This month *Science and Children* is exploring the integration of language arts into science. The Early Years is tackling the topic by showing how to link literacy with science activities—through the use of science centers. Fellow early childhood educators are sharing their views on the topic online—i.e., their favorite science centers and more—at the Early Years Blog: *http://nsta.science.org/earlyyears blog*. See the box at right to read excerpts from some of the best comments.

Young children are born scientists, exploring everything in their world around them. Yet, many teachers still find it hard to integrate science into the daily schedule. However, open-ended science or discovery centers are a perfect way for teachers to help students develop science processes and build literacy skills while they integrate science into the curriculum.

Discovery centers for preK to kindergarten foster observational and problem-solving skills through exploration and examination of objects, which best matches this age group's interests and abilities. Through these explorations, however, students can also develop vocabulary and be encouraged as they learn to write. Later, as children gain literacy and language skills in first and second grade, science centers can include more "advanced" writing and documentation tasks along with the exploration, providing an opportunity for teachers to reinforce science content while supporting reading, writing, and communication skills.

In the example that follows, students examine and make predictions about various nuts and bolts. Teachers can create similarly successful science centers that address other topics using this model as well.

What's happening at *http://science.nsta.org/earlyyearsblog.*

What do your science learning centers look like?

A small table can serve as a permanent science center. A freestanding tabletop magnifying glass and smaller magnifying glasses of various sizes are perfect.

Other objects include tweezers for picking up small objects, gloves, and just for fun, a couple of visors that have "scientist" written in marker or paint. The objects on the table can be changed weekly or monthly. Students may investigate the leaves in fall, shells in spring, or rocks and sand anytime. Have students bring in objects they wish to share. Allow the center to be a place that leads them to draw, write, or investigate the objects later.

Gail Gauthier
National Board Certified Teacher
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I suggest that maybe we don't want a content-based science learning center but rather a place where tools of science are kept. What science was happening would determine where the "science area" was.

For example, if the science focus was on living things and their connection to the environment, there might be plants growing on a window sill; sow bug habitats and worm habitats on a table where they could be watched; and appropriate books nearby each place. An outdoor area from which the animals came might be part of the science area as well.

On the other hand, if the science focus was on building structures, the block area would be the science area. If the focus were light and shadow, the science area would be outdoors and in a darkened corner of the room indoors. And maybe sometimes it would be the windowsill as well to make rainbows with prisms.

To me, a science learning center can feel constraining because science can happen in many

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The Nuts and Bolts of Discovery Centers

By Kent Chrisman

In a nuts and bolts science center, children develop skills in comparing similarities and differences among objects; developing fine motor control; classifying by size and shape; noticing and identifying similar objects in the classroom; using words to describe objects; and predicting.

These skills can be addressed using other objects as well, including working with simple scales (comparing objects that are heavier or lighter and recording observations); experimenting with pulleys and ramps (noticing movement and speed and using words to describe actions); and sorting rocks (using visual clues to categorize and graphing the categories discovered by shape, color, and weight).

I usually keep science centers open for about a week at a time, so that all the students in the class have time to visit the center and do the activity at least once, if not more.

Meanwhile, during group time, we conduct activities that reinforce science content and encourage development of literacy skills, including reading aloud books, doing finger plays, or singing songs that relate to the center's theme. I include books at the center both for reading and for reference. For example, some of the resources I use in the nuts and bolts center and during read-aloud time include:

- Gibbons, G. 1992. *Tool Book.* New York: Holiday House. The colorful illustrations provide content and context to words about tools for greater comprehension.
- Rockwell, A., and H. Rockwell. 1971. *The Toolbox.* New York: Macmillan. This book supports children's memory in retelling the kinds of tools they remember from the illustrations and words.
- Morris, A. 1992. *Tools.* New York: HarperCollins. A multicultural look at tools used by many people around the world for a variety of tasks.

