifying the data or objects.
2. **Observe** all items in the data set.
3. Find the most important **attributes** related to the purpose. This may be done by observing the data set or objects and noting similarities among the data or objects.

4. **Manipulate** the objects if possible or use a **graphic organizer** to aid the classification.
5. **Sort** the objects or data according to one or more of these attributes.
6. **Regroup** or make subsets if necessary.
7. Use these groups to help you draw a **conclusion** about your findings.

Activity Five
Explaining the Graphic Organizer
(2-3 Minutes)

Using a Graphic Organizer to Accompany the Skill Strategy

The teacher should show students the relationship between the components of the skill strategy and the parts of the graphic organizer. With some data sets, students will write directly on the graphic organizer as they practice the strategy. With other data sets, they can simply use the graphic organizer to organize the data they have and the steps they take to classify them. The graphic organizers that a student uses with this skill strategy will depend on the purpose for the classification and the number of attributes selected. The following graphic organizer illustrates one possibility.

Explaining the Graphic Organizer

When the skill strategy is used, students write or recall the purpose for the classification using the upper section of the graphic organizer. The objects or data that are to be sorted are listed in the left-hand column. The key features are listed in the upper row. The data are then sorted according to these key features. If real objects are being sorted (sport cards, small tools, flowers), students need not write on the graphic organizer, but instead use it for a structural outline. In addition, loops of string or yarn could be placed on the table or floor and the objects could be placed within the loops. Piles of objects could be made with written key feature labels. The box at the bottom of the graphic organizer is used to summarize the findings after the classification has been made.

CLASSIFYING

Definition: Classification means to sort data into groups based on relevant characteristics or attributes. Groups or categories for classification are made by the thinker according to the purpose for the job.

Steps:

1. **Set Purpose**

   Decide on the **purpose** for classifying the data or objects.

2. **Observe**

   Observe all items in the data set carefully.

3. **Identify Attributes**

   Find the most important **attributes** for your purpose.

4. **Manipulate/Use Graphic Organizer**

   Manipulate the objects, if possible, or use a **graphic organizer** to help you.

5. **Sort Data**

   Sort the objects or data according to one or more of these attributes.

6. **Regroup**

   Regroup or make subsets if necessary.

7. **Draw Conclusions**

   Draw a **conclusion** about these findings that is based on your purpose.

Graphic Organizer
Classifying

Purpose

Items	Attributes		

Summary

Activity Six
Modeling the Skill Strategy
(5-10 Minutes)

Sample Modeling Activity: Classified Information

Tell students that before they practice this skill and its strategy, you want to model it for them. Before beginning the modeling activity, you should have several stacks of different kinds of books arranged near you. Tell your students that it is time for you to rearrange your bookshelf and first you need to classify the books so they can be placed on the shelves with similar books. But how can they be sorted? Tell students that it would be easy to sort them by size or color, but you are not sure that it would be easy to find the books that you wanted. Say that you notice that some of them are teacher books you use when you are planning lessons for the class, some are non-fiction books about different animals and other things in nature, and some are novels that you like to read aloud to the class. Tell students that you think you will sort the books according to how you use them. As you speak, start moving the books into different piles according to this attribute. Purposely ponder aloud about several books that might be used in more than one way. Refer to your purpose to help guide your decision about their classification. Summarize how you decided on your classification system and how you went through the classifying process.

Phase Two:
Teaching the Guided Practice Lessons With Familiar Content

Sample Practice Activities
(10-50 Minutes Each)

1. Alphabet Zoo: (Science)
Brainstorm a list of animals by going through the alphabet and choosing one for each letter. This will help ensure a variety of animals. Write the names on note cards or slips of paper to make sorting easier. Discuss attributes of the animals that may help guide the classification. Sort the name cards into groups based on the attribute(s) selected.

2. Horses in Art: (Visual Arts)
Collect art prints of different artists' interpretations of horses (or any other object that connects to a unit or theme you may be exploring). Display all the prints for students to view informally for a few days before this classifying lesson. Students are to classify the reproductions based on attributes relevant to the visual arts.

3. Geometry Class: (Math)
After students have been introduced to geometric shapes, they will classify them according to pertinent attributes. They may choose number of angles, degrees of angles, symmetry, or other attributes of geometric shapes.

4. Points of View: (Social Studies)
Person-on-the-street interviews about a current topic of local interest can be clipped from the local newspaper. Students will identify the attributes of the respondents' expressed opinions and beliefs and classify them according to selected attributes.

5. Board Games: (Recreation)
Students brainstorm a list of board games they have at home or have played. Attributes of these games are generated. Students then classify the games based on relevant attributes. Students will need to devise ways to handle games that fit into two or more categories. They might use this information to make recommendations to parents for children's gifts or to the PTA to purchase additional games for indoor recess.

6. Tools of the Trade: (Vocational)
Students classify a wide variety of mechanical, carpenter, kitchen, and office tools. They may consider how the tool is used, who uses the tool, the material from which it is made, and/or the complexity of the tool. A variety of purposes could exist for doing this classification. Help students determine their purpose before sorting.

7. Parks in Our Town: (Community)
City parks can have many different features and purposes. Students brainstorm the names, attributes, and characteristics of local parks. Students will classify them based on these attributes and characteristics. They may realize that more diversity in the types of parks in your area is needed.

8. Tag Sale (Consumer)
To raise money for a special event, organize a tag sale and ask students to classify the donated items to make the organization of their tag sale the most effective for sales.

9. Musical Inventions: (Music)
After inventing new musical instruments, students will set attributes and classify the new instruments based on their chosen attributes.

10. Getting It Together: (Language Arts)
Students will work in groups to search for information about an eminent person. Information will be collected on large Post-It® Notes. They will share the information in their groups and decide on appropriate attributes to guide the classification of the information on the Post-it® notes. The Post-It® Notes can be arranged on butcher paper in a form students can use to write a report about their person.

Phase Three:
Guided Practice, Single Skill, New Real World Content

Sample Practice Activities
(10-50 Minutes Each)

1. Olympic Organizers: (Recreation)
Classify the events of the Summer or Winter Olympic Games. They may be copied onto cards for easy manipulation. Attributes to consider may include type of equipment used, team or individual event, and events in which students themselves participate.

2. Careers: (Vocational)
After researching a wide variety of occupations, students will enter data on forms (which could be in the form of a sports card). Information may include job description, responsibilities, tasks which make up the job, training and education, prerequisite skills, average salary, or job satisfaction of those in the occupation. Students will select attributes and classify the occupations accordingly.

3. All in the Neighborhood: (Community)
Students classify the different kinds of businesses in the neighborhood near their school. If possible, the class could go for a walking field trip and list the different businesses. Students would then classify them based on pertinent attributes. If a field trip is not possible or practical, the teacher could have someone drive him/her through the neighborhood slowly and make a videotape of the businesses. Students could view the tape, record the different types of businesses, and decide on attributes for classification.

4. Cereals: (Consumer)
After a unit on nutrition, students will collect data about cereals and determine attributes to use as a basis for classification. Small boxes of cereal could be used to gather nutritional information. Students could accompany parents to the grocery store to collect information about unit costs. The classification can be used to make purchasing recommendations for other students.

Phase Four:
Prompted Transfer to Current Academic Curriculum

Language Arts

1. When reading a novel with many characters, students may classify them to remember who's who.
2. Students may classify hard-to-spell words according to similar spelling rules.

3. Students may classify lines of poetry to identify the theme or message.
4. Students can be asked to organize a book shelf according to categories they create.

Science

1. When learning about endangered animals, students may classify the factors causing the problem.
2. When making collections, students can classify their items or artifacts to make their collection more manageable.
3. Students can design their own classification system for leaves, shells, or rocks they collect.

Social Studies

1. Students can be asked to analyze their textbooks to identify the author's structure and organization.
2. When learning about products imported into the United States, students can classify those imported goods that they use at home or at school to identify a theme or pattern.
3. When writing a report, students can classify their note cards to develop the various headings or sections for their report.

Math

1. Students can classify survey responses before they create graphs or charts.
2. Students can be asked to use a hundreds chart to classify numbers that share common features.

V. Making Observations: Background Information for the Teacher

Definition of the Skill

The activities in this unit have been designed to help students improve their skill at making an observation. For the purposes of this unit, observation is defined as the ability to purposefully examine the attributes of objects or events to note details through the use of any or all appropriate senses or mechanical means. These observations can yield either qualitative or quantitative data. This means that the data gathered from these observations can either be organized with words and phrases or organized with numbers and statistical procedures.

Although we normally think of an observation as an act that is conducted with our eyes, the skill can involve any or all of our senses and primary and secondary sources of information. In addition, observation can be aided by the use of mechanical or technical devices such as telescopes, microscopes, anemometers, thermometers, or CAT scan machines, or through numerous observations conducted over time.

Purposes for This Skill

Observation can be used in any academic area or career field and is not confined to the sciences or the arts. The purposes for making observations can be just as varied. Usually, observers try to:

1. gather information,
2. analyze information,
3. note details,
4. identify elements that are missing,
5. locate problems, or
6. understand what might be causing something to occur.

Examples of This Skill

This skill is usually used in conjunction with other thinking skills to make an inference, a decision, or to solve a problem. Examples of this skill include the following:

1. gardeners who observe plants before they clip, prune, or fertilize;
2. parents who observe a sick child before they give the child any medicine;
3. businesses that take surveys to observe the characteristics of the clients who buy their products;

4. teachers who observe students to identify the cause of misbehavior; and
5. referees who observe an athletic game to find rule infractions.

Prerequisites for Using This Skill

For students to use the skill of making an observation, they must be able to do the following:

1. be familiar with the content that is the focus for the observation;
2. be able to identify a purpose for the observation;
3. identify the attributes that are related to this purpose;
4. describe characteristics related to this purpose; and
5. be positively disposed toward using this skill.

If students have difficulty with any or all of these prerequisites, they are probably novices with this skill and it is likely that they will need explicit instruction from the teacher to improve their ability to make observations. It has been our experience that many students have difficulty with this skill, not because they cannot perceive the object or action under consideration, but because they often forget to set a purpose or are not aware of their purpose for making a directed observation. When this happens, students do not attend to the most important factors or attributes that would normally guide the observations of a more expert thinker and their inferences or decisions suffer as a result.

At other times, students may have difficulty with this skill because their observation is affected by erroneous expectations or prior experiences. We have all heard stories similar to the one about the police officer who assumes that an erratic driver is intoxicated and makes an arrest, rather than making a careful observation and finding the need for immediate medical attention for a diabetic driver. Poor observations can end up harming people or costing us money. When students or adults make statements or draw conclusions based on incomplete observations or observations that have been guided by stereotypes or prejudices, the quality of these observations is in doubt. Thus, the good observer must be able to keep an open mind during the observation and resist the urge to bring early closure to the observation to decrease stereotyping or jumping to inaccurate conclusions.

Strategy for Observing

To be a good observer, one must decide what the purpose is for making an observation and which factors (or attributes) should be observed. Keeping an open mind during the observation also allows us to find additional and valuable data that were not considered during the initial stages of purpose setting. For example, penicillin was discovered because Fleming kept an open mind and gathered additional data when he observed a contaminated petri dish.

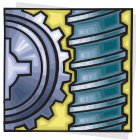
Good observations also depend upon some prior knowledge about the content area that is the focus of the observation. If we have little information about modern art, for example, it would be difficult for us to be to able to identify the common attributes, such as line, shape, color, texture, and balance, that would focus any observation of this art. Once we can

identify these attributes, they can be used to direct our observation and improve the depth of our understanding.

Third, good observers will use the purpose and attributes to guide the selection of data gathering procedures. If the attribute we wish to observe involves temperature, it makes sense to use a thermometer. If we wish to observe acidity, it makes sense to use litmus paper to aid our observations. Surveys, interviews, conferences, repeated observations over time, or experiments are also excellent ways to gather data.

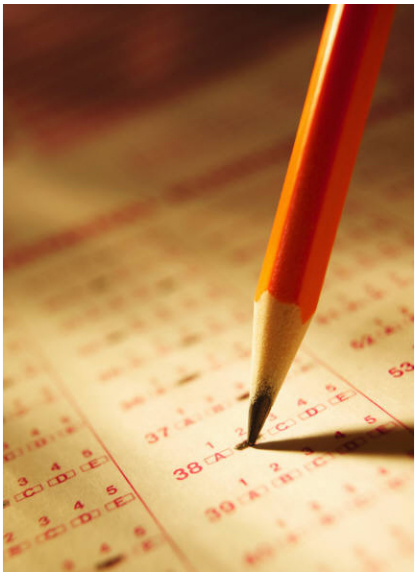
Fourth, good observers make detailed and systematic notes or records about the observations they have made. These notes should be based on the attributes that best reflect the purpose of the observation. Some observers prefer to design record keeping forms, charts, or graphs to record their notes, the characteristics, or the findings from their observations.

Phase One:
Introducing the Unit to Students



Activity One
Focusing Activity: A Thinking Test
(15-20 Minutes)

One way of impressing on students the importance of making careful observations might be to create a humorous situation that deliberately causes students to fail if they make poor observations. A popular activity for this purpose was created at least 20 years ago by an anonymous teacher who wanted to help her students pay more attention to written directions. When introducing this activity, a teacher might explain, "Before we begin our first thinking skills lesson, I would like to give you a short test to measure how good your thinking skills are at this time." The teacher might then explain that the "test" students will take must be completed within a 15-minute time limit, and that the test rules forbid the teacher from answering any of students' questions about the test. The teacher further explains that the directions for completing the test are all written on the test itself. The teacher then distributes the "test" papers (reprinted on the following page), face down. When all students have their "test" and a pencil, the teacher displays a stopwatch, tells students that they must be silent, that they must work alone, and reminds them of the 15-minute time limit.



As you can see from the reprint on the following page, the "test" is a contrived activity that asks students to read all test items before answering the first question. Since very few students follow these directions, because they are poor observers, they complete all test items only to find that the last test item asks them simply to put their name on the top of the first page. As more and more students reach the last test item, the groans and moans increase as they realize they have been "tricked."

Thinking Skills Test

Read all of the items on this test before you begin. Follow the directions.

1. Put your name in the top left section of this paper.

2. Add the first three digits of your telephone number.

3. Name the third president of the United States.

4. Alphabetize the first names of all students sitting in your row.

5. Name four ways you are different from your teacher.

6. Stand at your desk and try to touch your left knee with your palm without bending your knees. Can you?

7. Close your eyes VERY tightly. Describe what you see.

8. List four states that border the Atlantic Ocean.

9. Put only your forehead on your desk. Try to make the tip of your tongue touch the desk. Can you?

10. List at least 20 different things that are green.

11. Put your arm in the air and extend it as far away from you as you can reach. Put the palm of your hand away from you. Try to count the horizontal wrinkles on your third knuckle. How many do you have?

12. Now that you have read the entire test, do only item number one. Give your test to your teacher.

Activity Two
Helping Students Understand the Nature of the Skill
(5-10 Minutes)

For the Teacher: Definition for the Skill of Making an Observation

Observation is the ability to examine objects or events through the use of all appropriate senses. The purpose of observation is to note details, identify elements that are missing, locate problems, or understand what might be causing something to occur. One must decide what the purpose is in making the observation, and which attributes (or factors) should be observed. Characteristics of these attributes are gathered during the observation. Instruments or machines can be used to aid our observations. Inferences are often made on the basis of these observations. Observations can yield either qualitative or quantitative characteristics.

Student Definition for the Skill of Making an Observation

Observation is the ability to use some or all of your senses to find problems or details, to understand what might be causing something to occur, or to identify missing parts. To be a good observer, you must know why you are making the observation and what attributes are important to observe. When you observe, you find the characteristics of these attributes.

Synonyms for *observation* include these words:

noticing *paying attention* *studying* *focusing*

The Following Examples May Be Shared

Observation requires careful attention to the attributes and characteristics of an object or a scene. It is also important to notice things that usually go unnoticed and to have an open mind about your topic. By observing, we begin to gather the data or necessary information to answer some of the questions we may have about a subject, event, or object.

1. A doctor observes a patient's symptoms to diagnose an illness.
2. An artist observes color, light, texture, and other attributes before painting a picture.
3. A new student observes other students' behavior on the bus to decide how to act in the future.
4. We observe our old sneakers to decide what kind of new sneakers to buy in the future.
5. We observe the oranges or melons in the grocery store to decide whether to buy one or not.
6. In science, we observe the effects of an experiment to see if our hypothesis was correct.
7. We observe a music video with our eyes and our ears to decide if we want to buy the tape or the CD.

