

Unlocking the Power of Observation



Activities to teach early learners the fundamentals of an important inquiry skill

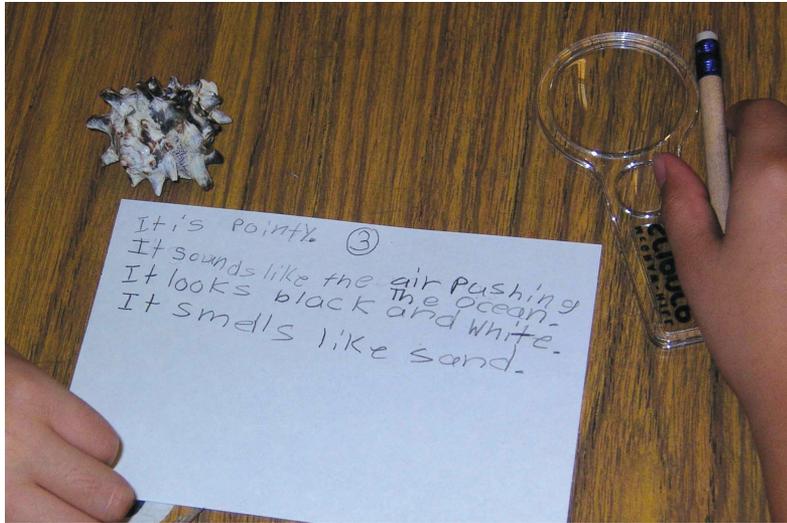
By Karen L. Anderson, Dean M. Martin, and Ellen E. Faszewski

The dawn of a new school year is the perfect time to reflect on last year's successes while setting even higher expectations for the upcoming year. For several years, many of our new-school-year resolutions have revolved around a common theme: improving the introduction of inquiry skills to young (kindergarten through second grade) learners, particularly students with limited English-language skills. After experiencing many partial successes, we have found the following easy-to-implement workshop activities to be just what we needed to make our resolutions come true.

The activities focus on observation and communication. These skills not only help to focus young children's natural curiosity but also build a solid foundation for future scientific learning.

Making Good Observations

Observation is the cornerstone of the inquiry process. It begins an investigation and continues throughout it. When making observations, young children are learning to gather evidence, organize their ideas, and propose explanations about the world around them. By challenging young children to use their five senses to make detailed observations, teachers are encouraging stu-



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dents to collect and organize information about natural phenomena that they naturally find compelling.

In this activity, we began with a review of the fundamentals of observation through the questions: “How do we make observations? Can someone make an observation about this room?” Student responses such as “I see six hanging lights,” “There are 26 students here today,” and “The tabletop is cold and smooth” were recorded on chart paper under the heading “Making Good Observations.”

Throughout this introduction, teachers helped students understand the difference between an observation empirically made (through the use of our senses) and other non-scientific statements. For example, the statement that the surface is “brown and wrinkled” is an observation, while the statement “it is ugly” provides little to no scientific value.

After emphasizing that “good” observations are detailed and involve the use of our senses, each group of students was given a tray containing a variety of seashells (or any other commonly found natural material) and hand lenses for each child. Students were encouraged to “examine these scientific specimens.”



Make sure items brought in for observation are safe. The “no tasting” rule should be emphasized before students are given their specimens.

After the students were given approximately five minutes to explore the variety of specimens, they were directed to select one shell on which to focus all of their “powers of observation.” Students were instructed to “record as many detailed observations as you can about your shell” on unlined index cards. During this time, the role of the teacher is to guide, facilitate, and continually assess student work, encouraging observation through the use of such questions as:

- *What sense did you use to make this observation?*
- *I see that you only used your sense of sight; what other sense could you use?*

- *Is this statement an observation, or does it describe how you feel about your specimen?*

Using the assessment checklist and rubric (Figure 1, page 34), we assessed students’ abilities to use their power of observation. As students complete the task, we circulated and noted for each student which skill they are not able to or do not demonstrate, meaning that they require additional assistance; which skill they are able to demonstrate when receiving assistance from the teacher or a more competent peer; and which skill they demonstrate a full understanding of (mastery).

After students recorded their observations, they placed their observation cards and shells back on the tray. We redistributed the trays to different groups and then asked students to select one of the observation cards and find the shell being described. When students located the shell that matched their observation card, they stood, shared the information on the observation card, and showed the class the shell they believed the card represented. The child who initially created the observation card was consulted to check for accuracy. Overall, we found students to be quite accurate, being able to either select the exact shell their peer had described or to be able to bring their selections down to two or three “possible” shells. We asked, “Which observation did you find most helpful? Why?” Student responses were added to the chart paper.

To end the activity, students answered the question, “What did we learn today about making good observations?” by commenting that good observations “use details,” “use adjectives,” or “make you do more than look at it, you need to touch it.” Students also said that observations that were made through the use of our senses, (e.g., “white with ridges”) were most helpful in identifying the object than nonscientific statements (e.g., “looks funny”), which provided little to no descriptive value.

Figure 1.

Assessment checklist and rubric.