Also, I provide plenty of art and writing materials at the center. This encourages students to record what they see and documents changes in their thinking during the activity. Students' work can be displayed or collected for assessing children's level of scientific understanding and level of writing development.

Words that describe students' experiences (e.g., *rough, smooth, hard, heavy, short, long,* and *round*) can be recorded on a chart or cards and hung in the center or posted on a science word wall in the classroom.

After all of the children have had the opportunity to visit the center activity, the whole class builds graphic organizers to summarize what they have discovered.

Examples of graphic organizers include webs (showing what things are held together by nuts and bolts), charts (showing the different lengths of the bolts used), or clustering of words that describe nuts and bolts (such as *hard* and *scratchy* or *heavy* and *long*).

The possibilities for integrated discovery centers are as numerous as the topics we teach. They are an effective place for teachers to help students develop both science and literacy skills.

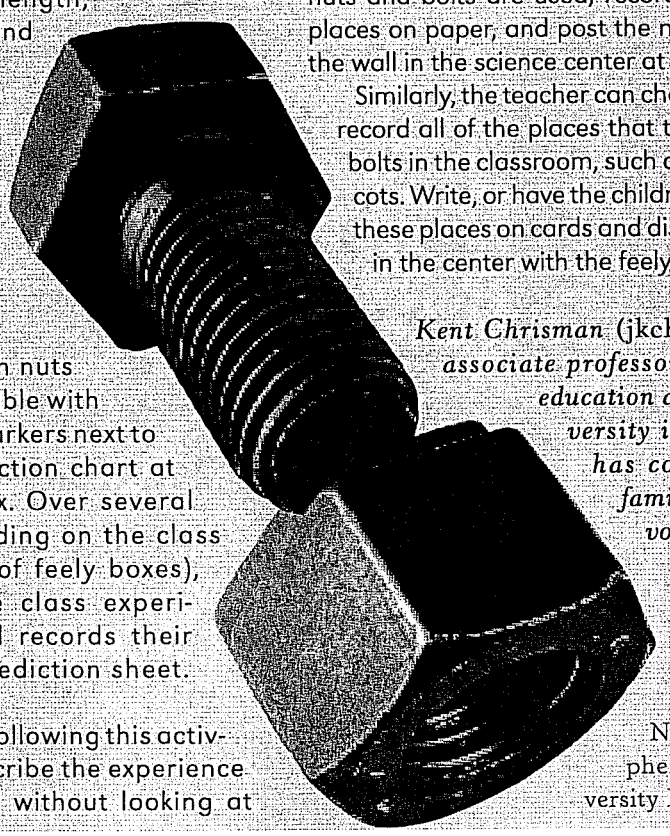
Nuts and Bolts "Feely" Box

Objective

Students predict which of the various sizes of nuts and bolts they have touched and record their prediction, practicing both science process and writing skills.

Materials

- A "feely" box (sealed cardboard box with holes cut out on two sides)
- At least five sets of nuts and bolts (short, long, light, and heavy)
- Direction Chart (a poster that says "Feel the nuts and bolts in the box (without looking) and record what you felt on the prediction sheet.")
- Prediction Sheet with columns (a worksheet that says "Circle the size of the nuts and bolts that you touched," or for older students, "Write words about the size, length, and weight of the nuts and bolts.")



Procedure

1. Preview the use of the feely box and direction chart at group time and discuss the prediction sheet.
2. Place the feely box, with nuts and bolts inside, on a table with prediction sheet and markers next to the box. Place the direction chart at eye level above the box. Over several days or weeks (depending on the class size and the number of feely boxes), make sure the whole class experiences this center and records their predictions using a prediction sheet.
3. During the group time following this activity, ask the class to describe the experience of touching something without looking at it. Have the students tell how it felt, if they noticed differences, and have them generate a list of descriptive words such as *hard, smooth, rough, long, heavy, short,* and *light.* Post the list in the center so it may then be used for a writing activity or for reviewing what has been learned in the activity.

