Thought-Provoking Questions

By Christine Anne Royce

Why, what, and how: Three words that young students often speak when they are full of questions about activities and experiences in their daily lives. Helping students clarify their thought processes and ask a question that can be answered through scientific inquiry is a skill that will help them throughout their lives.

This Month’s Trade Books

**Goldilocks and the Three Bears**
By Jan Brett.
ISBN 9780698113589.
Grades K–3

**Synopsis**
Although this is my favorite version of this traditional fairytale, any will work for this activity. The three bears arrive at home to find that their chairs have been sat in, their porridge has been eaten, and someone was sleeping in baby bear’s bed. The old standard “and who’s been sitting in my chair?” leads to an answer that helps students realize that “how” you ask a question is as important as what you want to know.

**June 29, 1999**
By David Wiesner.
Grades 4–6

**Synopsis**
A young girl launches seedlings into the atmosphere to determine what happens. What she doesn’t expect are the giant vegetables that fall from the sky; she becomes puzzled about what happened and never finds out about the spaceship that jettisoned the vegetables. Although the story is implausible, students will realize that asking questions often leads to unexpected answers.

Curricular Connections

Students encounter a variety of experiences around which they formulate questions, some of which can be answered easily by looking up the information (e.g., What is for lunch?), whereas others are more challenging and require greater investigation that may lead to a developmentally appropriate answer (e.g., Why doesn’t the classroom pet like lettuce?). When students engage in simple investigations, they develop the ability to ask scientific questions, investigate aspects of the world around them, and use their observations to construct reasonable explanations for the questions posed (NRC 1996, p. 121). As students become familiar with this process, they will begin to understand that “scientists use different kinds of investigations depending on the questions they are trying to answer. Types of investigations include describing objects, events, and organisms; classifying them; and doing a fair test (experimenting)” (NRC 1996, p. 123).

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For Grades K–3: Considering the Question

Purpose:
Students will learn to think about what information they have and ask questions that help them obtain more information to answer a puzzle.

Procedure:
1. Read *Goldilocks and the Three Bears* and ask students to think about the questions the bears ask and the answers they get. Students may see the pattern that the question asked provides a single-response answer. Some questions allow them to narrow down an answer one at a time. For example, the bears could have said “who’s been sitting in my chair” and get answers such as the cat or the dog, whereas other questions help eliminate a series of possibilities which allows them to arrive at an answer quicker and more efficiently (e.g., Was the person sitting in my chair a boy or a girl?). The teacher will most likely need to model how to ask questions initially in this activity and then help students rephrase questions as they continue.

2. To conduct this activity, the teacher should have a series of objects that the students are familiar with, each placed in a brown paper bag or small box so that the students cannot see the object or discern its shape. Begin with the first object, for example, a tennis ball, asking the students to develop a question that will help them learn the name of the object.

3. Students may begin by calling out random objects such as “Is it a pen? Is it a pencil?” Simply answer yes or no and record their guesses on the board. After several guesses, stop and ask: “Is simply guessing an effective method for finding out what the object is?” Some students may grasp the idea that it is a random approach. Modeling the “think-aloud” strategy, say “Hmmm, if I were trying to figure out this object, what better type of question might help me narrow down what the object is?” (Accept student answers if they offer them.) Continue with the think-aloud strategy: “Perhaps, if I ask ‘is the object something that is found in the classroom or outdoors?’ I might be able to narrow down where the object might be located. Continuing with this pattern of ‘is the object something you find in a student’s desk? Or on the teacher’s desk?’” Helping students see that using a certain type of question can narrow down what the object might be in this particular activity models the desired questioning skill behavior. This may take different examples, but students can then model the behavior of asking clearer questions that help them arrive at the answer.

4. As students generate more productive questions, write them on chart paper or the board to revisit. After the game, ask students to look at their questions and consider how they helped narrow down the object. For example, “do we use the object in the classroom?” would help students realize that the object might be used on the playground or at home (requiring another question to narrow the object further). Teachers can investigate other riddles that expand student’s questioning skills one step further, such as Stories with Holes or other brainteasers (see Internet Resource).

Materials
- Chalkboard or chart paper, markers, ball, pencil, eraser, block, brown lunch bags, and other common objects

Internet Resource
Stories With Holes
[www.storieswithholes.com/storwithol5.html](http://www.storieswithholes.com/storwithol5.html)

From The Project Gutenberg eBook, *English Fairy Tales*, by Flora Annie Steel, Illustrated by Arthur Rackham
For Grades 4–6: Carefully Crafted Questions

Purpose:
Students will ask a question that allows them to design an experiment or investigation.

Procedure:
1. Conduct a read-aloud of *June 29, 1999,* with the class. Stop at key points and ask the students to make observations about what is happening and predict what might happen. Ask “What is Holly Evans doing with the seeds?” or “What is a possible explanation for what happened when the vegetables start falling to Earth?” Students may believe that the seeds Holly launched grew into giant vegetables, however, they will get an unexpected answer. Explain that even when we ask a good question, we may get an unexpected answer. Students are often conditioned that they must have the “right” answer and can be a bit timid about taking a risk and being incorrect.

2. Having the students use common, everyday items will allow them to focus on asking carefully crafted questions. Different types of questions lead to different types of investigations. Some will require students to look up information using reputable resources, whereas others will require them to design a simple investigation.

3. Ask, “If you could investigate any idea using the materials provided in the center of the room, what idea would you choose and why?” Provide materials such as magnets, toys, dice, coins, or balloons to investigate questions using these objects or other questions such as the ones listed below.

- What happens when you mix the primary colors of paint?
- What happens to your heartbeat when you jump rope for one minute?
- Where do pill bugs prefer to live?
- How does my breathing rate change when I exercise?

List all topics on the board and ask students to separate the questions into two categories—those we could easily explore in the classroom and those that would require us to go somewhere else. Ask the students to determine whether they have the materials within the classroom or if they would need to obtain or buy them elsewhere.

4. Continue to narrow down the question possibilities to arrive at a few that are “doable” and “reasonable to do” in the classroom. Identify possible investigations that could be done easily with the materials provided. The activities would depend on the age of the students and the curriculum areas they are studying, keeping it within the content areas of science.

5. Either the entire class can investigate the same question, which is recommended for younger students, or different student groups can choose an individual question to investigate. The latter may require assistance from classroom aides or parent volunteers. Regardless, the teacher will need to elicit what students’ predictions are, the types of information they will gather, and what is the best way to record that information.

6. After thinking through their experimental design process, allow teams to set up and conduct their investigations as well as collect data. Then have students consider their initial prediction—was it accurate or did they have to change their ideas due to the data they collected? Follow up by asking whether they generated any more questions by conducting their investigation. Some may have generated a new question based on their outcome or what they observed during the activity—the process of inquiry!

Connecting to the Standards
This article relates to the following National Science Education Standards (NRC 1996):

**Content Standards**

*Grades K–8*

**Standard A: Science as Inquiry**

• Understanding about scientific inquiry


**Materials**

- Vary based on the questions students develop