Using Questions to Engage Students in Inquiry

Engaging students in inquiry involves creating interest, generating curiosity, assessing what students know or think about the topic to be investigated, and raising questions to initiate and focus inquiry activities. Let us see how questioning can be used to facilitate these tasks.

Creating Motivation and Interest

Nothing creates intrinsic motivation in students more than presenting them with novel events and asking for explanations. With extrinsic motivation, the source of motivation lies outside the task. Grades and teacher approval are examples of outside sources of motivation. With intrinsic motivation, the source of learning is within the learner and the task itself. When individuals are intrinsically motivated, they engage in activities for their own sake and out of interest in and curiosity about the activity (Wigfield, Eccles, & Rodriguez, 1998).

Novel or discrepant events that provoke interest and reflection might be presented through hands-on student investigations, or you might present a demonstration using science materials. If time and resources are constrained, you could show a film segment or use a pictorial riddle instead.

To create a novel event with a surprising outcome for students,

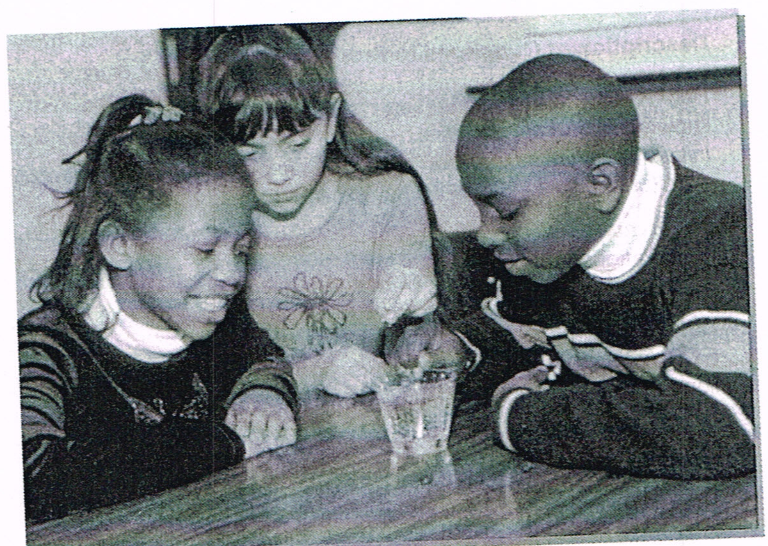
- select a scientific concept or principle from the topic to be learned;
- present an activity or situation that involves the concept or principle in an unusual or surprising way; and
- formulate questions to stimulate students' thinking about the subject and set the intellectual stage for further scientific investigations.

Teaching for scientific literacy includes helping students "ask, find, or determine answers to questions derived from curiosity about everyday experiences."

(National Research Council, 1996, p. 22)

Activity 5-1 shows a discrepant event that is sure to be interesting and puzzling to children. Try this activity yourself before reading further.

Have you formed an explanation about the phenomenon in Activity 5-1? Did you observe that the raisins initially sink to the bottom, and then rise to the top of the liquid, stay



A few raisins placed in a glass of clear, carbonated soda water create a "raisin elevator."

Activity 5-1: A Raisin Elevator

- Place a few raisins in a glass of clear, carbonated soda water.
- Wait a minute or so.
- What do you observe?
- How would you explain the "raisin elevator" phenomenon?
- What scientific concepts and principles did you use in your explanation?

a moment, then descend once more, only to rise again? How did you explain this phenomenon? If you had appropriate prior experiences and scientific knowledge about floating and sinking, you might have inferred that the raisins were initially too heavy to float and, thus, sank. You might also have inferred that when the raisins rose in the liquid, somehow they had gotten lighter.

Explanations in science need to be checked out through further investigation. By looking very carefully, perhaps with a magnifying lens, children can watch the bubbles attaching themselves to the raisins when they are at the bottom of the carbonated drink and popping when the raisins reach the surface.

Novel events also provide an excellent context in which to assess students' prior knowledge and conceptions about a topic.