8. We observe ourselves in the mirror to make sure we are dressed appropriately.
9. We observe various career fields to see what kind of job we might want in the future.
10. We observe a good athlete, dancer, or actor to learn how to move or act the same way.

Activity Three
Skill Rationale
(5-10 Minutes)

Various Purposes for This Skill

We use the skill of making an observation for a wide variety of purposes. Here are a few of the various purposes for making an observation that can be shared with students (or generated by students during a discussion period). There are at least seven reasons why people need to be good observers:

1. To find a problem.
2. To solve a problem.
3. To be able to reproduce something.
4. To better understand something new or different.
5. To decide on a future action.
6. To monitor a behavior or event.
7. To analyze or evaluate something.

Relevance of This Skill

To help students appreciate that the skill of making an observation is relevant for them, the teacher might spend an additional 3 to 5 minutes "selling" the skill to students with the list of benefits that follows. Another alternative is to provide or list a few of these items and then ask students, individually or in groups, to share additional reasons why this skill is useful.

If students are willing to work to improve their ability to make observations, they will reap these benefits:

1. They are less likely to miss important information when they read, travel, or conduct an experiment.
2. They will be able to spot problems or difficulties that other people miss or cannot find.
3. They will be more organized in the way they conduct an observation, take notes, or interview someone.
4. They will be able to enjoy books, movies, music, art, or travel more because they are spending more time making observations. More time spent on observation means a richer experience for the learner.

5. They will be able to write more descriptive and better-organized essays or reports. After all, many essays are descriptions based on what you have observed from your senses, or by reading or talking to other people.
6. They will be more likely to remain curious and full of wonder about the world and everything there is to learn.
7. They will be able to make discoveries and learn new things.

Consequences of Poor Ability With This Skill

Some students have difficulty with the skill of making an observation. Other students know how to use the skill, but fail to use it when it is important to do so. To help students appreciate the negative consequences of poor use (or lack of use) of this skill, the teacher can spend 3 to 5 minutes asking students to contribute anecdotes about themselves or others. These anecdotes should demonstrate why the person had difficulty when they failed to use the thinking skill. The anecdotes should also help to provide concrete examples of students' prior misuse of this skill. Students may share stories that describe what happened to them when these situations occurred:

1. They were asked to make an observation in school, but they paid attention to the wrong attributes and were not able to finish the assignment correctly.
2. They jumped to the wrong conclusions because they did not make a careful observation.
3. They were not willing to spend a lot of time on an observation and missed important information, or missed finding an important problem.
4. They did not understand a movie, song lyrics, or a story's plot because they did not make a careful observation.
5. They made a bad decision because they had not made an observation before they made their decision.
6. They made an observation just because someone told them to, but they did not really know what they were supposed to be looking for.
7. They did not check their observation by asking someone else, or by repeating it, and ended up drawing the wrong conclusions.
8. They forgot to use an instrument, a machine, a chart, or a measuring device, and their observation was inaccurate.
9. They did not complete their observation with an open mind and they jumped to the wrong conclusions.

Activity Four
Explaining the Skill Strategy
(5-10 Minutes)

Skill Strategy for Making an Observation

To help students understand how to improve their ability to make observations, teachers might explain the following skill strategy.

1. State the **purpose** for the observation.
2. Decide what you are going to observe and decide what **attributes** are relevant for the stated purpose. Determine how the observations will be recorded.
3. Concentrate on one element, characteristic, or attribute at a time. Use your **senses, tools, or charts** and record that piece of information.
4. Try to keep an open mind and put aside your experiences prior to beginning the observation. Take **notes** to gather as much information as you can about the characteristics of that attribute.
5. **Repeat** this procedure for all attributes.
6. Analyze the results and draw a **conclusion**.

Activity Five
Explaining the Graphic Organizer
(2-3 Minutes)

Using a Graphic Organizer to Accompany the Skill Strategy

The teacher should show students the relationship between the various components of the skill strategy and the various parts of the graphic organizer. The graphic organizer to accompany this skill strategy might be drawn to resemble a chart that has one column to list the attributes and another column to list the characteristics of the attributes that were noted during the observation. It is reprinted on the following page.

Explaining the Graphic Organizer

When used correctly, students will list the purpose for the observation in the top box of the graphic organizer. All attributes that are relevant to this purpose would be written in the first left-hand column. Specific details that result from the observation can be listed in the right-hand column. The last box on the page is used to help students draw conclusions or make decisions about their purpose after the observation has concluded.

OBSERVING

Definition: An observation uses our senses or tools to identify missing parts or to find information, problems, and details. To make an observation means to identify attributes and find the characteristics of these attributes.

Steps:

1. **Set Purpose**

   Decide on the **purpose** for this observation

2. **List Attributes**

   List of find the **attributes** that are relevant for your purpose.

3. **Use Your Senses, Tools, or Charts**

   Concentrate on one attribute at a time. Use your **senses, books, tools, or other people** to observe characteristics of this attribute.

4. **Make Notes**

   Make **notes** about the characteristics of the attribute that you observe.

5. **Repeat**

   Repeat Steps 3-5 for all attributes, as often as necessary. Beware of new or unusual information.

6. **Draw a Conclusion**

   Draw a **conclusion** based on your notes.

Graphic Organizer
Observation

Purpose

Attributes	Characteristics

Summary

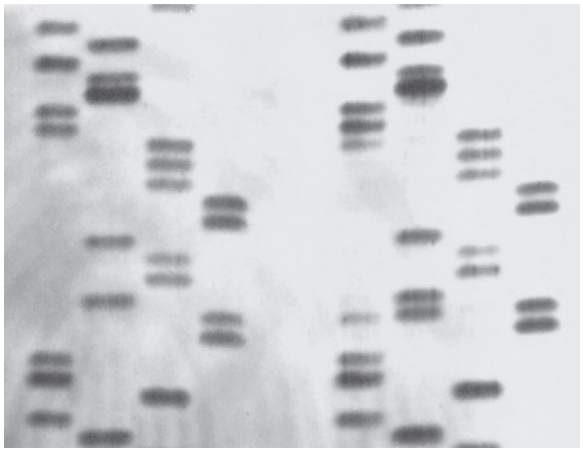
Activity Six
Modeling the Skill Strategy
(5-10 Minutes)

Sample Modeling Activity: The Sick House Plant

Tell students that before they practice this skill and its strategy, you want to model it for them. To model the appropriate use of this skill, bring an ailing houseplant from home or borrow one from a friend. Ask a neighborhood gardener or your local nursery to let you borrow some litmus paper (to test the acidity of the soil), a book about houseplants (to identify the attributes that are useful for this observation), a thermometer, and a hand-held tool (hygrometer) to measure the dryness of the soil and/or the humidity in the air.

Explain to students that you are worried about the houseplant because it doesn't appear to be healthy. However, before you try to do something to help the plant, you need to make a careful observation. Otherwise, you might give the plant a treatment it does not need, or a treatment that does not work. Tell students that you will model the skill of making an observation for them using your houseplant problem as the modeling activity.

Show students the plant and the houseplant book. Tell them that you have marked certain sections of the book that describe the attributes to observe when a gardener is observing an unhealthy plant. Write your purpose (to help cure the house plant) on a copy of the graphic organizer that has been made into a transparency for all students to watch. Identify the attributes that are relevant for this purpose (acidity of the soil, temperature of the room, length of the stems, depth of the roots, color of the leaves, water in the soil, humidity in the air) and list them on the graphic organizer. Identify which attributes should be measured with tools and that should be described through the sense of sight or sound.



After you have announced the purpose and the attributes, proceed with the observation using one attribute at a time. You might observe the acidity of the soil with the litmus paper, the temperature of the room with the thermometer, the color of the leaves using your eyes, the depth of the roots by lifting the plant from the pot. Write down all details as they are observed. When finished, orally review and summarize your findings. Draw a conclusion about what you believe is causing the problem and decide how you will solve the problem using the advice from the houseplant book. Think "out loud" as you explain how you use each step in the skill strategy to solve the houseplant problem.

Phase Two:
Teaching the Guided Practice Lessons With Familiar Content

Activity One
Conducting Guided Practice Activities With Familiar Academic Content

Sample Practice Activities
(10-50 Minutes Each)

1. A Rose Is a Rose: (Science)
Assuming that students can already name the parts of a plant, ask them to name the attributes of a flowering plant (stem, petal, leaves, stamen, anther). Provide each small group with a different flower and ask them to use the graphic organizer to list these common attributes and describe the characteristics of their flower as they pertain to these attributes.

2. The Art Critic: (Fine Arts)
Assuming that students already recognize the attributes of foreground, background, depth, and perspective, ask them to use attributes to complete a thorough and detailed observation of a familiar painting (Mona Lisa, Whistler's Mother, Starry Night). The debriefing can discuss how the characteristics of attributes can change from one observation to the next.

3. The Mathematics of Interior Decorating: (Math)
Assuming that students already recognize the attributes of height, length, and depth, ask them to use these attributes to measure, describe, and observe various pieces of furniture in the school, classroom, or in their home to aid in rearranging the furniture. The debriefing can include a discussion of how quantitative observation can be used to inform decision making—in this case, trying to decide which furniture might fit in special locations in a room.

4. The Mystery Locale: (Social Studies)
Assuming that students already understand various geographic terms, ask them to individually list five geographic attributes of any country (terrain, latitude, longitude, winter climate, average temperature, annual rainfall). These attributes can vary by students. Tell students to list these attributes on their graphic organizer and to pick a "mystery country" that they will describe, using secondary sources for their observation, on the graphic organizer. Students should not reveal the name of their country. After students complete their observations, they can exchange papers and try to identify the countries. The debriefing should emphasize the importance of choosing useful attributes that fit the purpose.

5. The Book Review: (Language Arts)
Tell students that we can observe print information just as easily as we observe events or actions. Tell students to assume they have been asked to write a review of a new book they have just read. Ask students to restate the purpose for making an observation in their own words. Ask them to name attributes they could examine for this purpose (characters, plot, setting, conflict, theme). Ask them to select several useful attributes and carefully observe their book to note and describe these attributes. Share reviews with each other. The debriefing can discuss the importance of "rich" adverbs and adjectives when making literary observations.

Activity Two
Conducting Guided Practice Activities With Familiar Real World Content

Sample Practice Activities
(10-50 Minutes Each)

1. Batter Up: (Recreational)
Assuming that students are already familiar with baseball cards and their contents, ask students to each take one card from a set the teacher has provided. Ask students to identify the attributes they would observe (from the card) to decide if they should keep or trade the player described on their card. During the debriefing session, ask students to describe the characteristics of these attributes as they pertain to the player on their card.

2. The Better Backpack: (Consumer)
Tell students to imagine that they have been given money to buy a new backpack. Tell them to assume that they want to buy a better backpack than they already have and that they have decided to do an observation of their old backpack before they visit the store. Ask students to use the skill strategy and the graphic organizer to complete the observation of the strengths and weaknesses of their backpack. During the debriefing session, stress the fact that different students chose different attributes to observe because different features were important to them.

3. Health Check: (Personal)
Tell students that observations can be conducted over time and that counting or measuring is one way to describe the characteristics of an attribute. Tell students that you would like to have them practice the observation strategy by measuring their pulse and respiration rate during different times of the day. Ask small groups of students to construct their own data chart to record these observations. Then ask them to measure their pulse rate during a 15 second interval and multiply by four to obtain the rate for one minute. Do the same for the respiration rate. Place these two observations on students' data sheet(s) and repeat the observation at four previously agreed upon times during the day. Reinforce the idea that this activity is designed to help them create observations over time and to create their own data sheets.

4. The Boss Is Watching: (Vocational)
As a small group, ask students to name the attributes an employer might use to guide the observation of a new employee (punctuality, neatness, independence, interpersonal skills). Give each group the name of a different kind of school employee to consider (nurse, custodian, bus driver, playground aide, teacher). Ask students to use their attributes to guide an observation of the employee assigned to their group. Encourage them to choose attributes that are relevant for a *new* employee in the particular position they have been assigned.

Phase Three:
Guided Practice, Single Skill, New Real World Content

Sample Practice Activities
(10-50 Minutes Each)

1. The Food We Eat: (Science)
Discuss the new food pyramid that has been disseminated by the health department to better guide our nutritional decisions. Explain that these categories also can be considered food attributes. Use these attributes to observe the nutritional label of a boxed, canned, or prepared food. Identify the strengths and the weaknesses of this food based on the observation.

2. Tombstone Art: (Social Studies/Local History)
Some people consider a cemetery a good place to gather data about local history. Many of the tombstones that decorate gravesites are full of information about famous people, local residents, their beliefs, and their values. Use slides, photographs, or a walking tour to help students identify the standard attributes observable on a tombstone (life span, names, relatives, religious beliefs, symbols, names of diseases, materials used, decorative symbols). Identify the attributes that they would like to observe (or let them set their own purpose), and conduct a walking tour of a local cemetery. Ask each student to observe 10 tombstones. Discuss their findings.

3. Observing Our Math Problems: (Math)
Most math problems that students encounter have a number of common attributes that should be used to solve the problem. Discuss with students the attributes of a math problem (goal statement, unknowns, givens, irrelevant information, procedures, evaluation). Give students several math problems and ask them to observe (not solve) the problem to identify the specific characteristics of the problem based on the list of attributes that was generated. Tell students that this observation step should help make them more accurate math problem solvers.

4. Fine Tuning: (Music)
One aspect of music appreciation is learning to recognize the various orchestral instruments that are used in different passages in a musical composition. Give students a short piece of music that is played by a variety of instruments (example: *Peter and the Wolf*). Tell them that it is their job to identify which instrument is playing first, second, third. Encourage them to find their own method for discovering how various instruments sound before they hear the piece.

5. The Story Editor: (Language Arts)
Explain to students that a proofreader or an editor makes careful observations when they analyze a story or an essay. Help students generate several attributes (punctuation, clarity, syntax) that an editor might consider in observing (reading) an essay or a short story. Reproduce copies of a contrived writing sample (a poor example) for all of students. Ask students to observe this writing sample using the attributes they have identified. Ask students to evaluate the writing sample on the basis of their observations. Based on their observations, what advice might they give to the author to improve the writing?

6. The Great Unknown: (Vocational)
Tell students to assume they are anthropologists who have to make an observation to describe a new culture they will be studying. Ask them to explain how they will go about organizing and making this observation. What is their purpose? What attributes will they use? How will they gather their data about these attributes?

7. To Buy or Not to Buy: (Consumer)
Ask students to explain how they could use observation to decide whether or not to purchase a new board game that is being sold in the toy store. Give them an unfamiliar game after they have discussed their technique and let them use their approach. Evaluate the strengths and weaknesses of their observation.

8. Buckle Up: (Civics)
Tell students to assume they have been asked by the police department to determine how many drivers who pass by their school are obeying the seat belt law. Allow students to create their own tally sheet to record their observations. Suggest numerous considerations they should discuss (time of day, length of observation, number of observers) before beginning their observation. If possible, let them conduct and describe their observations.

9. Tidy Up: (Personal)
Ask students what attributes their parents consider when observing a child's bedroom for cleanliness and tidiness. Ask students to use these same attributes tonight as homework to observe their *parents'* bedroom. Discuss the findings.

Phase Four:
Prompted Transfer to Current Academic Curriculum

Language Arts

1. During a unit on study skills and textbook organization, students might be asked to use the attributes of "heading, diagram, caption, and boldface" to observe the highlights of a new chapter in a content textbook.
2. During a unit on literary terms, students might be asked to read (observe) a new piece of literature to find specifics about the attributes (terms) of mood, setting, or theme.

Science

1. During a unit on dental health, students might be asked to observe the quality of their toothpaste for cost per ounce, abrasiveness, or pH level.
2. During a unit on plants, students might be asked to germinate a seed and observe the special characteristics of that seed's attributes (cotyledon, primary root, root hairs, hypocotyl).

Social Studies

1. During a map-reading unit, students might be given an unfamiliar map and asked to use the map key to find the map attributes.
2. During a history unit, students might be given an unfamiliar antique and asked to describe its attributes and unique characteristics to infer its function.

Math

1. During a unit on time, students might be asked to observe, describe, and measure the reaction time of a fellow student who is asked to conduct several activities.
2. During a unit on linear measurement, students might be asked to observe a specific classroom's two lengths and two widths to determine if the room was built properly, with identical widths and identical lengths.

