

## “Inventive” Learning Stations

Suggestions for creative, engaging, and manageable science learning stations

By Olga Jarrett

I learned many years ago that my students loved *doing* science and that I could engage them in investigations with few materials if I set up hands-on learning stations where they could work independently or in small groups. I began using learning stations with elementary school students and still use them as I design and share new stations with the teachers in my science and social studies methods courses.

The benefits of learning stations are many. Learning stations can be used for myriad purposes—to teach concepts, integrate subject matter, build interest, and allow for inquiry—the possibilities are limited only by the imagination of the teacher and the supplies available. Learning stations can be open ended (e.g., present students with a box of magnets and electrical supplies with the instructions to see how the items interact), or they can work toward a specific outcome (e.g., ask students to sort a salad into plant parts—the leaves, fruit, buds, roots, or stems). Often the objectives are process oriented and involve modeling scientist behaviors—observing, classifying, inferring, testing, and communicating (Pearce 1999). In addition, learning stations fit well within the 5E learning cycle model of inquiry, which recommends that lessons include the following stages in order:



PHOTOGRAPH COURTESY OF THE AUTHOR

Engagement, Exploration, Explanation, Elaboration, and Evaluation (Bybee 2002). Station activities can be designed to engage students in a particular study, or they can be designed as opportunities for exploration, the first two Es of the model. I have designed and implemented learning stations on such topics as oceans, trees, butterflies, electricity and magnetism, the geology of Georgia, and rain forests.

However learning stations are incorporated into teaching, I’ve

found them to be engaging to students and useful to teachers. This is particularly true if classroom materials are limited in quantity because students can work in small groups and rotate through stations, thus requiring fewer identical supply sets. In this article, I share suggestions and a checklist (Figure 1) for setting up successful learning stations. In addition, I include a series of learning stations on inventions used in my own classrooms (see NSTA Connection).

## Designing Stations

The term *learning station* can mean different things to different people. By my definition, learning stations generally feature objects (e.g., one microscope, one balance, a few batteries and bulbs, a small collection of fossils) and hands-on activities which can be done in rotation by small groups of children to investigate a topic. I like to put together a series of different stations (usually 4–7) on a given topic. As students might start at any one of the stations, stations are designed so the activities need not be done in any particular order.

For example, the activities in the Invention Learning Station series (see NSTA Connection) each allow students to experience a process central to science, such as *inferring* what various tools do, *identifying* the simple machines at work in some common tools, *researching* the history and contributions of African American inventors, or *observing* “useful accidents” to understand the idea that scientists build on past knowledge to make new or improved technologies.

Although learning stations can be organized around any topic, I find that the most effective stations have at their roots either a science or social studies learning standard. I like to start with practical objectives that fit within the science standards. For example, the objective from the first invention station (“What Are These Tools Used For?”) states, “The student will infer uses of various inventions from their characteristics.” I

## Figure 1.

### Learning station checklist.

Use the following learning station checklist as a guide to creating learning stations that will be engaging and manageable.

- \_\_\_\_\_ Stations follow a theme, allowing children to learn about a specific topic.
- \_\_\_\_\_ Stations don't have to be done in any particular order.
- \_\_\_\_\_ Station activities can be done in small groups with enough materials so that all children are engaged.
- \_\_\_\_\_ Station activities can not easily be done as a whole group.
- \_\_\_\_\_ Stations allow children to figure out things on their own without adults being too directive.
- \_\_\_\_\_ Each station focuses on an activity that can be explored in 10–15 minutes.
- \_\_\_\_\_ Instructions are clear and can be read by most of the children (for very young children, instructions are short enough that they can be read to the children quickly).
- \_\_\_\_\_ Stations can be cleaned up quickly by the children in preparation for the next group.
- \_\_\_\_\_ Most activities are hands-on, use real objects, and promote inquiry.
- \_\_\_\_\_ Stations to be done independently do not involve any safety hazards.
- \_\_\_\_\_ No more than one station requires extra supervision/monitoring (such as stations with “messy” activities).
- \_\_\_\_\_ Questions at the station encourage children to write and/or draw things in their journals that will allow the teacher to see what they think is important, how they organize data, and what they have learned. Don't ask a lot of specific questions that could be done on a worksheet.

want the students to examine the tools and observe what they can do (e.g., squeeze, pinch, cut, pump) to determine their use.