Questioning to Assess Prior Knowledge

To help your students build and strengthen their scientific concepts, you must be aware of what they know or do not know at the start of any study. You might assess children's prior knowledge by simply asking them what they already know about a topic. However, it is often better to provide a concrete activity so that students are called on to observe an object or event, form a question about why something happens, and recall relevant knowledge to be used in explaining the event. As children conduct an investigation or watch a demonstration, they typically talk about what they observe and think. By listening and interacting with the students, you will be better able to assess their prior knowledge and conceptions.

For example, in the raisin elevator activity, children display their prior knowledge of floating and sinking as they describe their observations, make predictions, draw inferences, and propose explanations about this discrepant event. In probing children's prior knowledge (as well as in generating interest and raising curiosity) you might ask:

What is happening in the glass?
What have you seen that is like this?
What is puzzling here? What needs explaining?
What might cause the raisins to rise? Why did they then sink in the water?

Students' responses to questions like these provide you with information about what they may already know and help you decide what you should do next in the teaching sequence.

Questioning to Initiate Inquiry

The very first task in inquiry, according to the *National Science Education Standards*, is to ask a simple question about objects, organisms, and events in the environment. There are dozens of things children wonder about and many questions they can ask. But which ones can be investigated through their hands-on activities? And what questions are most likely

The raisin elevator is used as an initiating activity to engage fourth graders and ascertain their prior conceptions in a floating and sinking lesson that is presented in Chapter 7.

to lead to significant results—from the perspective of young learners? How can we teach children to form simple questions that can guide their empirical investigations and lead to pertinent answers?

Questions requiring students to describe, classify, discover relationships, and form explanations can lead to productive investigations. Questions that can be investigated empirically can also come from considering unifying themes such as systems and interactions, change, and form and function (National Research Council, 1996, pp. 115–119).

Questions about Systems and Interactions. Asking questions about systems and interactions within them is often productive. Scientists define small portions, called "systems," for the convenience of investigating and describing the order and organization of the world (National Research Council, 1996, p. 116). A **system** is a group of objects or components that interact and form a whole. Some examples are solar systems, nervous systems, circulatory systems, and ecosystems.

Children tend to think of objects, their properties, and the ways the objects might change individually rather than in terms of a system. Thus, they need many opportunities to recognize and talk about the parts and interactions within small-scale systems. A small aquarium, for example, can provide a fascinating context for children to investigate interdependencies in aquatic life. They might be guided to ask:

How do fish interact with the plants in an aquarium?
What do the snails do in the aquarium?

These questions can lead to interesting descriptive investigations of aquariums and aquatic life.

Children might also be asked:

What are the essential parts of an aquarium?

They might decide initially that fish, snails, plants, and water are the essential components of the system. But what about air? Should the air above the surface of the water and the air pump also be a part of the system? These considerations might lead to a question about how fish breathe. Such a question can be investigated through observation and reading.

Focusing on the parts of the aquarium system, asking specific questions about the interactions of the parts, and observing over a period of days or weeks will allow students to explore how the various components in the system are interdependent.

Questions about Change. The natural world is characterized by change. Changes might occur, for example, in properties of materials, behaviors of organisms, and positions and motions of objects. Children can ask many questions about changes, for instance, about the changing appearance of the moon (as in Chapter 4's moon-watching lesson):

How does the moon change?
What is its rate of change?
Is there a pattern in the moon's changes?

Sometimes it is useful to measure changes. In investigating the nature of ice, for example, children might ask:

What happens to the temperature of water when ice is added?
Does the amount of water make a difference in the final temperature? Does the amount of i make a difference?

These are kinds of questions that could be answered through experiments.

Organizing initiating questions around systems, change, and form and function draws on these *unifying concepts and processes* from the *Science Standards:* systems, order, and organization; change, constancy, and measurement; and form and function.

Questions about Form and Function. Asking questions about the form or parts of an object or organism and how these parts function can lead to productive descriptive, classificatory, and experimental investigations. In Chapter 2, we asked questions about the structure of seeds and plants and the functions of their various parts:

What are the parts of a seed?
What happens to the cotyledon as the young plant develops?
Do plants get water through their leaves or roots?