VI. Planning
Background Information for the Teacher

Definition of the Skill

The activities in this unit have been designed to help students of all ability levels improve their skill at planning. For the purposes of this unit, planning is defined as the ability to identify what must be done to reach a particular outcome. Planning is a procedure that is used by skillful thinkers to identify all the elements in an effective plan. A good plan states what needs to be accomplished, lists the resources, equipment, and other items that are needed to carry out the plan, lists the tasks or steps that will be taken to accomplish that plan, and forecasts any problems that may prevent the plan from being implemented. An *effective* planner also includes a follow-up step that evaluates the plan's *effectiveness* and makes a list of suggestions or revisions for improvement after the plan has been implemented so that it can be used successfully in the future.

Before students begin a task, they should be encouraged to develop a plan or strategy to carry it out. This anticipatory thinking usually involves three tasks: setting a goal to be accomplished; describing the steps, strategies, or plans for achieving that goal; and anticipating potential problems that may interfere with the implementation or execution of the plan.

After students identify their goal, they will identify the materials, equipment, people, or data needed to carry out the plan and will then arrange a sequence of events or steps to accomplish that goal. As they begin to consider these steps, teachers should encourage students to think of any other resources they may need and add these to their resource list. Students should also attempt to identify the obstacles that may prevent the plan from being accomplished and errors that might be made. Teachers can ask students to make these predictions based on prior experience and to use them to improve the plan prior to implementation.

As students begin to implement the plan, teachers should ask students to follow the steps carefully and make any adjustments that would improve the plan or accomplish the goal. Although these plans appear to be sequential, the planner often returns to prior steps during the process to add more detail. Effective planners will be able to accomplish this by learning how to monitor and assess the tasks that are being performed. As they execute the plan, planners will assess the extent to which the plan is working and may revise the plan or even perform unplanned steps as they assess and monitor its effectiveness. Those who are learning the planning process for the first time may experience difficulty with these two acts of thinking. Prompting or coaching from the teacher will assist the novice thinkers as they learn to use the skill more efficiently.

After the task has been completed, students will be asked to assess the quality of the plan that they devised, assess how the plan accomplished the goal, and make recommendations for improvement.

Purposes for This Skill

The thinking skill of planning can be used in any academic area or career field. Some purposes may include the following:

1. to arrive at a solution to a problem;
2. to develop a strategy to accomplish a goal;
3. to teach someone else how to complete a task;
4. to plan future events; and,
5. to improve a situation.

Examples of This Skill

This skill is usually used in conjunction with other thinking skills to make a plan to accomplish a specific task. Examples of this skill include the following:

1. students who are planning classroom projects or assignments;
2. families who are planning vacations;
3. store owners who are planning to organize a sale at the store;
4. teachers who are writing lesson plans to use in their classroom; and
5. authors who are writing stories.

Prerequisites for Using This Skill

For students to use the planning skill, they must be able to perform these tasks:

1. recognize the goal to be accomplished;
2. develop a plan to achieve the goal;
3. predict circumstances that may prevent the implementation of the plan;
4. monitor and assess the implementation of the plan;
5. modify the plan or strategy based on potential obstacles that occur or errors that are likely to be made;
6. identify the resources that will help them achieve their goal and carry out the steps of the plan;
7. evaluate the quality of the plan; and
8. determine the extent to which the goal was achieved.

If students have difficulty with any or all of these prerequisites, it is likely that they will need explicit instruction from the teacher to improve their ability to plan. Students may have difficulty with this skill, not because they cannot devise a plan, but because they have not become proficient at thinking about their own thinking. Teachers can help students become better at their own thinking by engaging students in “think aloud” activities about

the thinking or tasks in which they are engaged or are about to be engaged, or the activity which they have just completed. Teachers can help students think about the plans they are implementing by intervening during the actual performance of the tasks and asking students to assess the results they are obtaining. Another way to facilitate this process is to ask students to coach the teacher as they model the overall process.

Students can design questions to help the teacher think about what they are doing as the teacher works through the plan.

There are several questions that can be useful in facilitating this process:

1. What did I do first to accomplish my goal?
2. What obstacles did I encounter? How did I discover these obstacles?
3. How did I know when I was on the right track?
4. Is the outcome of my plan making sense?
5. What considerations should be made before I begin to devise a plan?
6. What do I already know about the problem or task that I am planning to solve or accomplish?
7. Did the plan help me accomplish what I had initially intended to achieve?
8. What revisions would I add to my plans to make improvements for its future use?

At other times, students may have difficulty with this skill because they have incorrectly identified the problem to solve or goal to achieve, and have failed to divide a complex problem or goal into several sub-goals. When this happens, students may need to be directed in identifying when an activity has multiple problems or goals that need to be achieved and in understanding that different problem/goal statements will generate different plans.

Another common problem with the use of this skill is that students may experience difficulties in anticipating obstacles that could interrupt the execution of their plans. The ability to predict these potential problems often depends on prior experience with a similar task. Those students who refuse to rely on this information should be encouraged to talk to other people and to gather information that will increase the planner's knowledge about the topic under discussion.

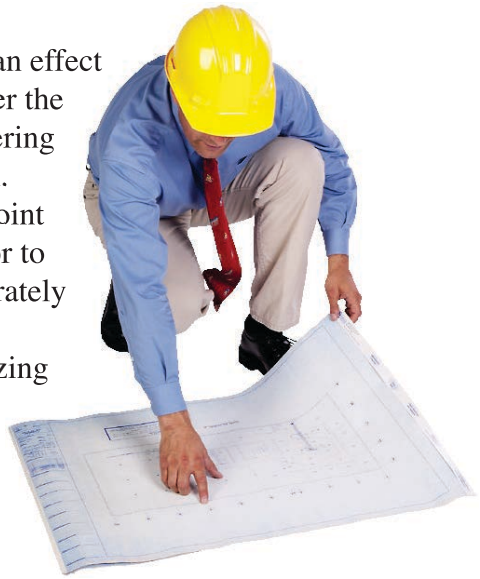
Students will also experience difficulty in assessing the implementation of their plans. They should be prompted to observe and evaluate the effectiveness of each step of the plan as it is implemented. Teachers can help students by having them stop after each step of the plan and mark the steps that worked successfully. In addition, students should be encouraged to periodically check the reasonableness of the outcomes they have achieved.

Strategy for Designing a Plan

To be an effective planner, one must realize that a plan needs to be made. This stage of problem recognition requires students to make a succinct statement of the problem or goal that will guide the development of a plan. It is important that students recognize there may be several problems or goals to accomplish. These complex plans should be broken down into several sub-goals/sub-problems to make the planning manageable. Initially, the teacher may want to identify the goal statement that will be accomplished so that students can focus on the development of the plan.

Developing plans or strategies also require some prior knowledge or experience with the content area that is the focus of the plan. When little information is known about the problem or goal that is under investigation, students may incorrectly identify the problem or fail to plan accordingly. Therefore, an understanding of the topic underlying the problem will help students to select their strategy or design the steps to reach the goal by eliminating obstacles or errors that have been previously experienced.

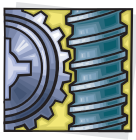
Good planners also realize that random events may occur while the steps are being implemented, and they must assess and monitor the outcomes at each step before proceeding forward with the other steps. Therefore, students should be prepared and encouraged to adjust the steps by building these provisions into their plans. The planners should realize that the execution of the plan may be interrupted, and they will be asked to seek additional information or data before they continue. This interruption may also require the planner to gather additional materials, equipment, or human resources before they can effectively implement their plan. Students should be encouraged to document this information and adjust the plan accordingly.



Planners will learn to recognize that important plans may have an effect on other people that will require the planner to carefully consider the outcomes. Often, they will make provisions for this by considering how these individuals perceive the plan prior to implementation. Those who work to develop group plans try to understand the point of view of others and seek to obtain information from them prior to the development of the plan. Therefore, planners should deliberately examine a variety of viewpoints and seek to be well informed. Respecting others, examining alternative viewpoints, and analyzing data that challenge a preconception should be the dispositions that effective planners use to eliminate their personal bias. Teachers can help students in this area by providing modeling lessons or by having students analyze a plan that failed as a result of not using all the available data.

After the plan has been implemented or followed, planners will reflect upon the effectiveness of the plan, evaluate the extent to which the goal was achieved, and note the areas of the plan that may need improvements. If the plan is to be used in the future and improvements have been made, students can use this plan again to accomplish similar tasks.

Phase One:
Introducing the Unit to Students



Activity One
Focusing Activity: Whoops! What Went Wrong?: Planning a Peanut Butter Sandwich
(30 Minutes)

One way of impressing on students the importance of using the planning process is to arrange an opportunity for students to help the teacher "think out loud" through a plan that the teacher is trying to make. The focus of this lesson will be on the introduction of the planning skill. During this introductory lesson, discuss with students the importance of this skill and how it is used on a daily basis. Emphasize that plans are often made without much thought, such as what we plan to wear to school, what we plan for supper, or how we make a sandwich. Other plans are major and have far-reaching effects based on what kind of action is taken. These major plans might include drafting a bill, planning a wedding, and writing a book. Ask students to share some of the plans they have made in their personal lives or plans that are school related.

Tell students that the planning skill unit will help them increase their ability to make plans that accomplish tasks, solve problems, and organize projects. Explain that the objective of today's lesson is to participate in a whole-group activity that will help them to work through the steps in the planning process. Use the sample focusing lesson below to introduce the planning skill to your students.

Explain to the class that you would like their help in developing a plan that tells someone how to make a peanut butter sandwich. Tell students that you realize they have lots of experience making these sandwiches and thought that they could help you with the planning. Divide students into 6 groups and ask them to prepare a plan that will help another person make the sandwich. Ask the groups to use the Graphic Organizer for Planning to record their responses. This guide will be used to identify the materials, list the steps to make the peanut butter sandwich, and state any problems that they think will prevent the other person from making this sandwich. Stress the importance of writing the steps in order and listing all the materials that are needed. Tell students that you will demonstrate how to make each sandwich by following their plans.

The teacher should be prepared to bring in the items that students have written on their guides. The day after the activity, use these plans to make the sandwiches. Follow each step of the plan exactly as recorded. You will notice immediately that students will inform you that you have completed the task incorrectly, and they will begin to clarify their intentions. Continue to demonstrate the other plans until you have used all of the guides.

This activity can serve as a springboard for the discussion of the planning skill. The difficulty of developing a plan that helps others complete a job or learn how to make

something should be emphasized. The teacher can bring closure to the activity by having students use this experience to discuss what they would do if asked to perform a similar task. The teacher may want to acknowledge students' thinking by distributing small sections of the sandwich.

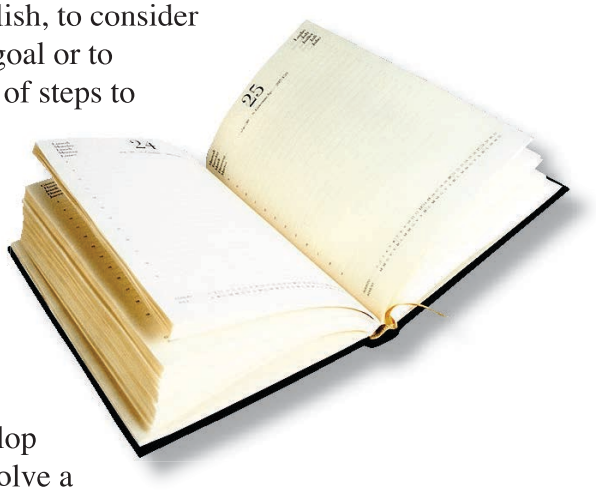
Activity Two
Helping Students Understand the Nature of the Skill
(5-10 Minutes)

For the Teacher: Definition for the Planning Skill

Planning is a procedure that is used to direct and regulate steps to help reach a desired goal. The purpose of the planning process is to design a strategy for solving a particular problem or accomplishing a stated goal. The planning process begins with the identification of a problem or goal and a deliberate attempt to examine and consider what information may be needed to assist you in the construction of a plan. Next, the planner begins to identify any materials, equipment, and resources that may be needed to accomplish the plan. Using the information gathered and resources identified, the planner seeks to brainstorm the steps or strategies that might be followed to reach the goal. When the planner begins the execution of these steps or strategies, he/she may be faced with obstacles or problems that might prevent the planner from accomplishing the goals. The planner will be asked to make revisions or consider alternative solutions or strategies to assist in moving forward with the plan. As the planner completes the procedure, he/she will evaluate the quality of the plan and make recommendations for improvement.

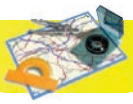
Student Definition for the Planning Skill

Planning is a way to identify what you want to accomplish, to consider resources and information that you need to reach your goal or to understand the topic, to design a strategy or make a list of steps to accomplish your goal, and to forecast problems that may prevent your plan from being used successfully. Planning is a skill that helps us achieve our goals, solve problems, and implement our ideas. To be a good planner, you must be willing to gather data about the topic, predict what problems you may encounter, and be willing to revise your thinking as you begin to execute your plan. Good planners are willing to seek outside opinions and remain open-minded as they develop a plan to accomplish their goal or design a strategy to solve a problem.



Synonyms for *planning* include these words:

representing *designing* *developing*



The Following Examples May Be Shared

Planning is a skill that we use everyday. Some of our plans are personal, such as exercise programs that we individually design to help us lose weight. These plans usually require us to think about how we can more effectively accomplish a personal goal. We must consider why other plans have failed in the past, and we must analyze why we choose to do different things. Examples of this type of planning might include the following:

1. developing a plan to improve the way we treat our brothers and sisters;
2. designing a homework schedule that will help improve my grades; and
3. making plans for saving money to go to college.

A second type of planning involves plans that affect other people. We make this type of plan when we try to solve social problems, design laws, or solve a problem that involves a lot of people. These plans require us to learn how to examine multiple viewpoints, seek credible sources, and remain objective in our thinking. Examples of this type of planning might include these tasks:

1. designing discipline rules that govern the school;
2. establishing playground rules;
3. planning a school reunion;
4. planning a visit to the local museum; and
5. developing a plan to protect children at night from being hurt by random violence.

Another type of planning may require the thinker to design a strategy to solve a problem. This will require the planner to identify a problem statement, identify a strategy for solving this problem, define the steps that the planner will execute first, second, third, gather data to help the planner solve the problem, predict potential errors or obstacles that may prevent this strategy from being successful, and evaluate the reasonableness of the outcomes. Examples of this type of planning might include these tasks:

1. designing strategies for solving complex math problems;
2. developing a plan to construct an earthquake structure; and
3. designing a plan to build a rocket that flies at a faster speed.

Activity Three
Skill Rationale
(5-10 Minutes)

Various Purposes for This Skill

We use the skill of planning for a variety of purposes. The following purposes for developing a plan can be shared with students (or generated by students during a discussion period):

1. arriving at a solution to a problem;
2. developing a strategy to accomplish a goal;
3. completing a task;
4. improving a situation; and
5. planning future events.

Relevance of This Skill

To help students appreciate the relevance of the skill of planning, the teacher might discuss the benefits of using this skill. Students can brainstorm, in small groups, additional reasons why this skill is useful.

If students are willing to work to improve their ability to make plans, they will reap these benefits:

1. They will be less likely to forget important information that may affect their plans.
2. They will be satisfied that their planning helped them to achieve their goal.
3. They will be more likely to use multiple resources to examine information from a variety of viewpoints.
4. They will be more critical of inaccurate information and use credible sources of information.
5. They will improve their ability to identify potential problems that may interfere with the success of their plan.
6. They will be more convincing when selling the idea of a possible solution to a problem because they have carefully considered the consequences of the plan.
7. They will be more confident in executing their plans because they have invested the time to consider all factors relating to the goal prior to implementation.
8. They will be more willing to change a position and make adjustments to the plan when evidence and reasons are sufficient to do so.
9. They will be able to assess when the plan is not working as it was originally anticipated.

Consequences of Poor Ability With This Skill

Some students will have difficulty with this skill, while others may be more accomplished planners. To help students appreciate the negative consequences of poor use (or lack of use) of this skill, the teacher can share anecdotes that provide concrete examples of the misuse of this skill. The teacher, as well as students, should be encouraged to share stories that describe what happened to them when these situations occurred:

1. They failed to consider how the plan would affect other friends.
2. They based their plan on personal preferences and did not consider other viewpoints.
3. The plan was based on inaccurate information or incorrectly selected data.

