Water Works

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"You worked hard digging that hole," "You really had to work to push that wagon," and "Climbing on the monkey bars is hard work," are phrases commonly heard on the playground. Children love to try difficult physical tasks that require the expenditure of energy. They know that even if they do not complete a task they will feel the satisfaction of working hard. Tell children, "I've got a job for you," and they eagerly crowd around to see what interesting use they will put their bodies to. *Work* is what they will be doing as they move water from one place to another, and the fact that the job has no apparent purpose doesn't seem to bother them. As the teacher, however, you'll know this "job" is giving students valuable practice in working with science tools. *Work* is also a term used to describe the result of *force*, a push or pull acting on an object causing it to move. Making observations about the motion of objects is part of the National Science Education Content Standard B for grades K–4.

Gravity is a pulling force that children are familiar with even if they don't yet know the term—they know that blocks always fall down instead of staying in the air or falling up, and that beverages always go down from the pitcher, not up, not sideways, but down every time.

In a pump, such as a liquid soap pump, the liquid inside must go up (from the bottom of the container through the tube to the opening) to come out. This is opposite of what happens when children pour a liquid but not likely to be noticed unless a teacher directs attention to it. (An inexpensive way to allow the children to repeatedly use the liquid soap container is to fill it with colored water.)

In the following activity, children will use their own force plus the force of gravity—and simple tools—to move water. Small motor work may not be fun if the child is afraid of failure. The activity introduces the easy-to-use tools first—spoons and scoops—and the difficult ones last—eyedroppers and pumps. Allow plenty of time for discovery and repeat the experience so children can thoroughly investigate.

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Resources

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

Water Works

Objective:

- To explore the idea of work as expending energy to move water.
- To raise the question of what force(s) move water.
- To gain experience using different science tools (spoons, scoops, pipettes, etc).

Materials:

- Two rectangular (clear if possible) plastic tubs for each group of 2–4 students
- Towels
- Water
- Food coloring (optional; makes the water easier to see)
- Various small tools for moving water: spoons; scoops (laundry powder, coffee, or measuring); eyedroppers or basters; pipettes; dental irrigators (ask an oral surgeon to donate unused ones); infant nasal aspirators; and toy pumps or pumps from liquid soap bottles (remove the pumps from the bottle and insert them into a piece of clear tubing that is just a few millimeters longer than the intake tube of the pump to support the tube and prevent its breakage).

Procedure:

1. Set up square plastic tubs side by side with a towel underneath. Fill one about one-fourth full with water.
2. Tell the children that you have a job you want them to do. Ask them to move the water from one tub to another using a spoon.
3. Join in with gusto, and talk about doing work: "I'm lifting the water with the spoon. Do I have to push the spoon or pull the spoon to get the water to go down in the other tub?" If no child responds after several times, say, "To put the water into the other tub I tip the spoon, and the water falls down into the tub. I am not pushing the water down."
4. Depending on the age of the children, use this as an opening to introduce the term *gravity* by saying, "Something must be pulling the water down. The word for the force that is pulling the water down from the spoon is *gravity*. Gravity pulls objects down toward the center of the Earth, so they fall to the table or the ground."
5. Wonder aloud how long it will take to move all the water, and solicit ideas about how to make it go faster. If a student suggests lifting one container and pouring all the water into the other, respond positively by saying, "That would work!" and then ask for ideas on how to more quickly move the water without lifting up the containers.
6. One type at a time, provide the additional tools. Many children will need instruction on how to use the pipette-type tools. Ask, "How do these new tools move water? What muscles are you using when you move water with that tool? When does the water go into the pipette—when you squeeze the bulb or when you release it?" Tell students, "You use your force to lift the spoonful of water or to squeeze air out of the pipette. Then water goes in the pipette when the bulb pops back out. What tool do you push to move the water? (pumps) What tool do you pull *and* push to move the water? (dental irrigators)
7. Ask the students to talk about the tools. *What tool works "best" to transfer the water? What tool is easiest to use? What tool is quickest? Do you have to work to lift up the water with that tool? Do you have to work to put the water down with that tool?* Children eagerly try new tools, at first preferring the tool that moves the most water the fastest. Given time, they focus on a particular tool they favor.
8. Putting their tally mark on a teacher-created "Favorite Tool Chart" can help children think about the difference between the tool they liked to use best (and why) and the tool that moved the most water (and why).
9. Clean the tools and tubs with a bleach solution and air dry before storing.

Have students draw their favorite tool and arrows to show where they put their force—lifting, squeezing, pushing, or pulling. As they draw, they will talk about the tool and can write or dictate some of their words.

The Early Years

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

Water Water Everywhere

Here are some ways you can keep the water table interesting for a long time. Don't leave any children near water unattended for even an instant!:

- Offer only measuring cups and funnels and encourage conversations about more/less/the same.
- Include plastic turkey basters and eye droppers to develop small muscles used for gripping writing tools. Supply a floating bowl or two for them to "fill" instead of squirting each other!
- Write numerals 1–20 on small boats, rubber duckies, etc., to increase numeral recognition.
- Put sandbox toys in the water table and make a class chart listing similarities and differences when they are in sand versus water.
- Mix dishwashing detergent (Palmolive or Dawn work best) with a little glycerin (purchased at drug stores) to extend the life of bubbles and gives them great prism effects.
- Add food coloring to water, changing the color every few days. Ask the children if the water smells, feels, or responds differently when it is colored blue, orange, or purple.

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

Teacher's Picks


Yvonne Fogelman

Yvonne Fogelman, an early childhood educator in Athens, Georgia, uses water activities to provide early explorations in absorption, buoyancy (sinking and floating), mixtures, surface tension, temperature, and more. She believes it's important to teach children about water conservation and water pollution.

Books

It Could Still Be Water: Rookie Read-About Science. Allan Fowler. 1993. Children's Press.
This book explains that water isn't always found in the liquid state; shows other forms such as steam, fog, and ice; and has a nice explanation of parts of the water cycle.

Science With Water. Usborne Science Activities. Helen Edom. 1992. Usborne.
This book has experiments of every kind about the properties of water.

Snowballs. Lois Ehlert. 1995. Harcourt Brace and Company.
A cute story for preschoolers about building a snow family that of course melts.

Where Do Puddles Go? Rookie Read-About Science. Fay Robinson. 1995. Children's Press.
A good explanation of the water cycle, which also mentions water pollution.

The Wonder Thing. Elizabeth Hathorn. 1996. Houghton Mifflin Company.
Poetic language and vivid illustrations showing water's beauty make this an excellent book for talking with preschoolers about how important it is to conserve water and not litter or pollute the water supply.

Internet

Water Splash
www.wateraid.org.uk/documents/early_years_posters.pdf
Use this set of posters as a template to create posters featuring photos of your students and their water use.