What questions about the structure of fish and the function of their different body parts might children ask to initiate investigations?

Questioning to Guide Discussion of Observations

One way children seek answers to their questions is through using the senses or instruments that extend the senses to observe what happens in an investigation or demonstration activity. Observing what happens familiarizes children with the natural world and provides the evidence for understanding it.

You can guide children in reflecting on their observations through the questions you ask. In general, observation questions should be open-ended. An open-ended question such as "What are some of the things you noticed during the demonstration?" allows many students to contribute useful information during inquiry.

Following are some suggestions you might follow and some sample questions you might ask or train students to ask to focus their attention on observing and describing.

1. In discussion with a group or a class as a whole, if you seek *descriptions of events* in an investigation, ask such questions as:
   - What did you do?
   - What happened in the experiment (activity, situation, investigation, demonstration)?
   - What are some of the changes you noticed in the . . . ?
   - What did you see that surprised you? (that you liked? that startled you?)

   By focusing on the aspect of an event that is puzzling, the last question begins to lay the groundwork for explanations.
2. Often discussion about observations occurs when children report their observations and data to the class. When groups report, train them to consider two kinds of questions about observational information (Rowe, 1973, p. 347):
   - What was observed?
   - In what sequence did events happen?

   Then, ask students to compare their observations:
   - Were the observations of all groups the same? Are the reported sequences the same? How are they alike? How are the observations different?

   Differences among groups in reports of what they observed or the sequence of events observed can lead to disagreements. To resolve these disagreements, students must think more carefully about their data and sometimes repeat an activity. If students are unclear about what happened in an investigation, they will not have adequate evidence for constructing explanations for why it happened.
3. If the observations reported by groups represent numerical data, and you want children to consider and compare measurements (quantitative observations), you might ask:
   - Which of the reported measurements is highest? Which is lowest?
   - Why do you think there is variation in the class's measurements?

Discussing differences in the data reported by groups gives you an opportunity to discuss the nature of science with your students. According to the *Benchmarks for Science Literacy* (American Association for the Advancement of Science, 1993, pp. 6, 10), by the end of second grade, students should know that

- science investigations generally work the same way in different places; and
- when people give different descriptions of the same thing, it is usually a good idea to make some fresh observations instead of just arguing who is right.

Sometimes you want children to compare measurements and notice changes that occurred:

- What changes in the temperature of the water did you notice?

4. Novel or discrepant events offer excellent contexts for students to observe and later use their observations as evidence to develop explanations. If you seek descriptions of objects in a discrepant event or investigation, ask such questions as:
   What objects do you see here?
   What are some things you noticed about . . . in the investigation?
   What was the sequence of events?

When working with small groups or the class as a whole, do not seek closure on a question until a number of responses have accumulated. Such a strategy not only gives more students a chance to enter into the discussion but also ensures that all students will have a variety of descriptive information from which to later build explanations. Observational information from students might be recorded on the chalkboard or on an overhead transparency.

When getting responses from several students on the same question, it is generally not necessary to repeat or rephrase the question. After one student has supplied an answer, you may *redirect* the question to another student by asking a question such as, "Juan, would you like to add anything else?"

It is important that children spend considerable time at the *observation* level before beginning to search for problem *explanations*. Unless sufficient time is spent in developing an adequate foundation at the lower cognitive level, students are often not able to sustain discussion at higher levels of thought.

Questioning to Guide Discussion of Explanations

Explaining is the counterpart of observing. In observing, students are directly involvec with objects and events. Explanations require students to reason about their experience: and to make up and test interpretations of them. Careful observations determine *what* hap pens. Explanation is concerned with *why* it happened.

The *Science Standards* (National Research Council, 1996, p. 145) emphasize that ii constructing explanations, students must think critically about evidence, considerin which of their observations constitute evidence and which are irrelevant. They must als have adequate subject matter knowledge. Finally, they must be able to link their evidenc with their knowledge in a reasonable way to explain why something happened.