4. The plan was executed without careful thought to the reasonableness of the outcomes as each step was performed.
5. They made the plan without considering if others would accept the idea.
6. They incorrectly identified the goal to be achieved.
7. They created a plan that caused more problems.
8. They failed to accomplish their goal because the plan was based solely on personal opinion.

Activity Four
Explaining the Skill Strategy
(5-10 Minutes)

Skill Strategy for Planning

To help students understand how to improve their ability to plan, teachers might explain the following skill strategy. To make a plan the thinker should:

1. **Identify** the goal to be achieved.
2. **Gather** any materials, information, equipment, or people that you need to accomplish this task.
3. **Brainstorm** the steps for accomplishing this goal. Arrange these steps in the order that they will be implemented.
4. Predict potential **problems** that may prevent you from accomplishing your goal and make adjustments to the plan.
5. **Implement** the plan.
6. **Evaluate** the quality of the product and your plan.
7. Decide to what extent your goal was achieved and identify ways to **improve** your plan for future use.

Activity Five
Explaining the Graphic Organizer
(2-3 Minutes)

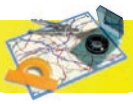
Using a Graphic Organizer to Accompany the Skill Strategy

The teacher should show students the relationship between the various components of the skill strategy and the various parts of the graphic organizer.

Explaining the Graphic Organizer

When used correctly, students will identify a goal to be accomplished or a way to solve a problem. This action will determine the type of materials and information that will be placed in the second box. Students should be encouraged to seek outside information that will help them understand the task, complete the strategy, or seek the opinions of others. As students begin to move through the planning process, they need to be encouraged to predict potential

problems that may affect their plans and to build into the plan provisions for dealing with these problems. The steps that they generate can be initially brainstormed and then arranged in the order of execution. As students complete the plan, they should identify any problems that prevented their plans from being implemented as intended so that improvements can be made for future use of this plan. In addition, students should be encouraged to evaluate how well they accomplished their goal.



PLANNING

Definition: Planning is a procedure that you use to accomplish a goal or task.

Steps:

1. Identify the Goal

Decide which goal you wish to achieve. **Identify** what you plan to do.

2. Gather Resources

Gather all the possible materials or information that may help you accomplish this stated goal.

3. Brainstorm the Steps

Brainstorm the steps that will help you to complete your plan. Arrange these steps in order.

4. Predict Problems

Predict **problems** that may interfere with your plan. Use these problems to revise your planning.

5. Implement the Plan

As you work through each step, assess each outcome to determine if it is reasonable. Are you successfully **implementing** your plan? Be prepared to make revisions to your plan.

6. Evaluate the Outcomes

Determine if you have reached your goal. **Evaluate** the effectiveness of your plan.

7. Make Improvements

Identify ways to **improve** your plan for future use.

Graphic Organizer for Planning

Goal Statement:

_____

_____

Resources:

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

Steps:

_____

_____

_____

_____

_____

_____

_____

_____

Predict Problems:

_____

_____

_____

_____

Evaluation:

Did I reach my goal?	☐ Yes	☐ No
Was the plan effective?	☐ Yes	☐ No

Improvements:

_____

_____

_____

_____

Activity Six
Modeling the Skill Strategy
(5-10 Minutes)

Sample Modeling Activity: My Lesson Plans

Tell students that before they practice this skill and its strategy, you want to model it for them. Have students work through a planning activity that has them think through the type of planning you do as you develop and execute daily lessons. Before teaching a lesson, you usually decide on the goal you are trying to achieve. You select the materials and resources that you will need to accomplish your plan, and you begin to select a variety of techniques to achieve this goal. You determine the order in which you think the activities should be performed and then try to anticipate any obstacles that may interrupt this process. You carefully monitor the lesson as it is carried out and use this information to adjust the lesson's sequence. After the lesson, you also assess the extent to which the techniques accomplished your goal, and then you modify the next day's lesson plans based on the results. Use one of your plans and share with students how the planning process helped you to develop a mathematics lesson. Use the graphic organizer to visually display these steps.

Phase Two:
Teaching the Guided Practice Lessons With Familiar Content

Sample Practice Activities
(10-50 Minutes Each)

1. Campaigning for the Trees: (Science)
Trees play an important role in our daily lives, yet we seldom celebrate the gifts they offer. After discussing the important contributions a tree makes to our environment, have students plan a collage that communicates to the public its importance. Students can use the project to demonstrate what they know, what they have observed after a close observation of a tree, and what they wish everyone else knew from their observations and research.

2. Sunflowers: (Fine Arts):
Using van Gogh's sunflower paintings, compare and contrast how the use of color in the two different paintings affects the feeling that is conveyed. Bring to school several sunflowers from a nursery and let students plan how they would paint this sunflower. Ask them to think about the variations they would make to the sunflower and the emotions they would hope to express. Let students create these paintings after they have developed a plan to accomplish this goal.

3. Fourth Grade Survey: (Math)
Have students design survey questions to collect data about fourth graders. The questions should yield numerical data that can be graphed in some fashion. Students might find out how many hours students watch TV, the number of students who have traveled to other states, or the number of students who have a dog. In small groups, students will plan a way to communicate the results of their findings on a graph. Students will use the planning process to prepare for their project.

4. Historical Pumpkins: (Social Studies)
Take advantage of the pumpkin season and bring seven large-sized pumpkins to school. Have teams of students select a historical character to represent by dressing the pumpkin to look like the character. Students should be prepared to make a small presentation about the character of their choice. To add humor, ask students to incorporate their unusual findings into the pumpkin's design. Students can use the planning process to define their tasks and to determine the research that needs to be completed before they begin their carvings.

5. Book Talks: (Language Arts)
To encourage the sharing of good literature, ask students to plan a book talk that describes a favorite story. Students should be encouraged to try to sell the book and may elect to present this talk in a variety of ways. They might be encouraged to dress up as the character, play the role of the supporting character to describe the main character, ask other students to be actors in a small play, develop an advertisement, or create a puppet show.

6. Plan Your Own Indoor Game: (Recreational)
Have students plan a game that can be played indoors when the weather is cold. Have them consider the materials that would be needed to play this game, identify how the game would be played, and list the problems that would need to be resolved before the game could be played.

7. Grocery Lists: (Consumer)
Have students design a new way to help others plan their grocery shopping. Many families prepare for their shopping prior to the event, while others randomly move through the aisles and purchase items that they really do not need. Have students develop a new strategy for those who do not plan accordingly. What might be done to help those people get organized before they go to the store?

8. Welcome Wagon: (Civics)
Using the planning skill, have students develop a "Welcome Wagon" for new students who enter the school. What do they think needs to be done? How would they welcome these new students to the school? What would they include in a package to introduce new students to the school's environment? What action should be taken? Have students develop these plans and develop a proposal to give to the school principal.

9. Homework Blues: (Personal)
Have students discuss the ways in which they complete their homework at home. When do they work on their assignments? What problems do they have in completing their

assignments at home? Ask students to develop a new plan that overcomes these obstacles Have them consider different strategies to solve their problem and then devise a way to carry out this plan.

10. Job Plans: (Vocational)
To find out how the planning skill is used in a variety of job settings, have students select one person in the school (janitor, principal, teacher, cook, secretary) to interview. Students will set up an appointment with this person prior to the interview. Their task is to find out the different ways in which these people use the planning process. Students should ask the person how he/she makes plans and what helps him/her to complete tasks. Students should develop their own plan for completing this activity. After students have completed their interviews, have them compare and contrast the types of plans that are made by these people.

11. Micro-plant Ecology in the Lot: (Science)
Ecologists employ sampling methods designed to limit their observations to measurable units of study called sample plots. Sample plots can be any shape or size, but they are usually square or rectangular. Have students design a plan that will help them organize an investigation to be conducted in a vacant lot. Students can use hula-hoops to define the boundaries. These hula-hoops can be divided into sections so that students can record the type of activity that is present. Students should plan how they will record these observations and measurements prior to the investigations. Students can record signs of vertebrate and invertebrate life and do tests on soil pH, texture, moisture content, and temperature.

12. Folklife in our Community: (Social Studies)
Folklife research by students can make them more aware of their families, their local history, and the bits and pieces of traditional knowledge they possess that makes each student a unique individual. People who are interested in folklife look at many different aspects of the region's culture. They might study the traditions that are passed on by word of mouth from one person to another. Examples of some of these oral traditions (often called folklore) are names, tales, jokes, proverbs, riddles, and tongue twisters. Have students search out their own folklife and folklore and plan a "Folklore Festival" in the classroom. Students can make plans to tell a story that has been passed down to them, recite rhymes and old sayings that are said in the family and explain how they were created, or demonstrate an art or craft that has been taught by one person to another.

13. Developing a Strategy: (Math)
Solving story problems are often difficult for students. Have students develop a plan that helps them to identify the steps that they can try as they solve a problem. Have them discuss what they currently do to solve these problems. What steps might they use to be more successful in solving these problems? Students can create a strategy that they can implement when they are trying to solve a difficult problem. Students can record this strategy in a math journal so that they can access it when needed.

14. Music Videos: (Music)
Have students plan a music video to accompany a theme or topic that has been discussed in class. A piece of music that is appropriate to the theme should be selected. Students will then record the words from the music on a piece of paper that has been divided into 4 inch squares. Students can storyboard their plans by drawing a picture of a slide that they can take with a camera to graphically represent the meaning of the words.

15. Create an Adventure Story: (Language Arts)
After discussing the elements in an adventure story, have students write their own adventure stories by using the planning skill to organize their thoughts. Students will select 4 to 5 adventures that their characters will experience and then identify ways in which the adventure will lead to another adventure. A plan that graphically represents the adventures, plans what action the characters will take, and shows how the adventure will terminate can help students to organize the events in the story and prepare for the writing process. It often helps to take an adventure story that students are familiar with and develop an outline that visually communicates how the adventure was designed by the author.

Phase Three:
Guided Practice, Single Skill, New Real World Content

Sample Practice Activities
(10-50 Minutes Each)

1. Architectural Designs: (Vocational)
Pretend you are an architect who has been hired by the school to design and construct a wooden play structure on the playground. How would you go about your planning? What would you need to consider before you constructed this design?

2. Tennis Shoe Sales: (Consumer)
If you were the owner of a store that sells mostly tennis shoes and you wanted to have a sale, what kind of planning would you do before the event? What problems might occur to prevent the sale from being successful? How would you design the plan to prevent these problems from occurring? Why would it be important to develop a plan?

3. Laws to Protect the Innocent: (Civics)
Bills are often created by our legislators to help develop laws to protect people from danger. How do you think they create these bills? Would it be important for the legislators to use their planning skills to design these bills? Why? What resources would they use? What obstacles might prevent them from reaching their goals?

4. Fire, Fire: (Personal)
In school, we have discussed the importance of knowing what to do if there is a fire in your home. What plans have you developed that will help you to leave your home if a fire starts? Is it necessary to make these plans? What steps will you take to get yourself out of the house?

5. Planning a Camping Trip: (Recreational)
Many families go on camping trips in the summer. Does this call for a plan? How do families prepare for this outing? What makes a camping trip successful? What items would you take to insure that the trip was successful?

Phase Four:
Prompted Transfer to Current Academic Curriculum

Language Arts

1. As students read various mystery books, have them develop a plan for the character to solve the problem. What would the character do first, second, third? What obstacles may prevent the character from implementing the plan?
2. During a writing session, ask students to use the planning process to plan the creation of a literary magazine. How would they accomplish the goal of having a literary magazine created by the end of the semester? What would they need to consider? What should be done first, second, third?

Science

1. As students learn to apply the scientific method to conduct experiments, have them design a project that demonstrates a particular concept. Have them plan the observations to be recorded and design a strategy to gather the data from this experiment.
2. Have students use their planning skill to plan a model of a cell using common household objects.

Social Studies

1. Have students plan a TV commercial/ad on a particular topic that will appeal to teenagers and inform them of a social problem.
2. After studying about various regions in the world, ask students to plan an independent project that investigates these regions in greater detail. Have them think about how to design this research process and develop the steps that will help them to reach their goal.

Math

1. Using a current events article, have students choose a topic to investigate. Have them find enough data about the topic and create story problems from material in the article. For example, students could read a story about a certain country, research the population of this country, and compare it to the United States population. Students can be encouraged to gather additional data from the almanac to create these

problems. Students can create problems that deal with comparisons, percentages, land areas, populations, and wages. The relevancy of this activity is threefold: to see how much mathematics is involved in the current events of the world, to help students apply their mathematical skills to a real world situation, and to develop a plan that will help them organize the project.

2. Students love to solve logic puzzles. Have them use the planning skill to create their own set to share with their peers. Students develop their own plans by analyzing the parts of the puzzle. The plan that they develop will help them organize their own puzzle, complete with directions, a grid, logic statements, and an answer key.

VII. Predicting: Background Information for the Teacher

Definition of the Skill

The activities in this unit have been designed to help students of all ability levels improve their skill at predicting. For the purposes of this unit, predicting is defined as the ability to satisfactorily forecast future events. Being able to make predictions helps us anticipate what may happen in the future and better prepare for upcoming events. Predicting requires us to state in advance what will probably happen next based on the observations we have gathered prior to the prediction, the data we have collected that is relevant to the prediction, and the perceived patterns, trends, or repetitions that we have identified. A good prediction requires the thinker to clearly define what the prediction is to be about; identify attributes relevant to the prediction and collect the appropriate data; observe as many data sets as possible; compare and contrast the attributes or data to decide what stays the same and what changes; determine how consistent these changes are between the data sets to identify a pattern, trend, or repetition; observe the direction of the change; and make predictions of outcomes most likely to occur.

A prediction is different from a guess because a guess is based solely on experiences that are recalled from the past. Guesses may lead to inaccurate predictions if they fail to be substantiated by data collected over time, or when the past experiences or patterns are not compared to current situations. Therefore, the likelihood of something occurring in the future should be based on the trend, pattern, or repetition found in the data over a period of time to prevent a prediction from becoming a guess.

Before students begin a task, they should be encouraged to develop a plan or strategy to carry it out. This anticipatory thinking usually involves three preliminary tasks: defining the prediction, determining what data needs to be collect, and designing a way to map or organize the data. Advanced organizing will help students when it comes time to collect data relevant to prediction, identify patterns, themes, repetitions, or trends in the data, and determine the likelihood of each imagined outcome actually occurring. Failure to plan accordingly may send students in the wrong direction in their thinking, which in turn may cause students to collect data that are not pertinent to the prediction and eventually lead students to state a prediction, outcome, or conclusion that is faulty or inaccurate.

After students identify the purpose for the prediction, they will determine the attributes to guide their observations and data collection. Next, students will need to determine which data will be recorded and develop a strategy to record their findings. If the data they collect are based on an observation, students will need to decide if they will record the event quantitatively (using numbers) or qualitatively (using words) or both. It will be important

for students to determine also *when* they will collect the data. Will they make the observation during a 5-minute period right after recess for one week, during a lunch period for several days, or by gathering known data from several years to identify a trend? This preliminary planning helps students to organize their predictions, to narrow the purpose of the prediction into a manageable experience, and to gather accurate data over time to identify possible trends. As they begin to consider these steps, teachers should encourage students to devise strategies to organize the collection of data. In addition, students may require additional equipment to facilitate the collection of data. Tape recorders may be used to supplement their note taking, while other students may find it helpful to record their observations on a chart or graph. Some observations may require the use of tape measures, stop watches, magnifying glasses, telescopes, petri dishes, and microscopes to obtain the data sets that will be used to make the prediction.

When students complete the collection of relevant data, teachers should ask students to develop a strategy to organize their findings. Students may chart their findings, use graphs, or identify categories of data that seem to go together. At this stage in the prediction, students will be asked to compare and contrast the data to identify patterns, trends, themes, or repetitions between data sets. Based on the consistency in the pattern, directionality of the pattern, the frequency of the pattern occurring, and the repetitiveness of the categories, students will predict the next possible occurrence. Students should also be encouraged to consider similar situations and prior experiences that they recall from the past to generate possible outcomes. Then, students should end the prediction by analyzing the likelihood of that prediction occurring in the future.

Purposes for This Skill

The thinking skill of predicting can be used in any academic area or career field. The purposes for making a prediction can be just as varied. Usually, effective forecasters use this skill to perform these tasks:

1. to determine if a solution to a problem will continue to be effective in the future;
2. to anticipate upcoming events;
3. to modify our behavior;
4. to improve a situation;
5. to decide future actions; and
6. to plan for improving events.