Extension

Encourage reading and writing about center activities at home by sending information to the students' families each week. Suggest simple activities for follow-up, such as asking questions, noticing changes in a similar situation, or looking for patterns.

For example, for this activity, students and their families might identify places around the house where nuts and bolts are used, record the names of these places on paper, and post the name of the places on the wall in the science center at school.

Similarly, the teacher can challenge the children to record all of the places that they can see nuts and bolts in the classroom, such as cabinets, carts, and cots. Write, or have the children write, the names of these places on cards and display them on a board in the center with the feely box.

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Resource

Pattillo, J. 1978. *Preprimary learning center activity cards.* Nacogdoches, TX: Stephen F. Austin State University Bookstore.

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places indoors and out. Science is rarely what we put on a table. I want children to feel that natural things and phenomena are all around them to be studied scientifically. The sow bugs are pets or, when we do science, they are animals of study. The block area is to build an airport, or from a science point of view, a place to study forces.

As teachers, we can help children to engage with stuff and events in many ways and science is just one of those ways.

Karen Worth
Science Educator
Newton, MA

I have "ABC Science Shoeboxes" in my classroom: 26 plastic shoeboxes are stored on shelves. Each shoebox has a big black letter sticker (the letter of the alphabet), and the same big black letter sticker is on the shoebox's spot on the shelf, so students know where to return it. I also have a laminated poster with the same big black letter stickers in two columns. Once I have introduced the shoebox, I write its name on the poster (i.e., Magnets), and students know it's "open" for use. Even if they can't remember the word I have written, they can see that I have written a word by that letter.

Each shoebox contains materials for a specific activity, but students may use the materials at any time. If they need a magnet for something, then they know they can find a variety of magnets in the "M" Shoebox. Students may work with the science shoeboxes at any work space in the classroom, at a table, or on the floor. If there is liquid involved, however, they must work at a table.

Here are a few shoeboxes:

- **A-Absorption** (eyedropper, little cup for water, various materials to test for absorbency, pencil, record sheet to draw results)
- **B-Balance** (balance toys from Oriental Trading, pencil, record sheet to draw your favorite balance toy) etc.

Ingrid Sherwood
Primary Montessori Teacher
Frederick, MD

Read more at *http://science.nsta.org/earlyyearsblog/comments.aspx?blogid=1&articleid=24.*

Online, your colleagues are also discussing these questions:
- How do you entice teachers to use a new school garden area?
- How do you use toys in teaching science?

Read more and join the conversation at *http://science.nsta.org/earlyyearsblog.*

Teacher's Picks


Kent Chrisman

In addition to his teaching duties at the university,. Kent serves on a county "Success By Six" Readiness Committee and a Preschool-Collaboration committee with a local school district. Some of his favorite resources for developing science centers are listed below.

Books

Investigating Science with Young Children. R. Althouse. 1988. Teacher College Press.
Contains activity plans for creating science experiences with water, food, motion, colors, etc. Very clear and workable ideas for preK through second-grade classrooms.

101 Science Poems and Songs for Young Learners. M. Goldish. 1996. Scholastic.
This book includes songs that can be sung to familiar tunes, poems with science terms, and book lists.

Using Children's Literature in Preschool: Comprehending and Enjoying Books. L.M. Morrow and L.B. Gambell. 2004. International Reading Association.
Explains a variety of ways that books can be used in preschool. Provides lists of books for different activities.

Open the Door, Let's Explore More! R. Redleaf. 1996. Gryphon House.
Includes songs, fingerplays, and resource lists to encourage exploration beyond the classroom.

Everybody Has a Body: Science from Head to Toe. R. Rockwell, E.A. Sherwood, and R.A. Williams. 1992. Redleaf Press.
Skills that promote observation, inference, and prediction are included.

Sandbox Scientist. M. Rose. 1996. Gryphon House.
Hands-on science activities including ice and bubbles, magnets, gears, and plant prints.