In Chapter 3, we suggested that learners in grades K–2 observe the world using all ‹ their senses, but typically do not construct consistent explanations of it. It is not unt around grade 3 or 4 that children begin to distinguish between observations and interpr tations of an event, and to construct simple explanations involving effects and their cause Complex explanations involving chains of causes and effects are not formed until the fc mal operational period (see Table 3-2). Yet learners at every grade level can profit fro considering why an event happened and how the world works.

When you are ready to shift instruction from an observation or exploration phase to explanation, let children help you decide which aspects of an investigation might need explaining. Find out what *they* want to know about the results of an investigation or why a puzzling event occurred. List the children's questions where they can see and think about them. Make sure that all children have a chance to frame their own questions.

In leading students to identify problems, you might ask:

What do you think needs explaining here?
What surprised you?
What is puzzling?

When attempting to focus thought on interpreting and explaining, a good approach is to start with the simpler problems that have been identified, gradually gather interpretative ideas, and build toward the more difficult problems.

A first step in developing explanations is for students to organize their data or observations in some way. To *organize* means to fit individual parts into an organic whole. Discussion of data and organization might take place as groups report their findings to the class, or perhaps in a whole class discussion.

Research suggests that understanding is enhanced when students actively integrate information in various ways (King, 1994). To help students see their data holistically rather than as fragmented parts, teachers might ask them to

- describe to others what they did and what they found out;
- summarize their data;
- organize their data/information into tables and graphs;
- elaborate information by adding details;
- generate relationships between the new material and information already in memory; and
- develop patterns from observational data.

For example, in developing ideas on *patterns*, ask such questions as:

How is this situation like (different from) the other one?
What similarities (differences) do you see in these situations?
Do you notice any pattern in your data (in your moon observations)?

Viewing data holistically is not enough, however. Kuhn, Amsel, and O'Loughlin (1988) found that children and adolescents had particular problems in coordinating evidence and theories. Through strategic use of questions, science teachers can help children reflect on and represent evidence more completely, think at deeper levels, and connect evidence and knowledge more logically in explaining events in the natural world.

Students may need considerable assistance in accessing prior knowledge to make sense of observations. Sometimes, as is emphasized in the Learning Cycle model of instruction, relevant scientific knowledge must be taught directly to students.

Here are some sample questions that focus on accessing knowledge and constructing explanation.

1. If you seek suggestions on *scientific knowledge* that might be involved in an explanation, ask such questions as:
   - What principles that we have learned do you think may come into play here?
   - What principles (rules, laws, concepts) do you think are needed in solving this problem?

- How do you think that (a particular principle) applies to this problem?
- What do we already know that might help us here?

2. If you seek ideas on the possible *cause of an event*, ask questions such as:
   - Why do you think (the event) happened?
   - What ideas do you have on why this happened?
   - What suggestions (guesses, theories) do you have about the cause of this?
   - Can you explain why it might have happened?
   - What do you think is the cause of . . . ?

Questions that focus on interpretation and explanation should be open-ended and divergent and should be pursued for a sufficient time to get responses from several students. This strategy helps to ensure that ideas and explanations at a variety of levels of abstractness are at hand for students of different abilities to consider.

Note the use of the personal pronoun *you* in the examples of explanation questions. Framing questions in this way helps to make them more open-ended, allowing children to respond at their own level of thought. An explanation question such as "What ideas do *you* have about why . . . ?" (rather than "Why did this happen?") focuses more on the act of thinking than on correct answers. This questioning approach frees children of the burden of knowing in advance why something took place. It encourages them to think about *possible* reasons for the cause of a puzzling event and to offer suggestions or theories to build on. Their initial responses need not be absolutely correct. The teacher, through sensitive listening, careful and caring questioning, and appropriate scaffolding, can help the class as a whole formulate a satisfying response that is age and grade level appropriate.