Examples of This Skill

This skill is usually used in conjunction with other thinking skills to make effective predictions. Examples of this skill include these instances:

1. students who use predicting to anticipate the disciplinary action that will take place if they behave in a certain manner;
2. families trying to predict their next month's heating bill;
3. clothing store owners who are trying to select the new fall, spring, and summer clothing colors that will be popular with the teenagers;
4. teachers who are trying to determine how long a lesson will take to teach; and
5. stockbrokers who are trying to project the value of certain stocks in the future.

Prerequisites for Using This Skill

For students to use the predicting skill, they must be able to do the following:

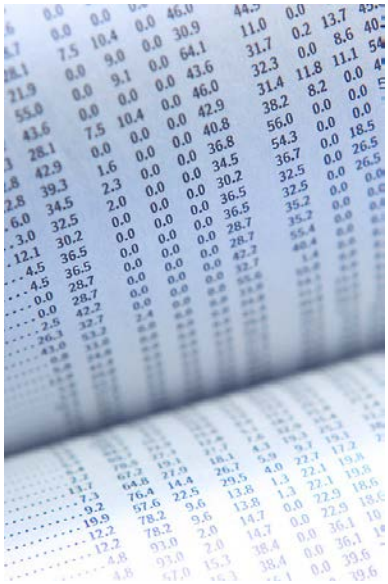
1. determine the purpose of the prediction;
2. select the attributes that will guide the data collection;
3. develop a strategy to collect and record the data;
4. devise a way to organize the collection of data;
5. compare and contrast the attributes or findings to identify patterns, trends, themes, or repetition between data sets;
6. identify the consistency in similarities, directionality of the pattern, or the repetitiveness of the categories to predict what will happen next; and
7. state the outcome that is most likely to occur.

If students have difficulty with any or all of these prerequisites, it is likely that they will need explicit instruction from the teacher to improve their ability to make a prediction. It has been our experience that many students have difficulty with this skill, not because they cannot make a prediction, but because they have not become proficient at organizing a strategy to collect, record, and analyze the data pertinent to the prediction that is to be made. Teachers can help students become better at using this skill by engaging students in "think aloud" activities about the tasks in which they are engaged or are about to be engaged, or the activity which they have just completed. Teachers can help students think about the prediction they are trying to make by intervening during the actual performance of the tasks and asking students to assess the results they are obtaining. Another way to facilitate this process is to ask students to coach the teacher as he/she models the overall process. Students can design questions to help the teacher think about what he/she doing as the process unfolds.

There are several questions that can be useful in facilitating this process:

1. What did you do first to help make a prediction?
2. What attributes did you select to guide the types of observations you made or data you collected?
3. What strategy did you use to record the data?
4. What data did you collect that was relevant to the prediction?
5. How did you organize your data so you could make comparisons?
6. What changes or similarities did you find by analyzing your data?

7. Did your data suggest a trend? Is there a direction to this trend? Did the data have a pattern? Did your information yield important findings? Are the patterns consistent over time?
8. What predictions can be made based on your findings?



At other times, students may experience difficulties with this skill because they have incorrectly identified the purpose for making the prediction, have not followed a systematic way to collect the data, have collected the wrong data, or have analyzed the data incorrectly. When this happens, students may need separate lessons that focus on a specific step. The goal is to help students improve in the ability to make predictions that are likely to occur. Therefore, the teacher will need to assess and monitor the implementation of this skill to identify the specific steps that need to be demonstrated or modeled in large group situations, for groups of students who are experiencing the same difficulty, or for an individual student.

Another common problem with the use of this skill is that students may lack in the experience of organizing their data. Teachers will need to devote time in helping students learn how to organize data in categories, on charts, bar graphs, histograms, line graphs, and pie charts. The ability to organize their own random data is different than being able to read someone else's data on a chart or graph. Teachers should not assume that because students can read a graph displayed in their mathematics books, that students will know how to organize their own data. These are two different skills.

Some students will also experience difficulty in analyzing their own data. This step requires students to observe, hypothesize, infer, detect biases, and note similarities and differences in the data sets. If a student experiences difficulty with any of these prerequisite skills, the outcome of their prediction may be flawed. Teachers should be prepared to help students "think out loud" while they are analyzing the data. In addition, a teacher can determine where students are experiencing difficulties by asking students to justify how they arrived at their prediction.

Strategy for Making a Prediction

To be an effective forecaster, one must determine the purpose for making the prediction. This purpose will help students select the appropriate attributes to observe and identify the data or information to be collected. It also guides students to consider not only **what** data will be collected, but **how** and **when** the data be collected. This anticipatory thinking increases the chances of the prediction being accurate and guards against the possibility of the prediction being a random or biased guess.

The ability to make a prediction also depends upon some prior knowledge or experience with the content area that is the focus of the prediction. When little information is known about the type of prediction that is under investigation, students may collect data that is inaccurate,

inappropriate, and irrelevant to the prediction. Therefore, an understanding of the topic underlying the forecast will help students to select unbiased and accurate data or to disregard data that may be not be pertinent to the prediction. Students should be encouraged to use multiple reference materials to understand the topic in greater detail and seek information from the past to compare with present information.

Good planners also realize that random events may occur while they are trying to collect their data. Therefore, students should be prepared and encouraged to adjust their predictions when there is evidence to suggest that a different trend is possible, to collect as many data sets as possible prior to making the prediction, and to retest their prediction in the future. Forecasters realize that their predictions are based on the probability of something occurring so they are willing to describe their forecasts in terms of what might happen, or is most likely to occur. They also realize that others who are trying to make the same prediction may question their prediction, and they may be asked to substantiate their claim, consider other possibilities, or revisit their data to check on the accuracy of their observations. Students should begin to realize that predictions may change over time, when different data sets are collected and analyzed, or when random events occur to disrupt the predictability of the situation.

When a prediction is made by observing another person, the forecaster must be careful not to influence the behavior of that person. Those who make predictions will learn to recognize that their observations may have an effect on other people that will then require the forecaster to carefully consider the accuracy of their predictions.

Prior to the prediction being made, forecasters will reflect upon several outcomes that are possible and determine the probability of each imagined outcome actually occurring. This will help the forecaster to evaluate the predictions and identify the outcomes that are most likely to occur or warrant further investigation.

Phase One:
Introducing the Unit to Students

Activity One
Focusing Activity: What Is in My Box?
(30 Minutes)

One way of impressing on students the importance of using the predicting skill is to arrange an opportunity for students to help the teacher "think out loud" through a prediction that the teacher is trying to make. The focus of this lesson will be on the introduction of the predicting skill. During this introductory lesson, discuss with students the importance of this skill and how it is used on a daily basis. Emphasize that some predictions are often made without much thought, such as predicting what the end of a story might be or forecasting the weather so you can select the proper clothing. Other plans are major and have far-reaching effects based on what kind of action is taken. These major plans might include selecting a particular stock to purchase, predicting

the effects on the community after many people have lost their jobs, and determining the likelihood of a hurricane approaching the eastern shore line of the United States. Ask students to share some predictions they have made in their personal lives or that are school related.

Tell students that the predicting skill unit will help them increase their ability to make predictions that will help them to anticipate future events, make further decisions, and to plan accordingly. Explain that the objective of today's lesson is to participate in a whole-group activity that will help them to work through the steps in making a prediction. Use the sample focusing lesson below to introduce predicting to your students.

This activity is based on the old "Twenty Questions" game that many of us played with our grandparents when we were younger. Explain to the class that you would like their help in finding out what is in the box that you have brought to school. Tell them that you have placed an object in the box and you are curious to find out whether or not they can identify the object by asking several questions. Tell students that you realize they have lots of experience asking questions and you think that they may be able to make this prediction if they ask the right questions. List on the chalkboard several attributes (e.g., **color, size, shape, material, function, taste, sound, texture, smell**) that students can use to guide the type of questions they ask about the object. Explain to students that they can use these attributes to ask questions concerning the object's color, shape, taste, sound, etc. Tell students that the questions they ask can only be answered by a yes or no response and you will keep track of the questions and answers on the board so that they do not repeat the same questions. For example, if a student asks "Is the object white?" the teacher will record the question on the board under the space marked, **color**, and will respond to this question by placing the word yes or no beside the word, **white**. The following chart is a display of what the chalkboard might look like if the teacher had placed an egg in the box:

COLOR	SIZE	SHAPE	TEXTURE	TASTE	MATERIAL	FUNTION
blue N white Y	8 in. N 2 in. Y	square N triangular N oval Y	smooth Y bumpy Y	sweet N sour N	wood N plastic N	play N writing N eating Y

Explain to students that can use the chart to help them generate other questions. The teacher should encourage them to look for any relationships that they see to help them predict what might be in the box. This activity continues until someone makes the accurate prediction. The teacher can ask students to generate at least 20 questions before they begin to make these predictions. If there are students who know what is in the box prior to the 20 questions being asked, the teacher can encourage them to write their response on a piece of paper or continue asking questions that will confirm their predictions. This game can be played several times

during the class period. Students also enjoy taking turns at playing the role of the teacher who selects the item and has their peers ask the questions, while the teacher plays the role of the student who will ask questions.

This activity can serve as a springboard for a discussion of the predicting skill and its use. The teacher can bring closure to the activity by having students use this experience to discuss what they would do if asked to make a future prediction about some other situation.

Activity Two

Helping Students Understand the Nature of the Skill

(5-10 Minutes)

For the Teacher: Definition for the Skill of Predicting

Predicting is the ability to satisfactorily forecast future events. To make an accurate prediction involves the ability to make close observations, find relevant information, discover possible patterns, trends, or repetitions in the data, and infer what might happen under similar conditions in the future. The purpose of the prediction is to be able to anticipate what may happen in the future and better prepare for upcoming events. The skill of predicting begins by stating in advance what the prediction is to be about. Next, the attributes that are pertinent to the investigation are identified and a strategy is designed to collect the data. The person who is making the prediction also considers how the data will be recorded. After these decisions are made, the process of data collecting is initiated. Using the information that is collected and organized, the forecaster compares and contrasts the attributes to identify similarities and differences, patterns, repetitions, and trends in the data. The directionality and frequency of a pattern will be used to make predictions and determine the likelihood of this prediction to occur.

Student Definition for the Skill of Predicting

Predicting is an educated guess about what will happen in the future. It is made after reviewing appropriate facts or data and looking for trends or patterns in the data. By comparing these data to other data collected in the past, we may be able to predict future events that will have an effect on your community, your family, or you. Predicting is a way to anticipate what may happen in the future and better prepare you for upcoming events. To be good at predicting, you must be willing to collect data pertinent to the prediction, plan a strategy for recording these data, and be willing to use these data to identify similarities and differences, patterns, trends, and repetitions to state your predictions. Making predictions requires the willingness to seek outside opinions, use multiple resources, and remain open-minded as you search for patterns within the data to substantiate your predictions. A faulty prediction can lead to inaccurate information and may cause harm to others who are affected by your prediction.

Synonyms for *predicting* include these words:

forecasting *projecting* *foretelling* *educated guess*

The Following Examples May Be Shared

Predicting is a skill that we use everyday. Some of our predictions are personal, such as determining the likelihood that you will complete my school projects on time. These predictions usually require us to think about how we can more effectively accomplish a personal goal. To make these predictions will require us to monitor and observe our past behavior so that we can begin to change the outcome. Examples of this type of predicting might include these situations:

1. collecting data over a month's time to analyze your eating habits;
2. collecting data over 2 weeks to analyze the amount of time you spend on your homework each night and if there is consistency in your studying behavior; and
3. collecting data to analyze the number of hours and type of television you watch each week.

A second type of predicting that people need to learn how to make involves making predictions that affect other people. We make this type of prediction when we try to forecast how others will accept an idea. These predictions may center on social problems, laws that need to be implemented, or solutions to problems that pertain to other people. These predictions require us to learn how to examine multiple viewpoints, seek credible sources, gather pertinent data, and remain objective in our thinking. Examples of this type of predicting might include these tasks:

1. predicting over time the success of a new school rule in solving a problem;
2. predicting the election outcomes;
3. predicting the sales of various types of candy bars at the school store;
4. predicting the success of a particular type of business in a community; and
5. predicting the weather forecast for the next week.

Activity Three

Skill Rationale

(5-10 Minutes)

Various Purposes for This Skill

We use the skill of predicting for a variety of purposes. The following purposes for making a prediction can be shared with students or generated by students during a discussion period:

1. analyzing whether or not a solution to a problem will continue to be effective in the future;
2. anticipating upcoming events;

3. modifying our behavior;
4. improving a situation; and
5. deciding future actions.

Relevance of This Skill

To help students appreciate that the predicting skill is relevant for them, the teacher might discuss the benefits of using this skill. Students can brainstorm in small groups additional reasons why this skill is useful.

If students are willing to work to improve their ability to make a prediction, they will achieve the following goals:

1. They are less likely to use irrelevant information as the basis for making their predictions.
2. They will be satisfied that their predictions helped them to plan accordingly.
3. They will be more likely to collect data from multiple resources and to examine information from a variety of viewpoints.
4. They will be more critical of inaccurate information and use credible sources of information.
5. They will improve in the ability to organize their data sets prior to making their analyses.
6. They will be better prepared to substantiate their predictions.
7. They will be more confident in making predictions because they have disciplined themselves to collect, record, and analyze data prior to making their predictions.
8. They will be more willing to make adjustments to their predictions when new evidence is available.
9. They will be better able to analyze data by comparing and contrasting data sets, looking for patterns, trends, and repetitions.

Consequences of Poor Ability With This Skill

Some students will have difficulty with this skill, while others may be more accomplished forecasters. To help students appreciate the negative consequences of poor use (or lack of use) of this skill, the teacher can share anecdotes that provide concrete examples of the misuse of this skill. The teacher, as well as students, should be encouraged to share stories that describe what happened to them when these situations occurred:

1. They failed to make their prediction after analyzing data pertinent to the prediction.
2. They based their predictions on personal preferences and did not consider other viewpoints.
3. The prediction was executed without careful thought to the reasonableness of the outcome.
4. The prediction was based on inaccurate information or incorrectly selected data.
5. They made the prediction without ever considering their past experiences.
6. They incorrectly defined what the prediction was to be about.

7. They created a prediction that caused more problems.
8. They failed to make a prediction because they did not record data that would have helped them to make the prediction.

Activity Four

Explaining the Skill Strategy

(5-10 Minutes)

Skill Strategy for Predicting

To help students understand how to improve their ability to make a prediction, teachers might explain the following skill strategy.

1. State the **purpose** of your prediction.
2. Decide on the relevant **attributes** to guide the data collection.
3. Develop a **strategy** to record the data.
4. **Observe** as many data sets as possible.
5. **Organize** the data.
6. **Compare and contrast** the attributes to decide what changes. Identify patterns, trends, or repetitions in the data.
7. If the similarities are consistent, use the directionality of the change to make your **predictions**.
8. **Select** the outcome most likely to occur.

Explaining the Skill Strategy to Your Students

The skill strategy listed on this page describes only one way to execute this skill. Often teachers and students create their own strategies or techniques after they reflect on the process they use to make a prediction. The use of these individual strategies should be encouraged when they promote and enhance the understanding of the predicting skill.

If you chose to use the skill strategy described above, you may find that the language used to explain the skill strategy may not be appropriate for your students. You may need to reword the strategy to better suit your students and increase their understanding of the skill. Remember that this strategy is just an abbreviated version of the important steps that a forecaster follows.

PREDICTING

Definition: Predicting is stating in advance what will probably happen in the future.

Steps:

1. **State the Purpose**

   Decide what the prediction is about and **state** the purpose for the prediction.

2. **List the Attributes**

   Brainstorm all the possible **attributes** or information that may help you to make your prediction.

3. **Design a Strategy**

   Identify the plan you will use to collect the data needed to help make your predictions. Implement the use of this **strategy**.

4. **Observe the Data**

   Observe as many data sets as possible.

5. **Organize the Data**

   Use charts, graphs, or categories to **organize** your findings.

6. **Compare and Contrast**

   Compare and contrast to note relationships and search for patterns, trends, or repetitions in the data.

7. **Make Predictions**

   Use the information from step #6 to **predict** all possible outcomes.

8. **Select the Outcomes**

   Select the outcomes which are most likely to occur under similar situations.

