

Tools of Science Inquiry That Support Life Science Investigations

By *Cindy Hoisington and Jeff Winokur*

Since humans first began studying the natural world they have been designing, making, and using tools to extend their senses and assist in their explorations. These tools are of particular importance in life science investigations because the study of living things relies on the ability to closely observe and describe the physical characteristics and behaviors of plants and animals over time. Introducing and using tools with young children to make measurements, record observations, and collect other data enriches their understanding of living things. It communicates the idea that using tools effectively is an important component of doing and learning science, as outlined in the *Next Generation Science Standards*. We suggest that early childhood teachers put together a classroom kit of tools for exploring living things, keeping it handy for planned or spontaneous outdoor explorations. Following are ideas for what a science toolkit might include and some suggestions for where to purchase particular tools. See Internet Resources to find some of these tools online.

Trowels

Trowels or hand shovels are multi-purpose tools for exploring in the ground and digging for small creatures. Look for heavy-duty plastic trowels that have a shovel end that

comes to a (not too sharp!) point. Fiskars makes a variety of reinforced plastic trowels. Using adult-sized trowels, provided children can handle them, sends the message that these explorations are done by adults as well. There are also durable plastic trowels on the market designed especially for small hands, such as those made by Midland Hardware.

Hand Lenses

Hand lenses are useful for observing plants and animals closely. They need to be small enough for children to carry in their pockets or on a string around their necks. It's also advantageous for children to have access to two different magnifications, preferably 3× and 6×. Preschool is a good time to introduce children to the appropriate way to use a hand lens, although learning this skill will take time. Hold the lens up close to the dominant eye, and bring the object up to the lens rather than bringing the lens down to the object.

Bug Boxes

Bug boxes are available in a variety of shapes and sizes, like those available from the Acorn Naturalists website and have one side that acts as a magnifier. They are handy for observing small creatures that wouldn't stay put otherwise. They are also useful



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I spy with my eye...

for looking at small plant parts while keeping both hands free for drawing.

Terraria

Terraria are useful when plants and/or animals will be brought indoors and observed over several days. These are available in multiple styles and sizes, like those from Pet Mountain found under “pet carriers,” and also available at most retail pet stores. The most important characteristics of a terrarium are transparency for easy viewing and holes small enough to keep most small critters from escaping, yet large enough to ensure airflow.

Large Craft Sticks

Large craft sticks are useful for turning over decaying leaves and more gentle digging in places where small creatures like to hide. They are also useful for picking up living things that might be inadvertently harmed if picked up by hand, or by those who do not wish to touch the creatures directly. They also can be used for dig-

ging small holes in loose soil for planting seeds.

Field Guides

Field guides, which can be used by adult and young naturalists, are useful for purposes of comparison and identification. They are also great for browsing at any time. There are many from well-known organizations aimed at younger audiences, such as the *Peterson First Guides* and guides produced by the National Audubon Society.

Measuring Tools

Measuring tools are useful for measuring the height of growing plants over time, the length of a worm, or the distance a snail moves. Any small object can serve as a nonstandard measuring unit as long as there are enough to perform the measuring task at hand. Manipulatives like Unifix cubes work well and can be snapped together to represent total height, length, or width. Small paper clips can be strung together and displayed to show different lengths or heights of several animals or plants. Life science investigations provide an authentic context for introducing standard measuring tools including rulers and yardsticks. Cups and spoons of different sizes are useful for measuring liquids and other materials when making a terrarium or watering a plant.

Tools for Recording and Representing

- **Clipboards** can be used to hold paper and help young naturalists steady themselves as they draw.

Science learning in the early years has gained renewed importance in recent years and NSTA has responded with an Early Childhood Science Position Statement. This column is designed to provide practitioners with guidance in selecting resources to inform their classroom teaching. We seek resources and materials that present relevant and appropriate science content and describe inquiry-based approaches to engage young children (ages 3 to 5) in the practices of science and engineering, as described in the NSTA position statement and the *Next Generation Science Standards*. We hope you find this column supports your work with children and/or teachers.

Please share your suggestions for resources or comments about the column with the column editor Ingrid Chalufour at ingridchalufour@gmail.com

These can be the standard-sized ones; they also can be made to suit any size by using a piece of rigid cardboard with a binder clip to hold paper.

- **Colored pencils** are useful for drawing living things. They lend themselves well to showing the many colors in nature. Depending on the plant or animal being represented, markers, crayons, and even paint may also work well. Keep in mind the various colors children are likely to observe in their own environments and at particular times of year. Even on a single plant one might observe many shades of green.
- **Collage materials** are useful for making models of living things and may include a wide range of materials like crepe paper, paper strips, pieces of felt, pipe cleaners in various colors, small pieces of cardboard and foam, and so on.
- **Chart paper and markers** are useful for recording the observations and ideas of a small group of children who have been exploring together. In this case the teacher might record children's contributions or children might contribute by drawing or writing about what they observed.

Remember, however, that the most important tools you and the children have at your disposal are your own senses (excluding taste). And the ultimate tool for making meaning from your science observations is your own curious and thinking brain! ■

Cindy Hoisington (choisington@edc.org) and **Jeff Winokur** (jwinokur@edc.org) design, develop, and deliver science professional development to early childhood teachers at Education Development Center, Inc. (EDC) in Waltham, Massachusetts.

Internet Resources

Bug Boxes

Acorn Naturalists

www.acornnaturalists.com/store/Magnifiers-Loupes-Hand-Lenses-and-2-Way-Viewers-C47.aspx

Hand Lenses

Lakeshore

<http://products.lakeshorelearning.com/learning/Hand-Lens>

Terraria

Pet Mountain

www.petmountain.com

Trowels

Fiskars

www2.fiskars.com

Midland Hardware

www.midlandhardware.com