Name of Student	Used sense of sight	Used sense of touch	Used sense of taste	Used sense of hearing	Used sense of smell	Number of senses used	Use of tools of science: hand lens	Verbal representations used	Pictorial representations used	Measured length or width	Measured area or perimeter	Comments
	2	1	n/a for this activity	1	1	4	0	1	1	0	0	Needs additional support
	2	1		1	1	4	0	2	1	1	1	
	2	2		2	0	3	2	1	1	0	0	Stayed focused throughout
	2	0		0	0	1	0	1	1	1	0	
	2	2		2	2	4	0	1	1	0	0	
	2	2		2	1	4	1	1	1	1	1	Used measurement concepts with prompting
	2	1		1	1	4	0	1	1	1	0	Needs further vocabulary to express details
	2	0		0	0	1	0	1	1	1	1	
	2	2		0	0	2	2	2	1	0	0	Great detail-written
	2	2		0	1	3	1	1	1	0	0	Color and texture detailed well
	2	2		1	0	3	0	1	1	1	0	
	2	1		1	2	4	1	2	2	2	2	Used numbers, pictures, and words
	2	2		2	2	4	1	1	2	1	0	Used pictures throughout
	2	1		2	1	4	2	1	1	1	0	Works well with partners

Rubric:

- 0 = Demonstrates little to no understanding/needs additional help or assistance
- 1 = Demonstrates understanding with assistance from adult/more competent peer
- 2 = Demonstrates full independent understanding

Communicating Observations

To further their learning, students conducted a second activity that focused on making “better” observations. To begin, the class reviewed the statements written on the “Making Good Observations” chart. Students were once again given hand lenses and a tray containing a variety of seashells and encouraged to examine the specimens. After observing the materials, students were given the same instructions as before, but this time were presented with a second tray containing

unlined index cards, lined index cards, ¼ in graph paper, 1 cm graph paper, and pencils. They were instructed to “record as many observations as you can about your specimen.”

As we circulated the room questioning students about their observations, we assessed their use of the tools and their ability to generate “scientific” observations. This time, however, instead of focusing on “What sense did you use to make this observation?” students were questioned about their use of the materials:

- How might you use this paper to make observations?
- What type of observation could you make if you used this graph paper?

Students made statements such as “as soon as I saw this paper, I knew I should trace my shell.” The students appeared to know intuitively what to do with the graph paper. No instruction or hints were given concerning how to specifically use the graph paper beyond the questions asked above. This enabled the group to add to their “Making Good Observations” chart paper that good observations “use numbers” (referring to length, width, perimeter, and area measurements), “use drawings,” or “include diagram.”

Once students recorded their observations and placed all materials (observation records and shells) back on their tray, trays were again collected and redistributed. Students were then asked to select an observation record, locate the shell it represented, and share their findings with the class (as described in the prior activity). The child who initially created the observation record was consulted to check for accuracy.

Again, we asked, “Which observation did you find most helpful? Why?” Student responses were added to the chart paper “Making Good Observations.” Closure for this activity involved answering the question “What did we learn today about making good observations?”

After presenting this second activity, we were pleasantly surprised by how frequently the presence of “special paper” encouraged students to:

- Move beyond their written observations to include pictorial representations,
- Identify length and width (by counting the number of squares long or wide it was), and
- Use numbers and other symbol systems.

A major advantage to these materials was that it also enabled all students, particularly those with limited English proficiency, to increase the length and complexity of their responses. Whereas before, when using only the unlined index cards, students’ responses were often limited to single words or short phrases; once the “special paper” was present, more students were able to express conceptual understandings (e.g., “The shell is 5 blocks long” or “length = 5 blocks”). Observations such as these provide far more information and are therefore much more valuable when communicating about the characteristics of individual shells.

Assessing Inquiry Skills

Because these activities can be completed multiple times across the school year to develop and strengthen students’ powers of observation as well as their ability

Connecting to the Standards

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

Content Standards

Grades K–4

Standard A: Science as Inquiry

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

Science Teaching Standards

Standard A:

Teachers of science plan an inquiry-based program for their student

to communicate their developing scientific ideas, these activities can be used as a key assessment of students’ developing abilities. In order to document students’ developing inquiry abilities, the assessment checklist (Figure 1) should be created once and completed at several key times during the school year when completing activities that involve student observations. For additional assessment data, you may also choose to collect their recorded observations. Also, students should periodically be encouraged to review their “older” observations and critique their skills. *What do they like about the observations they made? Where do they see growth in their own understanding?*

In order to build a solid foundation for understanding scientific concepts, young children need multiple opportunities to exercise their skills of inquiry and to make sense of their worlds. A primary goal of early childhood science should therefore be to provide opportunities for students to develop the skills which lay the groundwork for future scientific learning. Through experiences with the skills of inquiry, coupled with the “language of mathematics,” young children develop the tools necessary to form more complex scientific ideas and become more proficient at using the language they need to communicate these developing ideas. ■

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Resources

National Research Council (NRC). 1996. *National science education standards*. Washington, DC: National Academy Press.