Activity Five

Explaining the Graphic Organizer

(2-3 Minutes)

Using a Graphic Organizer to Accompany the Skill Strategy

The teacher should show students the relationship between the various components of the skill strategy and the various parts of the graphic organizer. The graphic organizer for the predicting skill is reprinted on the following page.

Explaining the Graphic Organizer

When used correctly, students will identify the purpose of the prediction, which in turn will help them identify which attributes are relevant in making this prediction. Students will need to devise and plan a strategy to gather data about these attributes. In addition, it may be helpful to have students design a data collection instrument to help them organize their task. Then, students will use the strategy to record several data sets over time. After students gather these data, they will organize the information categorically or graphically in a meaningful way. Students will then be asked to compare and contrast the data by looking for similarities and differences. Hopefully, students will begin to note trends, patterns, or repetitions in the data, which will help them to make some predictions. They will complete the organizer by selecting those predictions that are most likely to occur.

Predicting Graphic Organizer

Attribute

Attribute

Attribute

Purpose

Attribute

Attribute

Attribute

Attribute

Attribute

Strategy to Collect Data

Organize the Data

Compare & Contrast Data
Look for patterns, trends, or relationships in the data

Predictions

Activity Six

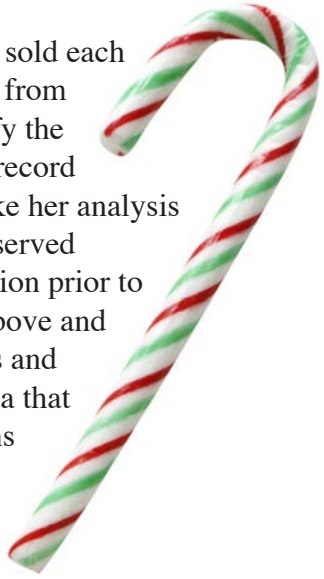
Modeling the Skill Strategy

(5-10 Minutes)

Sample Modeling Activity: Candy Bar Inventory

Tell students that before they practice this skill and its strategy, you want to model it for them. Have students work through a predicting activity that has them think through the type of predictions that are made when an owner of a candy store tries to predict which type of candy bars to purchase each month for the store. Discuss why this type of prediction would be helpful to the storeowner. Tell students that this store owner tried to gather information that would help her to make a better prediction about the numbers and types of candy bars she should purchase each month. Record on the board the following information that will be used to lead the discussion:

	Week One	Week Two	Week Three	Week Four
Snickers	42	43	50	52
Mars	25	27	26	25
Hershey's Chocolate	10	9	8	6
Salted Nut Roll	5	3	2	3
Twix	35	43	35	40



Tell students that this store owner charted the number of candy bars sold each week to make a prediction about the quantity of candy bars to order from the candy bar distributor for the next month. Ask students to identify the purpose the storeowner had in mind for making this prediction and record this on the graphic organizer. Discuss the attributes she used to make her analysis and record these under the second step. Do students believe she observed several data sets over time to help her gather the necessary information prior to making her prediction? Why? Why not? Use the data sets listed above and ask students to compare and contrast the data to look for similarities and differences. Ask students if they can identify any patterns in the data that may be useful information to the storeowner. List these observations on the organizer. Ask students to make predictions based on what they think the data suggests and record these predictions under the correct section of the graphic organizer.

Phase Two: Teaching the Guided Practice Lessons With Familiar Content

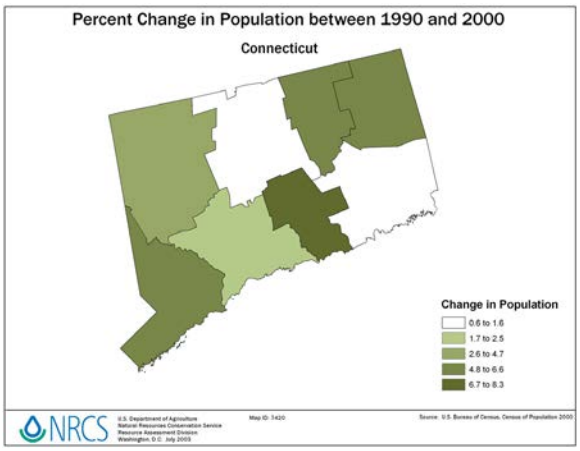
Sample Practice Activities
(10-50 Minutes Each)

1. Marble Races: (Science)
Have students make predictions based on the data they collect from rolling marbles down a ruler that is at various inclines. Students can use their math books to adjust the height of one end of the ruler and begin to record the distance that a marble travels after leaving the bottom edge of the ruler. Students will need to designate a starting point from which to release the marble and develop a strategy for measuring and recording these data. Does the distance a marble travels increase or decrease as the height of the ruler is raised? They can use the collected data to observe patterns and make predictions. Does the type of surface it travels on influence the distance a marble travels? How does this pattern change when the marble is released at different starting points on the ruler? All of these questions encourage students to gather data to make a variety of predictions. The teacher can begin with one question that will in turn spark another investigation.

2. Art Emotions: (Fine Arts)
Artists transform what they see into images that take us on journeys to other times and to distant places. They also have the ability to stir the emotions of each and every one of us in a different way. Have students investigate how adults and students perceive four paintings that are very different in style. Do fourth graders react in a similar fashion to the third graders? Do adults react differently to these paintings than third and fourth graders? In this activity, students can be grouped in teams to select four paintings that are very different in style and investigate how different these students and adults feel when they view each of the paintings. Students can ask each individual to respond to the question, "How does this painting make you feel? Happy or depressed? Calm or excited?" The data can be recorded and used to make some predictions about the relationships between moods and ages, adults and students, or females and males. Students should identify relationships or patterns in the data on which to base their predictions.

3. Pulse Rates and Jump Roping: (Math)
Is there a relationship between the number of minutes we jump rope and our pulse rates? What happens to our pulse rates over time when jumping rope? Predictions can be made when the data suggest that a trend is found. Initially, students should record their resting heart rate by using two fingers and pressing on either side of their neck. Discuss with students different ways a minute can be divided to measure their heart rate and select the time interval to be used (e.g., the number of beats in 15 seconds multiplied by four). After this information is recorded on a data sheet, students will begin the activity by working with a partner to jump rope for 30 seconds while their partner times the event. At the end of this designated time period, students will stop their jumping to take their pulse rates. These data should be recorded on a chart that students have created prior to the activity. After they

have recorded their pulse rate, the second student will perform the same activity while their partner keeps track of the time. This process repeats itself as students increase each jump-roping event by 30 seconds and is terminated when students have jumped for 2 minutes. Students who do the timing should be discouraged from sitting down while they are waiting for their turn. They can walk around their partner while they keep track of the time. When students return to the classroom, the data can be placed on a graph and used to identify trends or patterns in the data and make predictions about the relationship between pulse rates and jumping rope over time.



4. Population Trends: (Social Studies)
Students can use data collected and recorded in an Almanac to explore population trends in our country. Have students go to the library and collect information from this source and record each state's population over the last 50 years. In teams, students will be responsible for retrieving this information for 5 states. Students can record these data on a class chart that has been designed to organize the findings. By comparing and contrasting these data, students will be able to identify trends in various states or regions. Students can make futuristic predictions about these growth patterns after they analyze the data.

5. Repeat That One More Time!: (Language Arts)
Ask your librarian to find you several children's books that would be classified as prediction books. These books can be used by students to make predictions about upcoming events in the story by having them analyze the patterns that are identified. Many of these books contain only pictures and are often used with students in the earlier grades to help them construct an understanding of the reading process. Have students select a book to analyze by reading or observing each page and recording what they see happening in the story. After several pages, students should begin to see a repetitive sequence of events emerge in their data that will help them predict what may happen next based on what they have discovered.

6. Summer Recreational Activities: (Recreational)
Recreational departments are often responsible for organizing summer sporting events for the children in the community. Imagine that you are the director of the local Recreational Department. How would you decide what type of activities to offer in the summer? Design an investigation that would help you to predict which sporting events would be most likely to succeed. Students can create a survey or conduct an interview with a random sample of students. After collecting these responses, students can compare and contrast their findings and make predictions based on the results.

7. Short Sleeve Shirts: (Consumer)
Imagine that you are the designer of children's clothes and you are responsible for creating short sleeve shirts for children ages 7-10. What should be the standard size for the length of a short sleeve shirt for the various age levels? This question can help students consider what

factors clothing designers must think about prior to making a shirt. Can there be a standard size to fit every person exactly the same way? Have students work in pairs to take the sleeve measurement of each other and other students of various ages. Students should record their data on a prepared chart that lists the age of the student and the length of their arm from the middle of their shoulder to slightly above the elbow. Use the results to explore the patterns that exist and make predictions about the likelihood of creating standardized sizes for this age range.

8. Recognizing Different Points of View: (Civics)
The story *Jack and the Beanstalk* by Richard Walker and Niamh Sharkey can be used to introduce the concept of learning to understand someone else's point of view. Have students reread the story and then pose the following question: Do you think that Jack was being greedy by returning up the stalk the second and third time or was Jack being curious about the situation? This question should generate a discussion which engages students in a healthy debate about their beliefs and the evidence they have located in the book to justify their opinions. Following this activity, students should be encouraged to discuss the difficulty of listening to another classmates' point of view. The teacher can use this oral discussion to help students identify any themes that have emerged during their discussion about the concept of point of view. These themes can be used to have students predict what feelings will emerge as they discuss a topic that is controversial or can be interpreted from many points of view. How will they conduct themselves in the future when faced in a similar situation? How can this prediction actually be used to improve the use of this skill?

9. Watching the Weather: (Personal)
Knowing how to read a weather map helps us to know how to prepare for certain events. Students can learn to read weather maps and make predictions based on the data they collect over a 5-day period. Students can learn how to read various symbols used to explain the types of fronts and barometric pressures that are occupying specific regions or states. This day-by-day reading can be useful in making predictions about the upcoming weather conditions.

10. Choosing Children's Books: (Vocational)
Illustrator Randolph Caldecott is credited with being the forefather of the modern picture book for children. His illustrations had an enormous impact on children's book publishing in nineteenth-century England. Today the Caldecott Medal and Honor Awards are presented annually to the illustrators of the most distinguished picture books published in the United States. The first Caldecott Medal and Honor Awards were presented in 1938 and this tradition continues today. Have students assume the role of one of the members of the Children's Services Division of the American Library Association and select the award winning books from a specific year to evaluate. Teams of students can evaluate each of the winning selections and decide which of the books should have received the Caldecott Medal. How does this differ among various ages? Do their recommendations match those of the official committee? How do the data compare in other years? Is there a close match between what students selected and the American Library Association endorsed? Students can use these findings to project how likely their selections in the future will match those making the official decision.

Phase Three:
Guided Practice, Single Skill, New Real World Content

Sample Practice Activities
(10-50 Minutes Each)

1. Teeter-Totter Balance: (Science)

The relationship between weight and distance from the fulcrum of a lever can be explored by using a teeter-totter on the playground. The teacher will need to bring a scale to school that will be used to weigh each student prior to the start of this activity. Students should record their weight on an index card and take this card outside when the activity begins. The activity begins by having the teacher sit at one end while a student sits at the other end of the teeter-totter. Ask students what can be done to achieve a balance between the two people. Explore this concept by gradually moving inward toward the pivot point. When a balance is achieved, have a student measure, with a yardstick, the distance you are sitting from the pivot point. Have students use a grid that has been designed with the weights listed on the grid horizontally and vertically, from the lightest weight to the heaviest weight. Continue this activity by selecting two students to take their places on each end of the teeter-tooter. Again, determine the distance from the pivot point one of the individuals must sit to achieve balance with the other student. Students will record this distance in the box where the two weights intersect on the grid. After every student has been involved in at least one experiment, return to the classroom and put all the data from each trial on the blackboard. Students will use the data to discover any relationship between the balancing weights and their distances from the pivot point. (Mathematically, this equation will emerge: weight times distance = weight times distance.) Students can use this relationship to make predictions about which students would balance which others sitting at what distances from the pivot point. They can return to the playground and test the predictions.

2. What's in the Future?: (Social Sciences)

Children have a natural curiosity about the past and enjoy comparing it to their own lives. They love to hear stories from their teachers who respond to their request "tell me about when you were little." Teachers can capture this interest by having students investigate how their lives compare to those in the past. Students can develop an interview that seeks to identify trends in the ways different generations have celebrated special events, or students might want to know what school was like in the past compared to their own school. For example, if students choose to explore how schools were different in the past, students may consider investigating the following attributes: discipline, furniture, equipment, playground equipment, extracurricular events, duties at the school, and homework assignments. The data

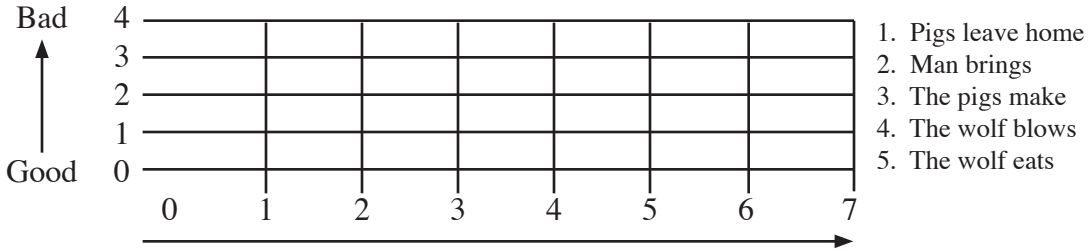
that are collected can be used to identify major themes that occur repeatedly in the responses from the interviews. How do these themes compare to their current situation? Ask students to make predictions about what they think school will be like in the future based on the findings.

3. Raisins in a Box: (Math)
Statistics is the study of data. Data are numbers that give information about something in the real world and is used by mathematicians and scientists to identify patterns that might help them make predictions about something important. Just like these mathematicians and scientists, we can collect data to identify patterns and relationships to help us make predictions or even decisions about upcoming events. Have students explore something that is very common to them, such as a box of raisins. Provide each student with two different brands of raisins (the half ounce size). Have each student count the number of raisins in each box and record these findings on the chalkboard. Then arrange students in pairs or small groups and have them choose a way to organize the data. You might want to show them how to use a line graph by drawing a horizontal line on the board with the values of the data arranged along the axis from the lowest to the highest and X's to mark the frequency of those values in the data set. Have students compare and contrast the raisin data sets for each brand. What patterns do they observe? What predictions can be made from the data sets? Why would these predictions be important? If they were given another box of raisins with the same brand name, what would be their predictions? Using the same box of raisins, what other attributes might be observed to provide us with more information about the different brands of raisins? Students might explore the sizes of the raisins and the price for each box.

4. Exploring the Musical Composition of a Story: (Music)
In music class, students can use the predicting skills by investigating the relationship between the action of a story and the tone of the music that a composer might create to represent a particular action or event. The selection *Peter and the Wolf* can be used to make a comparison between the action in the story and the type of melody that accompanies each section of the story. First, have students draw pictures of the important events that occur from the beginning of the story to the end of the story. Next, have them listen to the music just long enough to identify the type of music that is played during the first few incidents in the story. The data can be used to identify if there is any relationship between the music that a composer creates and the action in a story. What relationship might exist? What predictions can be made about the upcoming events? Have students predict what type of music they expect to hear as the musical story is completed and then let them listen to the end of the piece. Were their predictions accurate? Compare what they predicted with what they recorded to substantiate their claims. Were there times when the music did not perform in the manner that they had anticipated?

5. Plot Profiles: (Language Arts)
A plot profile (in *Literacy Through Literature* by Terry D. Johnson and Daphne R. Louis) is a technique that can be used by students to explore the relationship between problems and conflict, rising action, dilemma, parallel plot, and story climax. It can also help students recognize plot patterns or themes repeatedly used in stories of various genres. A plot profile can be constructed by students and used as a data collection instrument to explore the

relationship between the incidents in the story and how well the character copes with these incidents over time. To construct a plot profile requires the combination of a time line and a rating scale. First, each major incident in the story is summarized and assigned a number that will be used to represent the incident on the graph. These numbers are placed horizontally on the X-axis and are used to identify each event over time. On the Y-axis, a scale is placed to represent the rating of a particular feeling. These feelings might include the measurement of a character's excitement level (high to low) during any point of the story. In addition to the excitement levels, the fortunes (good or bad) of the protagonist during each incident in the story can be plotted to help students identify that when a protagonist is at risk, his or her fortunes are quite low and the story is usually very exciting, but when the protagonist is successful, the tension is usually lower. The plot profile technique can be introduced by using the story *The Three Little Pigs* by Steven Kellogg. Have students sequentially recall the story events and list these on the board. On a plot profile chart (see below), record these events along the X-axis. Tell students that you want to explore the fortunes of the wolf during different parts of the story by charting if the fortunes were good or bad for the wolf. Use the Y-axis to develop a numerical scale from 1 to 10 that will represent the degree of fortune the wolf feels. Begin asking students to rate the wolf's degree of fortune during each incident and record these data on the chart. Students can use this information to identify interesting patterns in the stories. If the teacher plots both excitement and fortunes over time, students can identify additional patterns and relationships in the story.