Questioning to Guide Discussions of Applications to New Situations

Children need opportunities to apply new knowledge and understanding in many problem-solving situations. Problems can be generated in various ways. For example, you may plan the problem situations, or they may arise from students' creative ideas and interests. As they work on fresh problems, students try out their recently learned ideas by transferring them to the new situations, thereby refining and elaborating their developing understanding. The application phase of a lesson thus allows students to make new connections and construct more useful schemas from the knowledge they gained in previous activities.

Application can often encompass science-technology-society (STS) approaches to studying human problems. As societies grow and change, particularly as they adapt to technological advances, problems are bound to arise. The process of problem solving typically includes analyzing problems of human adaptation, determining alternative choices, charting cost/benefit/risk factors, making decisions, and taking action (Pizzini, Bell, & Shepardson, 1988).

Here are some sample questions that focus on different aspects of application.

Extension of New Ideas to New Phenomena. To elicit thinking about how new knowledge and understanding might be extended to different phenomena, ask such questions as:

- How do you think . . . applies to . . . ?
- In what ways does this idea compare/contrast with . . . ?
- How can we use this principle to explain . . . ?
- What new problems does this suggest?
- What might happen if . . . ?

In the Annenberg Video Case Study featuring Erien (first year), Erien's fifth grade class studies STS issues related to wetlands areas. Which of these elaboration questions might be applied to focus and extend the lesson? A study guide for this video can be found in this chapter.

Investigating Science-Technology-Society Issues. To guide students to apply new learning in studying STS issues and problems, ask such questions as:

- How would you state the problem?
- What decisions need to be made?
- What are the alternative choices?
- How does what we have just learned apply here?

Making Decisions and Taking Action. To guide students to weigh risks and benefits of each choice and to consider different courses of action, ask:

- What are the consequences/benefits/risks of this choice?
- Who will be affected by this decision and in what way?
- What personal and societal values are related to this choice?
- In what ways are the choices related to these values?
- Which choice do you think is the best choice?
- What do you think should be done next?

Application opens up the opportunity for students to explore the natural and technological world more deeply and to realize how extensively science and technology affect people.

Next we look at ways you can respond to students' answers to facilitate and encourage inquiry.

Responding Strategically to Student Ideas

Instructional research indicates that student growth is influenced by teacher actions that involve students in the development and extension of ideas (King, 1994). There are three main ways you can respond strategically to nurture and extend children's ideas during inquiry (see Table 5-2). You can *accept* student responses without judging them; you can *extend* student responses by adding something new to what was said; and you can *probe* student responses by asking questions based on their responses.

Accepting Student Responses

Your inquiry teaching repertoire should incorporate an attitude of initial *acceptance* of student ideas, even when they contain errors, mistakes, and alternative conceptions. Students

TABLE 5-2 TEACHER RESPONSES THAT NURTURE AND EXTEND STUDENT INQUIRY

Teaching Purpose	Description of Response
By responding strategically, teachers encourage critical discourse and communication of procedures, data, and explanations.	*Accepting.* Acknowledge and reinforce student responses; repeat or paraphrase student responses. *Extending.* Clarify, compare, or contrast student ideas; summarize and assess group progress; apply student ideas to explanations or problem solving. *Probing.* Building on ideas students have proposed, ask questions to get them to follow up on their own or other students' ideas, such as seeking clarification, justification, or verification of hypotheses.

should feel that they have the "right to be wrong." Because the very process of inquiry involves the challenge of trying the unknown, it necessarily must result in mistakes. The need to be always right, whether imposed by teachers, peers, or self, is a limiting and threatening position. Teachers have a major responsibility to help students explore new experiences and new meanings without penalizing the mistakes and wrong turns that are certain to accompany the process. By "accepting" children's ideas without initially judging or evaluating them, the teacher helps establish a climate in which students feel they can risk their ideas.

Teachers can show acceptance of student ideas by acknowledging, repeating, and reinforcing.

Acknowledging. When *acknowledging,* you should refrain from evaluating students' responses. This leaves the door open for further discussion. For example:

- OK.
- All right.
- Let's list your idea on the board.
- Let's keep your idea in mind.

