



Portfolio Activity 2.2

INVESTIGATE YOUNG LEARNERS' IDEAS

Materials Needed:

- Something to write with
 - Baking soda
 - A 250 ml beaker
 - Vinegar
 - Water
 - Two students of different ages to talk with
- A. Set up a conversation with two students of different ages to learn about how they understand some science concepts. You might want to tape your interview. Make sure to find out the following information:
- Age of student.
 - Current grade.
 - What science topics they remember studying in school or at home.

NOTE: Probing a child to determine his or her conceptual understanding is a difficult process. It is a good idea to practice with a classmate or a friend before you conduct these interviews with students. Tape these practice sessions and study the way you asked questions. In general, observe the following guidelines when interviewing your learners:

1. Avoid using leading questions that suggest responses. For example, don't say, "How do you think this will re-

act?" By saying *react*, you lead the students to think something is going to happen.

2. Avoid praise or negative comments. For example, don't say, "Good." Rather, say, "I see."
3. Use phrases that allow a learner to clarify and expand on his or her ideas. Be sure to probe when scientific or technical terminology is used. For example, if the student says, "It will evaporate," ask, "What do you mean by 'it will evaporate'?" To clarify ideas, say things like, "Could you tell me more about what you mean?" Here are other phrases:
 - "Please describe that further."
 - "What do you mean by...?"
 - "Tell me more about...?"
 - "Is this what you mean...?"
 - "Please explain that further."
 - "Hmm. That's interesting. Tell me more about that."
 - "What else would you like to tell me about what you observed?"
4. Listen to the learner—use active listening techniques. For example, look at the child when he or she is speaking. Paraphrase what the student says. For example, if the child says, "I think it will disappear," you might say, "Do you mean you wouldn't be able to see it?" Ask for explanations. Summarize what you think the student said.

5. Use the learner's language to rephrase and further probe the learner's response. For example, if a student says, "I won't be able to see it," say, "Why can't you see it?" Don't say, "Do you mean it will dissolve?"
6. Provide the learner with ample time to construct a response. Wait at least three to five seconds after asking a question before you say anything more.
7. Establish a calm and accepting atmosphere. Don't rush the conversation by talking hurriedly or being judgmental about responses.
8. If a learner cannot answer a question, try rephrasing the question to find out what the student does know and what his or her thoughts are. For example, if you first ask, "What do you think will happen?" and the child doesn't respond, rephrase the question to say, "What do you think will happen when I put this baking soda into this water and stir it?" However, be careful; don't add more than what the student said.

B. Complete the following tasks with the two students:

Dissolving Change Task. In this task, you will mix a teaspoon of baking soda in 100 ml of water. The baking soda will dissolve in the water.

- Show students a teaspoon of baking soda and a 250 ml beaker with 100 ml water. Ask students to predict what will happen if you mix the baking soda in the water.
- Place the baking soda in the beaker of water and stir. Ask the students to describe what they see. Ask the

students to explain what they observe. Find out what the students mean by the words they use. For instance, if they say, "It dissolved," ask them what they mean by *dissolved*.

- Ask the students what they might see if they could magnify the contents of the beaker 100 million times. Ask the students to draw what they think they would see.

Chemical Change Task. In this task, you will mix a teaspoon of baking soda in vinegar. This is a chemical change; the baking soda will react with the vinegar to form new products.

- Show students a teaspoon of baking soda and a 250 ml beaker with 100 ml of vinegar. Ask students to predict what will happen if you mix the baking soda in the vinegar.
- Place the baking soda in the beaker of vinegar. Ask students to describe what they see. Ask students to explain what they observe. Find out what the students mean by the words they use. For instance, if they say, "It reacted," ask them what they meant by *reacted*.
- Ask what they might see if they could magnify the contents of the beaker 100 million times. Ask the students to draw what they think they would see.

C. Process what you found. Combine your data with the data from other students in your class. Summarize your data. What conclusions can you draw? What educational implications do your conclusions indicate? Record these in your portfolio.