6. The Cook's Dilemma: (Vocational)

Cafeteria cooks work hard to plan the types of meals that are offered to students and teachers of the school. Every day they try to select the type of foods that will be eaten by the majority of the people and arrange different combinations so that a nutritional meal can be offered. Tell students that they will assume the role of a cook and develop a survey to find out which sandwiches, soups, fruits, drinks, meat, vegetables, and desserts are favorites in each grade level. Have students use these attributes (food choices) to develop a survey that will be given to each grade level. After students have gathered the data have them determine a way to display the results. Comparisons can be made between the grade levels and patterns or relationships can be detected. Students can use the findings to make predictions about food preferences that exist among grade levels. Additional predictions can be generated about what might occur when one grade level is offered a certain food that is not preferred by those students in other grade levels.

7. Will the Real Coca-Cola Please Stand Out: (Consumer)

How accurate are consumers in predicting the difference between different brands of colas? Select two different brands of cola, one being a brand name that students are familiar with

and one generic brand (Coca-Cola and a generic cola). Have students design a taste test to check the accuracy of other third graders or fourth graders in being able to identify which mystery cola is the name brand and which is the generic brand. After the data have been collected, students can compare the results to make predictions about how likely is it that individuals can tell the difference between the real stuff and the imposters. This activity can be combined with a curricular unit on advertisement.

8. How Accurate Is Gossip?: (Personal)
Have students discuss the harmful effects of gossip. How does it get started in the first place? Interpersonal communication is an important skill that we learn to depend on every day of the week. The teacher can ask students to think about how the skill of predicting might be used to help a person determine whether or not the information that has been told to them about another individual is an accurate statement. Teachers should have students identify the strategy they would use to check on the accuracy of the data that have been told. How would these data be collected? How would this information prove or disprove the gossip? What predictions would you possibly make?

9. Baseball League: (Recreational)
The predicting skill is used frequently in the sports world as managers, coaches, and interested fans keep track of data about their favorite teams. Attendance records are analyzed, win/loss percentages are calculated, and players' batting averages are computed. The collection and analyses of these data have become a recreational past time for many individuals. Have students apply the predicting skill by selecting one player from the American League or National League to keep a record of the player's batting average. Weekly, students will collect their player's number of hits and time at bat and use these data to calculate weekly and cumulative batting averages. Students can graph the weekly and cumulative batting averages over time to identify patterns and make predictions about this individual's record. Students could also use their data collectively to explore the patterns within a team's statistics.

Phase Four:
Prompted Transfer to Current Academic Curriculum

Language Arts

1. Students can use the skill of predicting in a reading class by having students analyze the relationships characters have between and among each other. After investigating the strengths of these relationships, students can begin to predict if the events in the story affected the strength of these relationships. Do the characters' relationships influence the outcomes in the events in the story? Do the characters' relationships change as a result of the event?

2. Students can generate solutions to the problems characters experience in the story and use these solutions to make predictions about the upcoming events. These predictions should be made after the solutions are generated and supported with evidence in the story so that the prediction is based on what is known about the character, plot, setting, conflict, and tension that exists. This knowledge serves as the springboard for the prediction. Simply asking students to make a prediction without the reasons becomes nothing but a guess.

Science

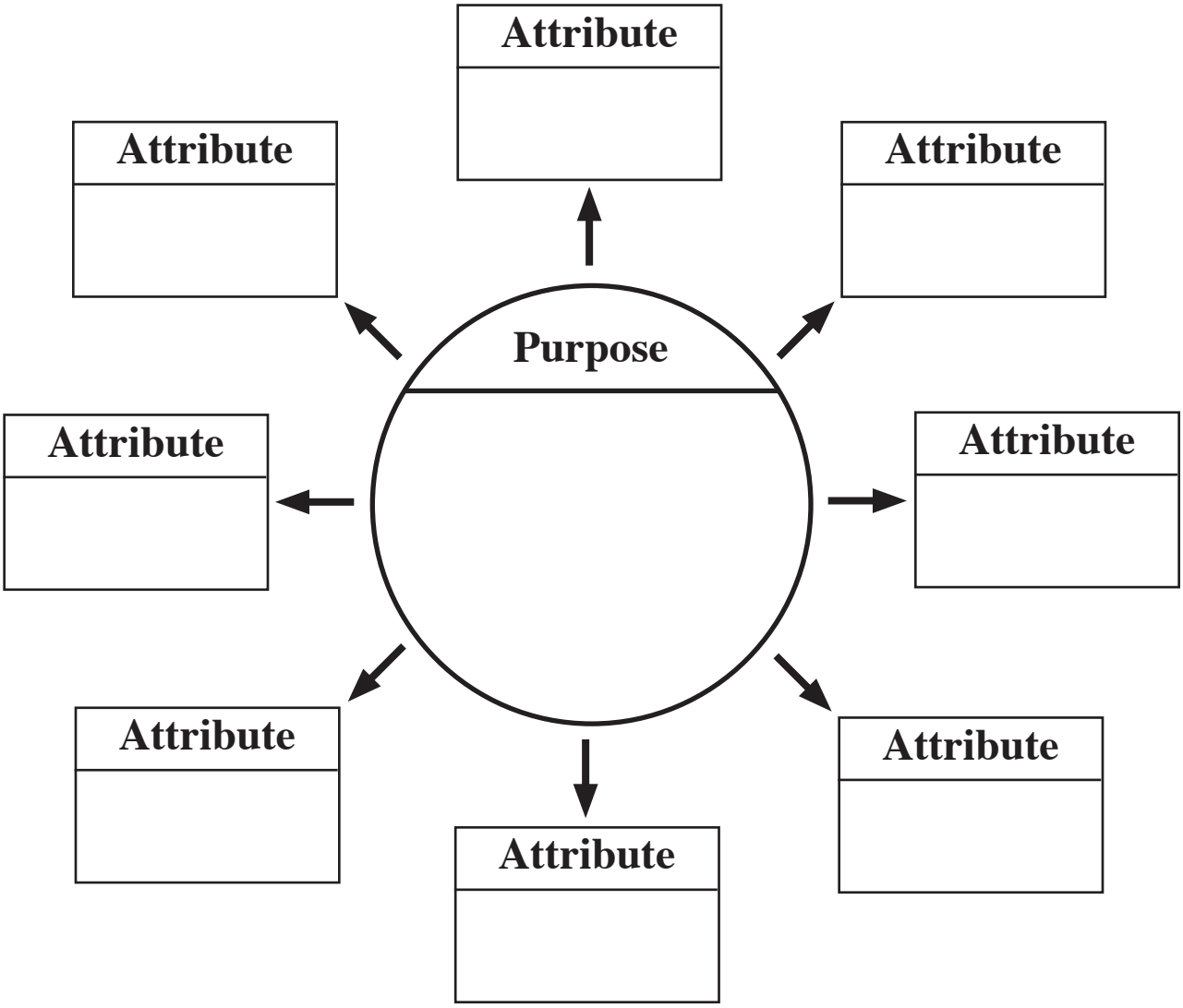
1. Students can predict the effect the size of a jar will have on the life of a lighted candle. Let students work in teams to gather data by standing a birthday-cake candle in a wad of clay on a smooth desktop or table top. One student can be designated as the candle-keeper, one can time how long the light remains lit after the jar is placed over the candle, another student can place the container over the candle, and the last member of the group can record how many seconds the flame continues to burn. Students should be encouraged to repeat the experiment twice. Students will need to measure the volume of air in its jar by pouring in water from a small paper cup or measuring cup. The volume can be measured in fluid ounces. Students can plot their findings and examine the relationship of air volume to flame life. What would be the predicted life expectancy of a candle beneath a 2-quart jar or a 1-gallon jar?
2. How does the length of a pendulum affect its swing? Hand out metal washers or nuts and pieces of thread of various lengths from 10 to 150 centimeters. Let students work in teams to make the pendulum and count how may times it swings in 1 minute. Prior to the activity, demonstrate how to count complete, back-and-forth swings. Students can take turns being the "pendulum counter" or the "time keeper." Students can record their findings on a graph that has been constructed on graph paper and use these graphs to help them make projections about how the length of string affects its swing. Further extensions of this activity can be explored by having students make predictions about how the weight, or mass, of the swinging object affects a pendulum's rate. For example, would a pendulum made with two or three washers fit the same data set as what was found by using one-washer pendulums?

Social Studies

1. What is the cause for the noise that is generated in the school cafeteria? Have students gather information directly by asking their friends why they think so much noise is made. Combine these data to identify categories of opinions that may help to explain this observation. Students can use their findings to develop new strategies that may reduce the noise level. Proposals can be submitted to the principal suggesting how the problem may be reduced.
2. What school factors contribute to students' feelings of being respected as an individual? What do kids think? When do you feel respected? What do people say? What do teachers do that make you feel respected? Have students explore these questions through a group discussion and record their responses on the board. Students can analyze the data to find recurring categories of responses from which to base future predictions. This may be integrated into the social studies unit that focuses on families or peer relationships.

Math

1. Students can apply the skill of predicting to the game "What's My Rule?" As the teacher places numbers on the chalkboard in two columns, students will compare and contrast the two numbers to make a prediction about their relationship. This prediction can be used to evaluate the relationship between the other numbers on the board. This prediction may need to be modified as the teacher provides students with new examples or data sets.
2. Have students design a project that requires them to collect and record data, analyze the findings, and make predictions about possible occurrences. Some options may include investigations of the relationship between the number of hours of sleep first grade students receive during the week compared to fifth graders, the distance a ball can be thrown over time, or designing a strategy to determine how many jelly beans are in a 2 liter container and checking the accuracy of the prediction against the actual amount.


Attribute
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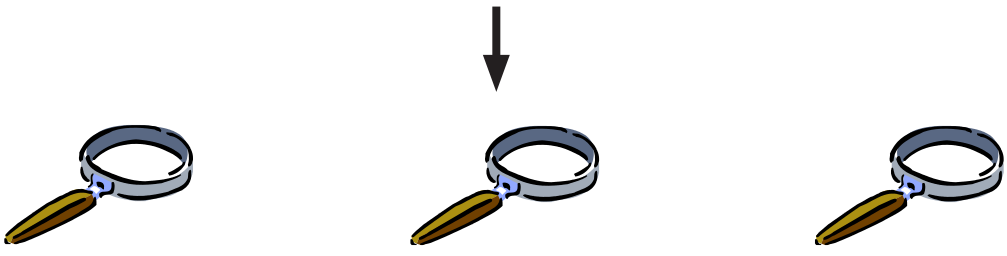
Strategy to Collect Data



Organize the Data

Compare & Contrast the Data

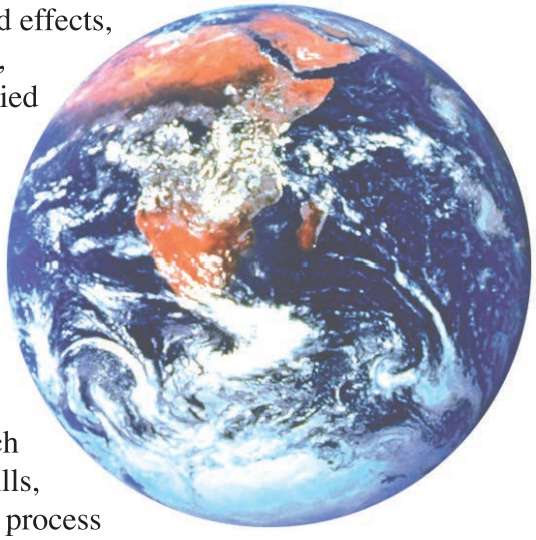
Look for patterns, trends, or relationships in the data.

Predictions

Instructional Methods

Practice and Application Activities for the Skills

When introducing a skill, it is often advisable to practice with simple and familiar content. These exercises should ask students to practice the new skill with varied academic and real world content. As students become more proficient with the skill, it should be used with new content. Eventually, activities with the skill should be in all content areas. Analyzing causes and effects, decision making, comparing and contrasting, classifying, observing, planning, and predicting skills should be applied to language arts, social studies, science, math, and fine arts.



Real world practice activities can involve recreation, consumer issues, current events, vocations, and personal/social issues. For example, students might be asked to compare and contrast exercise programs to select an appropriate program. Characters in a story or book could be classified according to their attributes, such as attitudes about other people, response to adversity, skills, or abilities. Students might be asked to use the planning process to organize a career day at the school. All of these real world exercises should emphasize practical use of the skill.

Application Activities

Students should be asked to use these skills to acquire new information as part of a simulation activity or during a real world problem solving project. The emphasis of these application activities should be on teaching students to select which thinking skills should be used to solve the particular problem, and in what sequence. Students should be encouraged to communicate their findings orally, visually, or in writing.

Phase One:
Introducing the Unit to Students

When teachers use a direct instruction method to teach thinking skills, the instruction usually begins with an introductory lesson or two (each one being 30-60 minutes in length) that has several components. During the introductory lesson the teacher provides students with the following:

1. an assessment of their current strengths and weaknesses when using the skill;
2. a focusing activity that introduces the skill to students, along with a debriefing and discussion session;
3. an opportunity to define the skill and give examples of and synonyms for the skill;

4. a rationale that explains the importance of the skill in academic and real world scenarios;
5. a skill strategy that explains how to execute the skill;
6. an activity in which the teacher models or demonstrates the use of the skill strategy within a familiar content area; and
7. a closing discussion designed to assess students' attitudes toward the learning process as well as their understanding of the skill strategy and its use in various content areas.

Activity One
Focusing Activity
(5-10 Minutes)

The purpose for the focusing activity is to draw attention to the skill and its purpose. Another benefit of the focusing activity is to provide time for the teacher to preassess students' familiarity with the use of the skill, and to assist the teacher in his or her planning of additional lessons.

We recommend that the teacher use content that is familiar to students and consider thinking about how thinking skills are used from a "kid's point of view." Asking students to recall an experience when they had to use a particular skill will be more meaningful to them and will help the teacher focus on the skill and its components. Some teachers have found that sharing a personal story with students about their own use of the skill and the difficulties they encountered often works well in accomplishing the purposes for the focusing activity. Other teachers have used cartoons, literature, anecdotes, and discrepant events in presenting this focusing activity. In any case, the focusing lesson should introduce the skill and serve as a "warm-up" activity as the teacher and students begin to dialogue about its use.

A debriefing session should be held following the focusing activity. The intention is to help students see what conclusions can be drawn after using a given skill at the most basic level, as well as at a more abstract level. The ability to use a particular thinking skill is a key feature in drawing well-grounded conclusions. A major component to any skill is the ability to identify relevant factors that will become the basis of the comparison, classification, decision making, prediction, and so forth prior to beginning the process.

The following questions might be included in the debriefing session. Teachers should add, modify, or delete questions to meet the needs of their classes.

1. What did you do first when asked to use this skill?
2. Do you have enough information on which to base your conclusion?
3. To be successful at using this skill, what advice could you give someone who has not used this skill before?
4. What would you do differently the next time you do a similar activity?
5. What other skills did you use to complement the use of this skill?

At the conclusion of each lesson, share with students that they will be working on the use of this skill. They will be involved in a variety of activities which use this skill and others in all of their subject areas and in real world applications.

Activity Two
Helping Students Understand the Nature of the Skill
(5-10 Minutes)

After the focusing activity and the debriefing discussion have been conducted, the teacher should lead a lecture or discussion that emphasizes the name and definition of, and examples for, the skill being discussed. By naming and labeling the skill, we improve recall, metacognition, and students' abilities to communicate their use of the skill with others. By defining the skill, we help students build a conceptual bridge that links their individual and prior experience with the skill to the subsequent training that will be provided in these units. When we help students generate examples of the skill, we hope to make the skill relevant and meaningful in light of their own environment and experiences.