You might also use nonverbal behaviors, such as a nod, to tell students that their responses have been heard and accepted.

Repeating. You can also show that you accept a student's idea by repeating it almost verbatim, or by paraphrasing the idea, without changing or adding to it significantly.

For example:

Student: Maybe it's the air leaking.
Teacher: OK. You think it may be the air leaking. (Repeating); or,
Teacher: OK. You think the bubbles may be caused by escaping air. (Paraphrasing)

Blosser (1991) cautioned against the overreliance on repeating student responses. If students know you are going to repeat responses, they may tend not to listen to one another but wait for your repetition. If you think the whole class has not heard a response, you might say something like:

Teacher: That's an interesting idea. I don't think the whole class heard it though. Would you say it again so everybody can hear?

Reinforcing. A third type of accepting behavior is *reinforcing* student ideas. It is an established principle of behavioral psychology that a person's tendency to display an action is dependent on events that follow the action. These special events are called reinforcements. In order to encourage student participation in discussion, a teacher may need to reinforce the act of responding. Teachers may also wish to reinforce good thinking and good ideas.

One way of reinforcing student responses is with praise. For example:

- Good!
- Fine!
- Excellent!

A stronger way of reinforcing children's responses is through praise followed by a word or explanation about the reason for the praise:

- Great! I like the way you are contributing.
- Good job! Your idea is particularly good because it relates your theory to your observations.
- Fine! I like the way you compared your idea to Celeste's idea.

Praise is important but should not be given in such a way that students think the idea praised is the only possible one. Other children might thus give up on their own lines of thought. Even when the idea you are seeking is voiced by a student, reinforce the child but let the class know there is more to be done. For example,

> *Teacher: Great thinking! Your idea is one we will have to consider. (Then, to the class) What other ideas do you have on why this happened?*

Reinforcement will be more effective if it follows an unpredictable schedule. If the student is able to predict that the teacher will say "very good" after every response, this form of praise will lose its effectiveness. For best results, the teacher should vary the type of reinforcements.

Reinforcement is, of course, more than a matter of what the teacher says. Both research and practice show that students are less inhibited about making responses and show more productivity and achievement when their teachers tend to be approving, to provide emotional support, to express sympathetic attitudes, and to accept their feelings.

Extending Student Responses

When students give vague, incomplete, unorganized, or partially incorrect responses, or when they are on the right track but need assistance, the teacher may act to nurture and extend their ideas. Perhaps the best reinforcement for students comes when they see their own ideas used by the teacher. Several techniques for extending student responses are described next.

Clarifying Student Ideas. To help clarify a student idea, a teacher may restate the idea in simpler terms, reorganize the idea, or perhaps summarize it. For example, suppose a student has given an unclear and unorganized response. The teacher may reply:

- In other words, the air takes up more space when heated. (Or)
- If I understand you correctly, you are saying that the air takes up more space when it is heated.

Compare or Contrast Student Ideas. When two or more students make suggestions that have significant similarities or differences, the teacher may wish to extend the ideas by comparing or contrasting them:

- Your idea is similar to Jamal's in that . . .
- Notice the difference in Kenesha's suggestion and Sean's suggestion. Kenesha said the wire would expand when it was heated; Sean said it would expand when it cooled. Both are good hypotheses. How could we test them?

Correcting Student Responses. There is uncertainty among teachers about how to handle incorrect ideas and misconceptions held by students. On the one hand, a student who is told that his idea is all wrong may be reluctant to participate in discussions again. On the other hand, misconceptions left unchallenged can cause confusion and interfere with correct explanations. Teachers need tactful ways of helping students confront and change wrong notions. One possibility is to determine if part of the student's answer is correct and to reinforce this part. For example:

> *Teacher: Yes, heat does play a part in the expansion of the copper rod, but melting does not take place. Remember, in melting, the solid rod would become a liquid. Can you make another suggestion?*

Applying Student Ideas in Constructing Explanations. Applying an idea suggested by a student in building an explanation is an excellent method of extending student ideas. However, teachers should be careful not to shift from extending student ideas to simply giving the desired information through lecture.