When designing stations, I try to keep the station instructions simple so they can be read quickly. To accommodate different grade levels and diversity in reading ability, the instructions can be illustrated with photos or diagrams, read to the students, or read by an advanced reader to her classmates. The instructions can be laminated or placed in a du-

rable transparent sheet protector. I keep the materials and instructions together in a large sealable plastic bag or a tub; then when I teach, I simply need to add any expendables. For each topic, I also assemble a small library of books students can read if they finish a learning station early (see NSTA Connection for the list of children's books on inventions).

## Managing Stations

When beginning with learning stations, keep them simple. Manage-

ment and cleanup between rotations will be easier if each station is limited to one idea or one activity. Avoid having more than one station in each series that requires close teacher supervision, for example, stations using a toaster oven, hairdryer, plastic serrated knives, hand tools, or water. Obviously, the teacher needs to be aware of what is happening in the whole room, but it helps not to have more than one potentially challenging station in a set.

To keep classroom management problems to a minimum, make expectations clear at the outset. Before beginning station work, I explain to the group what we are going to do. Students are divided into groups by counting off by the number of stations. I've found it works best to have only 3–5 students at each learning station. Also, each station needs to have enough materials for everyone in the group; otherwise management issues can arise and students may fall off task. I tell students that they will have approximately 10–15 minutes in each station and that they will receive a two-minute warning when it is time to rotate to the next station. The warning gives students time to finish writing in their journals and to straighten up the station for the next group of students. Depending on the number of stations, the number of children, and the class schedule, station rotations can be done all in one day or over a period of several days. I provide a minimum of one hour for four stations, including group instructions and a closing discussion. Because students may not always finish in

the allotted time, and some students may want to continue their explorations with the materials, stations should be available later for further investigation.

## Assessing Stations

Most stations include an assessment task for students to respond to in their science journals, and I examine journal entries for understanding. Make sure the assessment draws on what the students have experienced. I use journals rather than worksheets because they allow students to write and draw things they think are important, organize the material in their own way, and end with a personal account of their investigations.

If I do not have stations that require special supervision, I circulate around the classroom and share suggestions for making useful journal entries. For example, several of the assessment tasks for the invention learning stations involve illustration, so I discuss the importance of scientific drawing (i.e., drawing for accuracy) with students. At a station where the students are to draw and identify tools, I might ask whether a tool maker could use their drawing to build a tool or whether something is missing.

I respond to students' journal entries in writing, recognizing good ideas and adding questions for students to think about for future investigations. I try to provide positive, constructive comments that will help students learn what they are doing correctly and where their responses show inconsistencies. Journals are

## Connecting to the Standards

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

### Content Standards

#### Grades K–8

#### Standard E: Science and Technology

- Abilities of technological design
- Understanding about science and technology

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

## NSTA Connection

Find the Invention Learning Stations series and internet and print resources at [www.nsta.org/SC1001](http://www.nsta.org/SC1001).



collected at the end of each science period. I usually spend between an hour and an hour and a half reading the journals and responding—at least briefly—to each student.

At the end of each set of station rotations, I pull the students together for a scientist meeting to discuss what they learned. If students have rotated through all the stations in one day, I have not yet read their journals at that point. However, I still learn a great deal about what students have learned through the activities. For example, after the invention stations, I listen

for comments about the invention process.

Scientist meetings are also useful for extending difficult concepts and for sparking discussion. For example, students may comment "Wow, the hooks on burrs really look like Velcro!" These discussions emphasize the importance of careful observation and what might have happened if the inventor of Velcro had not looked at the burrs stuck to his jacket.

Fifteen minutes at a learning

station is not long enough for an in-depth investigation of a topic, but it is long enough to spark interest and raise questions. Increases in motivation, curiosity, content knowledge, and cross-disciplinary understanding can be important outcomes of learning stations. It takes a bit of effort to assemble the materials and create the instructions, but once you have created a set of learning stations, you'll be glad you did. You will want to use them again and again! ■

*Olga Jarrett (ojarrett@gsu.edu) is an associate professor of early childhood education at Georgia State University in Atlanta.*

### References

- Bybee, R.W. 2002. *Learning science and the science of learning: Science educators' essay collection*. Arlington, VA: National Science Teachers Association.
- Pearce, C.R. 1999. *Nurturing inquiry: Real science for the elementary classroom*. Portsmouth, NH: Heinemann.

## PreK-Primary teachers of science, we want to hear from you!



Early childhood science teachers need their own place to find resources and get support. Find it at [http://blogs.nsta.org/EarlyYearsBlog!](http://blogs.nsta.org/EarlyYearsBlog/) This online companion to *Science and Children's Early Years Column* is your place to interact with colleagues and share the joys and challenges of your classroom. Visit The Early Years blog and share what's happening in your classroom.