We suggest teachers offer students all three experiences—naming the skill, defining the skill, and creating examples of the skill—to provide the strongest possible foundation. Together, these three elements help students see connections and relationships between their experiences and training, and future applications and adaptations of these skills.

Some teachers may prefer to give definitions and examples to students, while other teachers may prefer to ask students to create their own group or individual definitions and examples for these skills. Either way, the definitions should be brief and clear. A good definition should include synonyms and examples of the skill and how it is used in various content areas. In addition, the definition should be written with regard to students' age and vocabulary level.

It may be helpful to create a poster or a chart that lists these definitions and the examples, or to give students their own copy of this definition on a notecard or pamphlet. The name of the skill can also be written on the chalkboard, or on an overhead projector transparency. We recommend that this chart remain visible in the classroom during the remainder of the school year. When completed, the chart will list the name of the skill, the skill definition, and a skill strategy. This chart serves as a reference for students, and as a reminder for teachers to transfer and apply this skill in all appropriate content areas.

Activity Three
Skill Rationale
(5-10 Minutes)

During each activity, the teacher should initiate a brief discussion to explain the importance of the skill being learned. It should explain:

1. the various purposes for using the skill;
2. the relevance of the skill for students; and
3. what happens when the skill is not effectively used.

Teachers might view a discussion of each skill rationale as their opportunity to "market" the importance of the skill to students. To use a Madison Avenue analogy, the teacher becomes an advertiser who is trying to convince her clients of their need to "buy into" the importance of the skill. If the "sell job" is relevant and compelling, students will become emotionally committed and actively seek to improve their use of the skill. Students will be encouraged to generate new applications for the skills, both in classroom situations and in real world applications.

Activity Four
Explaining the Skill Strategy
(5-10 Minutes)

Skill strategies can be useful in showing students how to improve their use of a given thinking skill. As teachers explain and model these skill strategies, they are providing explicit instruction that helps the novice thinker better understand how to perform the various thinking skills. Some teachers use poster-size charts to display the skill strategy that is presented below. Other teachers have used transparencies or have asked students to develop their own skill strategy notecard as a reminder of the skill's steps or procedures.

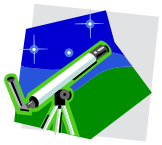
Activity Five
Explaining the Graphic Organizer
(2-3 Minutes)

Using a Graphic Organizer to Accompany the Skill Strategy

A graphic organizer is a visual diagram that can be used to illustrate the various components of the skill strategy. It can help students be more systematic in their application of the skill strategy during the early stages of skill practice. The graphic organizer also provides a handy reminder for students and can be introduced after the teacher has explained the various steps or parts of the skill strategy. The teacher should show students the relationship between the components of the skill strategy and the parts of the graphic organizer.

Creating a New Graphic Organizer for Your Strategy

The graphic organizer used in each lesson may not fit the skill strategy that you or your students create. If you plan to create your own organizer, you will want to try it with several different practice activities to insure that it is viable for a wide variety of practice and application activities.



Activity Six
Modeling the Skill Strategy
(5-10 Minutes)

A modeling lesson usually follows the teacher's explanation of the skill strategy and the graphic organizer. The purpose of this modeling activity is to provide an opportunity for the teacher to demonstrate the skill strategy to students by thinking "out loud" and talking through the skill strategy in their presence. In addition, this modeling lesson precedes the practice activities and prepares students to use the skill strategy as they engage in the skill themselves. In a way, this lesson will serve as the orientation to the use of the skill strategy and graphic organizer.

After completion of the modeling lesson, teachers should hold a debriefing discussion. The purpose of this debriefing discussion is to determine if students can explain how the teacher used the skill strategy to accomplish a goal. Debriefing questions can also be used to check students' understanding of the purpose of the lessons, to monitor their use of the skill, to determine when this skill might be applied to future assignments, to name the skill, and to define its purpose.

Sample Debriefing Questions

The following questions can be used to guide this discussion:

1. In the activity I just demonstrated for you, what was the purpose for using a particular thinking skill?
2. What other thinking skills did I use to help me with the main skill we discussed?
3. Why did I think about my purpose before I began to use the skill?
4. What technique did I use to organize my data?
5. How would you define this skill for younger students?
6. Are there other ways I could have recorded my data?
7. How could I improve my use of this particular skill?

Ending the Lesson

Close the lesson with positive comments about students' participation, enthusiasm, or responses. Encourage students to think about situations when we use a particular thinking skill, how other professionals (e.g., artists, scientists) use this thinking process in their careers, and what must be considered when we use the skill. Students who are using a

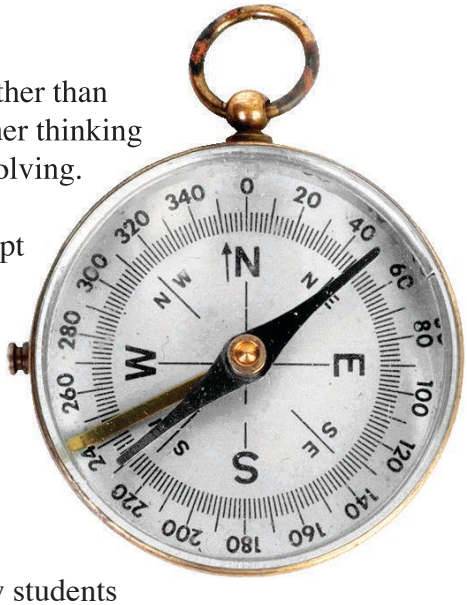
thinking skill log should be encouraged to express their ideas about questions that ask them to analyze lessons and their own thought processes.

Developing Practice Activities That Fit Your Curriculum

The practice activities described above may not fit the curriculum units that you are teaching in your classroom. Although the activities do require the use of the thinking skills activity, and although they may be motivational for students, time schedules may require you to select practice activities that are more closely aligned with the subject areas you teach. Use the suggestions above to understand the nature of the practice activities, then brainstorm other alternatives that have a closer relationship to your curriculum and the content students have experienced in the recent past.

Phase Two: Teaching the Guided Practice Lessons With Familiar Content

Several guided practice lessons should follow the introductory lesson. These guided practice lessons should help students work in large groups, small groups, pairs, or individually to learn how to use the skill strategy to improve their use of the thinking skill. The content for the Phase Two guided practice activities should be motivational and as realistic as possible, yet simple enough not to confound students with learning a new skill and learning new content at the same time.



The practice activities will help students learn to use the skill, rather than assuming that they can automatically combine it with several other thinking skills when learning new content or during real world problem solving. Later (in Phases Three and Four of the unit), as students become more adept with the skill, the teacher will show them how to adapt the skill strategy for use with various content areas. The teacher will also help students learn to combine various thinking skills during the real world problem solving scenarios and simulations that are presented to students.

The teacher's role during these sessions should be to coach students to use the skill strategy in a conscious and successful manner. In addition, the teacher should encourage positive dispositions toward the skill and provide feedback that will show students how to alter their use of the strategy if they are experiencing difficulty.

Sample Discussion Questions

After each student or group shares the products and responses with the class, the teacher may ask three or four questions designed to assess students' progress in using the skill to learn new content. Some sample questions might include the following:

1. How did you organize this information?
2. Was your thinking different using new information as opposed to using only prior knowledge?
3. How would you explain the use of the graphic organizer when using this skill?
4. How might you change the graphic organizer to make it more useful for you?
5. If you were to tell somebody who is unfamiliar with this skill how to effectively use it, how would you explain it to him/her?
6. How might we become better at using a particular skill?

Providing Coaching and Feedback Tips

As students make their observations and discuss their findings, the teacher may find that some students are having difficulty applying the skill strategy. The following feedback tips may help students improve their use of the skill strategy:

1. We must be sure to identify our purpose before we begin using a particular thinking skill.
2. It can be useful to check the findings of each activity with other people.
3. Our biases, experiences, or stereotypes can affect the quality of our work.
4. Failure to organize the information we are gathering will limit our understanding.
5. Try to remain open-minded when using these skills. You may find that you need to add other factors to consider as you gain more information about the objects.

Sudents benefit from cognitive coaching when it helps them improve at a skill and points out weaknesses in their thought processes. The following tips may help students improve their ability to use a particular skill to understand new information and think about prior knowledge in new ways:

1. Organizing information about your product or response can facilitate understanding.
2. Often it is helpful to receive input from others as to what information they think is significant.
3. It is helpful to identify key concepts that may guide the thinking process that is being studied.
4. The products and responses must be complete and descriptive for others to understand their importance.
5. Your work may be helpful in gathering evidence to build a case for a particular argument.
6. Supplemental information or alternative points of view can enrich your work.
7. The effectiveness of our thinking can be hindered when we consider information that may be irrelevant to our purpose.

Phase Three:
Guided Practice, Single Skill, New Academic Content

The purpose of Phase Three lessons is to show students how this newly acquired skill can be used to understand new content. It is also important that students can discern when it is appropriate to use this skill to learn new information or to answer a question that has been posed.

Phase Three should involve activities (2-4) that include (a) skill strategy review; (b) skill practices; (c) feedback and coaching; and (d) opportunities for students to discuss their thought process and dispositions toward the skill. During Phase Three, the teacher will be emphasizing the various uses of the skill and how it is a life-long skill that students will use outside of the school setting. Students should be asked to use this skill with novel and unfamiliar content to help them appreciate how important it is to adapt the decision making process and use it in an unfamiliar context.

When students are ready to begin Phase Three, the teacher should explain that the difference between these activities and those that students just finished is that these lessons will ask students to use the skill with new content. The teacher will give students directions for completing an activity that requires the use of the skill, and students will be expected to use the skill strategy and the graphic organizer to understand the new content. Initially, students may benefit from the practice of these activities in large or small group settings and then proceed toward an independent use of the skill as they become more proficient. The teacher may have to spend additional time assisting students in learning to use the skill independently. When students have completed the activity, they will share and discuss their responses with the group, and the teacher will provide feedback and coaching tips.

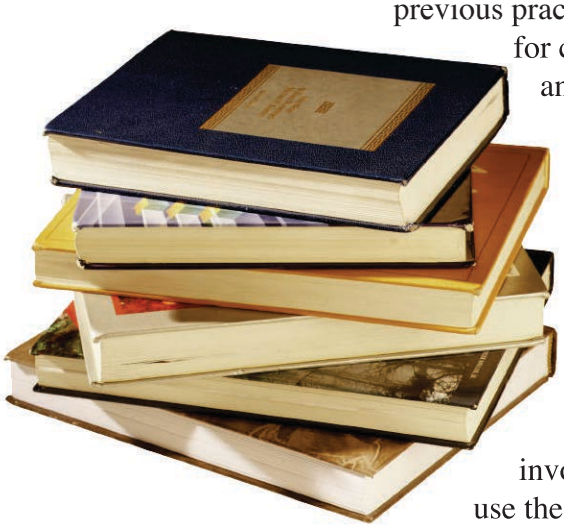
The sample activities deal with all academic content areas. Ideally, these new practice activities should be related to the curriculum in the school district: outgrowths of the concepts and principles that are already familiar to students, but activities that require them to apply these concepts and the skill to the new content. For this reason, the sample practice activities described on these pages should be viewed as examples, not as “add-on” activities that have little to do with a specific teacher’s course of study. Teachers should use these examples to generate their own relevant academic content practice activities.

If possible, the teacher should help students see that each skill is useful in a number of academic disciplines by varying the content of the practice activities. The emphasis at this point is on learning to use the strategy to effectively acquire information, analyze a certain situation, or solve a particular problem. Each activity should be followed by a short debriefing session. As students improve in the use of the skill, they should move from large group work to working in small groups, in pairs, or individually.

After each practice activity, the teacher may wish to ask a few of these questions to encourage skill transfer and the development of positive dispositions toward each skill.

1. How did you organize the information on your graphic organizer?
2. What decisions did you make in regard to your findings?
3. What outside resources did you need to use in order to have enough information to use a particular thinking skill?
4. Did your classmates choose the same resources?

After students have practiced the skill with familiar academic content, they will begin to use the skill strategy (and possibly the graphic organizer) with real world content. As in the previous practice activities, the teacher will give students directions for completing an activity that requires the use of the skill, and students will be expected to use the skill strategy and the graphic organizer to complete the practice activity. When students have completed the activity, they will share and discuss their responses with the group. The teacher, once again, will provide feedback and coaching tips.



The sample activities that are described deal with recreational, consumer, civic, vocational, or personal topics. Ideally, these guided practice activities should involve content that is familiar to students. Teachers should use these examples to generate their own real world practice activities.

The activities in this section should emphasize the use of a particular skill strategy rather than learning new content by using the skill. Each activity should be followed by a short debriefing session. As students improve, they should move from large group work to working in small groups, in pairs, or by themselves.

Evaluation Criteria

Commend students on the progress they have made and remind them to use the skill whenever appropriate. Consider discussing the following items to prepare students for any evaluation that will follow the last lesson:

1. Ask students to define each thinking skill in their own words.
2. Ask students to describe how they have improved their use of each skill.
3. Ask students to explain the strategy for each skill in their own words.
4. How capable do you feel you are to use each skill without the teacher's help?
5. In what ways have you used each skill at home?

To measure student progress with this skill, the teacher might (a) use criteria for effective use of the skill to observe and evaluate student proficiency, or (b) prepare a test that deals with the skill definition, rationale, strategy, examples, etc.

The following Record Keeping Sheet can be used to guide a performance evaluation of an individual or of a small group of students who are asked to use a particular thinking skill. Several performance evaluations should be conducted over the course of the unit.

Designing a Formal Test

If a test is developed to measure students' progress, the following activities or items can be included to assess several aspects of cognitive development. Look for growth and progress in an individual student over time.

Evaluating the Quality of Student Thinking Skills

Student Name: _____ Date: _____
Activity: _____
Evaluator: _____
Thinking Skill: _____

Rating Key: 3 - Exceeds Expectations
2 - Satisfactory
1 - Needs Additional Help

1.	Resources and methods used were relevant to the purpose. Comments:	1	2	3
2.	Resources and methods were selected prior to using each skill. Comments:	1	2	3
3.	Methods for using each skill were appropriate. Comments:	1	2	3
4.	Specific details for each attribute were accurate. Comments:	1	2	3
5.	Specific details for each attribute were thorough. Comments:	1	2	3
6.	The student approached the task with a positive attitude. Comments:	1	2	3

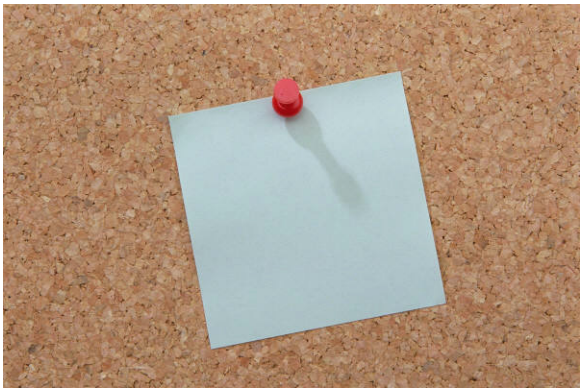
Phase Four:
Prompted Transfer to Current Academic Curriculum

Now that the formal unit has come to a close, the teacher should be alert to opportunities in the daily academic curriculum that lend themselves to the use of a particular skill. Teachers should not assume that students will automatically use the learned skill when appropriate. By prompting them with reminders and cues, we encourage transfer and automaticity.

A review of the learning objectives in several textbooks and an analysis of the various activities in these books should reveal abundant opportunities for using this skill. Once again, the teacher should not assume that the textbook will necessarily prompt students to use a particular thinking skill. Instead, the teacher might prefer to use Post-It® Notes that contain the skill name to highlight appropriate opportunities for prompting the skill through the use of supplementary directions and assignments that are adapted or created by the teacher using the textbook content.

Summary

The activities, components, and sequences within each unit are designed to provide teachers with a blueprint that can be adapted to create a "custom built" unit of their own choosing. Some classes and some individual students will need more or less practice than is described in the unit. A different sequence, grouping pattern, or teaching style might also be beneficial. Use your knowledge of your students, your curriculum, and this skill to artistically and creatively modify this unit. By making it unique, you will increase your own motivation for teaching the unit, your understanding of the skill, and your students' proficiency with the skills. Keep notes of your progress with these lessons and keep your eyes open for new and better approaches for teaching this skill. Change and adapt the unit whenever necessary.



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