Summarizing Group Progress. To move the inquiry along, occasionally summarize the group's discussion and assess the various suggestions. This will not only extend students' ideas but also promote further inquiry. When the concepts involved are abstract or vague, when there are many responses, when student answers have been lengthy, or when some investigations have taken a great deal of time, you might say:

- Briefly, please summarize what you have just said.
- Tell us in your own words what we have learned.
- What were the main ideas discussed today?

Probing Student Responses

After a student has contributed an idea to a discussion, the teacher may attempt to produce greater critical awareness by probing (McDonald & Allen, 1967). Probing is a strategy in which the teacher reacts to student responses by asking penetrating questions that require students to go beyond superficial, first-answer responses.

Probing student ideas is different from *extending* student ideas in one main way: In extending, teachers add to student ideas; in probing, students are asked to add to their own ideas or those of others. A variety of probing techniques are given next.

Seeking Clarification of Ideas. A teacher may ask the child to clarify the response by giving more information, explaining a term used, or restating the response in other words. For example:

- What do you mean?
- Could you put that in other words to make clearer what you mean?
- Can you explain that further?
- What do you mean by the term . . . ?

The following interaction illustrates the clarification technique:

Teacher: What do you think is the relationship between the pressure of the air and its volume?
Student: The pressure got more and the gas condensed?
Teacher: Can you tell us what you mean by condensed? (Or) Can you restate that in terms of volume?

Seeking Justification of Ideas. Here you are asking the student to justify a response rationally. You might say:

- What are you assuming here?
- Why do you think that is so?
- I'm not sure I follow your reasoning. Tell us how you arrived at that answer.
- What evidence supports your idea?

Seeking Verification of Ideas. Here you are calling on the student to suggest means for testing or confirming a theory. For example, you may say:

- What would you do to test your idea?
- What would it take for that to be true?

- What evidence (additional information, data) would we need to test your explanation (suggestion)?
- What experiment could we do to test your idea?

Asking Questions Based on Student Ideas. Here the teacher takes a student response and builds a question based on it. For example:

- You have said that the bubbles are caused by escaping air. What do you think happens to the air pressure in the tube when some of the air escapes?

Develop Your Own Questioning and Responding Strategies

Developing personal competence in strategically guiding students in inquiry is a matter of

- fixing each questioning and responding skill and its purpose in mind,
- planning lessons carefully,
- using the inquiry discussion strategies in lessons with students, and
- analyzing the results.

This sequence should be followed by more practice in using the discussion strategy in teaching situations.

Analyze the teaching example in the next section to help you learn to use questioning and strategic responses in teaching science as inquiry.

Analyzing Inquiry Teaching Behaviors

Study the following dialogue in which teacher statements are numbered 1–22. Using the discussion in the previous sections and Tables 5-1 and 5-2 as guides, identify the specific type of question (observing or explaining) or responding skill (accepting, extending, or probing) that fits each of the teacher's questions or statements. Record your answers in the space provided. Note that some of the questions and statements may not fit any of the identified teaching skills.

In this dialogue, a discrepant event presented via video served as the engagement for the lesson segment. In the film, clear liquid was poured from two pitchers into two identical glasses. An ice cube was placed in each glass. Surprisingly, the ice cube floated in one glass but sank in the other (see Figure 5-2).

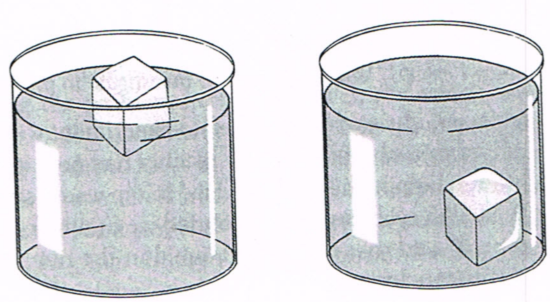


Figure 5-2 Why does one ice cube float and the other one sink?