

A Progression of Learning

By Peggy Ashbrook

As teachers in childcare programs prepare to say goodbye to the children starting kindergarten in September, we reflect on their growth of understanding. We will be resetting our developmental expectations for the next class of children, who may be a whole calendar year younger than our last group, and reevaluating what activities and materials are appropriate for them.

One of the principles of *A Framework for K–12 Science Education* is that “understanding develops over time” (NRC 2012, p. 26). This is also one of the principles of the NSTA Early Childhood Science position statement. The National Association for the Education of Young Children (NAEYC) recognizes the importance of allowing children to spend sustained time with experiences (see Internet Resources). All three documents identify the concept of progressions of learning, “building progressively more sophisticated explanations of natural phenomena” (NRC 2012, p. 25).

While the three preschool classes I teach (children ages 2 through 5) take place in the same room, I change the materials based on the developmental readiness of the children. For example, to help children begin building toward a grade 2 understanding of the NGSS performance expectation 2-PS1 Matter and Its Interactions (see Internet Resources), we work with

materials with varied properties (e.g., various recipes of play dough, ceramic clay, and garden soil). Through discussions of “wet” and “dry” while making play dough, two-year-olds learn vocabulary and describe one property of matter (Ashbrook 2011). As they mix, children may also notice small grains making up a cupful of salt and the slippery feeling of oil compared to the wet feeling of water. Four-year-olds who have had these experiences may ask questions about the changes in properties through heating. This can be further explored by firing the ceramic clay.

Introducing a natural, water-based ceramic clay formulated for safe use by children expands children’s experiences with materials. The children may use tools such as craft sticks to manipulate the clay. As children progress from making balls to making more complex models, they are ready to learn techniques such as how to adhere pieces of clay so they will stay together when dry. ■

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References

Ashbrook, P. 2011. Sharing research results. *Science and Children* 48 (8):



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National Research Council (NRC). 2012. *A framework for K–12 science education: Practices, crosscutting concepts, and core ideas*. Washington, DC: National Academies Press.

NGSS Lead States. 2013. *Next Generation Science Standards: For states, by states*. Washington, DC: National Academies Press. www.nextgenscience.org/next-generation-science-standards.

Internet Resources

NAEYC Developmentally Appropriate Practice in Early Childhood Programs position statement www.naeyc.org/files/naeyc/file/positions/position%20statement%20Web.pdf

NSTA Early Childhood Science Education position statement www.nsta.org/about/positions/earlychildhood.aspx

NGSS Table: 2-PS1 Matter and Its Interactions www.nextgenscience.org/2ps1-matter-interactions

Forming Knowledge of Clay Properties

Objectives

Children will explore the properties of ceramic clay formulated for children's use, learn related vocabulary, and describe the changes in property when water is added.

1. Read the safety tips about art materials (see Internet Resource) and use the searchable certified products list to purchase ceramic clay with an AP seal. Gray or white clay is preferable because red clay can stain clothing.
2. Begin with play dough if students have never used it before introducing the clay. This will allow them to become familiar with manipulating a three-dimensional material—and for you to assess if children are able to resist putting dough or clay into their mouths.
3. Keep supplies—clay tools and wet paper towels—nearby. Craft sticks are a good tool for inexperienced children. With practice and development, children can use rolling pins, butter knives, and other tools. Use wet paper towels to clean dry clay dust to avoid airborne dust (see Roy 2014).
4. Dampen the clay in advance. Then, model how to make finger impressions in the clay or roll a ball to help put hesitant children at ease. Questions such as, “What can we do with this clay?” and “How did you do that?” focus children's thinking on the properties of clay. Provide a tub of water for initial hand-rinsing to keep most clay from going into the sink drain.
5. Put aside some worked pieces of clay so children can notice clay drying out and becoming harder.
6. If the stock of clay dries out, ask, “Was it too dry yesterday?” and “What can we do to make it soft again?” Allow children to add water, beginning with a mister or shallow dish to dip fingers into for the two-year-old children. Older children may be able to add water sparingly using a small pitcher.
7. Have the clay available for 30–45 minutes several times a week over many weeks. This will support a progression of understanding of the properties of clay as children experience the clay becoming drier each time. Try storing the clay in a plastic tablecloth tied up with a rope (Rogers and Steffan 2009), which can simply be unfolded on a table to open a clay center.

Through experience with ceramic clay, sand, and the local soil, children will feel the differences in their tex-

Materials

- Play dough (homemade or store-bought)
- Ceramic clay formulated for safe use by children (see Internet Resource)
- Plastic tablecloth and string
- Water to keep clay damp
- Wet paper towels
- Tools such as craft sticks, plastic knives, scrapers, rolling pins, sea shells, acorns, and small water containers
- Tub or bucket large enough for hand rinsing
- Trays to hold drying clay pieces

tures, a beginning understanding of soil science. If your locality has a clay soil, digging in soil and comparing local clay with prepared ceramic clay can help children make the connection that clay is a resource from the Earth.

Internet Resource

Art and Creative Materials Institute, Inc. (ACMI) Safety Tips
http://acminet.org/index.php?option=com_safetytips&view=safetytips&Itemid=30

References

- Rogers, L., and D. Steffan. 2009. Teachers on teaching: Clay play. *Young Children* 64 (3): 78–81.
- Roy, K. 2014. Safety first: Modeling safety in clay use. *Science and Children* 50 (4): 84–85.

NSTA Connection

Download a list of additional books and resources at www.nsta.org/sc1507.



Manipulating clay teaches children about properties.