Science: It's a Girl Thing!

Looking at How Liquids Move (For children ages 4-8)

A quiet and calming experiment to observe the surface tension of water, and learn how colors mix

20 – 30 minutes

Skills Developed:

- Color mixing
- Recording data
- Observing, inferring, and predicting
- Understanding cause and effect

Materials Needed:

- Water basin or large foil pan about 3-4 inches deep
- Cold water
- Cornstarch
- Food coloring (package of four)
- Straws
- A small amount of liquid detergent (keep hidden)
- Newspaper
- Paper or a notebook to record observations

What's the Science?

The top layer of water has something called surface tension, which means that the water molecules, the smallest particles of water, are shaped so they stick together — they have cohesion. If the water is cold, it has a stronger surface tension and a drop of food coloring will float on the surface before eventually breaking through. A few drops of detergent will break the surface tension, causing the water molecules to move away from each other, which will make the food coloring disperse more quickly. Cornstarch will absorb some of the water and the food coloring, eventually settling on the bottom.

Getting Ready:

Cover your work surface with newspaper to protect from spills. Fill a basin or pan with cold water about two inches deep and place it in the center of the table. Put a few drops of detergent into a small cup and keep it aside.

Activity:

1. Add a thin layer of cornstarch to the water in the basin and stir gently to mix. The water should be creamy white. Your daughter can help you prepare this solution.
2. Give your daughter a straw and show her how to hold the straw above the water and practice blowing gently on the water.
3. Have her squeeze 1-2 drops of one color of food coloring onto the mixture, observe what happens, and then blow very gently through the straw along the surface of the water. Together, observe as the color travels through the creamy liquid. Ask her to describe what she sees. Ask questions like:
   - How is the color moving?
   - Can you make it go another way?
   - What does it look like? Is there a pattern?
   - How can you change the pattern?
4. Now have her add 1-2 drops of the second color. Watch how the color moves through the liquid. Ask your daughter to describe what happens when the two colors join together.
5. Continue adding drops of the third and fourth colors. Let the color move naturally and watch the pattern it makes before blowing gently with the straw. When the color drops join together, that's called color mixing.
6. When you are finished, ask your daughter to watch carefully since the next part of the experiment can only be done once. Drop a fresh color into one spot on the water, but don't blow on it. Pick up a few drops of the liquid detergent with the end of a straw and drop it into the food coloring. Watch as the color moves away from the detergent. Ask your daughter to describe what she saw and if she can explain what happened.
7. After experimenting, pour out most of the water and observe what happened to the cornstarch.
8. Press a piece of paper (paper towel works well) onto the cornstarch to make a print of the colors.
9. Help your daughter write down (or dictate) her observation and illustrate what she observed.

Additional activities for different age-levels:

4 year olds

Set up three small pans (foil pie pans work well) with the cornstarch and water solution. Mix 1-2 drops of red and blue food coloring in one pan to make purple, red and yellow in another to make orange, and blue and yellow in the third to make green. If your daughter wants to, she can mix all the colors in a fourth pan to make brown.

5-6 year olds

Do the activity first with very cold water, and then with very warm water. Look for the differences in how the food coloring mixes when the water is different temperatures. Talk about what those differences are and write them down in a list.

Make ice cubes using blue food coloring and put them in water that has been mixed with yellow food coloring. What color does the water become when the blue mixes with the yellow? Ask your daughter to think of other colors that can be mixed this way.

Activities for different age-levels (con't)

7-8 year olds

To compare the surface tension of hot and cold water, get two plastic cups and fill one with hot water and one with cold. Gather a pair of tweezers and a thin sewing needle. Use the tweezers to place the needle gently on the water's surface in each cup without touching the water with the tweezers. You'll notice that the needle will float in the cold water, but sink in the warm. This is because the surface tension is greater in cold water.

If Your Child Has a Disability

All the activities can be done with children with a wide range of disabilities by making some modifications. You are the best judge of what those modifications might need to be, but here are some suggestions that have worked well.

For a child who is blind or visually impaired:

Using a Braille or large print ruler, measure the amount of water in the basin. To help your daughter grasp the concept of surface tension, place cold water in a small bowl and sprinkle black pepper or sesame seeds on top. The pepper or seeds will be resting on the surface tension. Add a drop of detergent to break the surface tension and the pepper/seeds will be pulled to the side of the bowl. Your daughter can use her hands to feel this occur. To help her understand the circular motion of the food coloring, use finger paints, guiding her hands on the paper, to illustrate how the color moves through the water. If your daughter is able to see strong colors, use extra food coloring and make sure she is very close to the basin of water. Follow up with finger paints (see above).

For a child who is deaf or hard of hearing:

Review ASL and English (or child's native language) vocabulary words and concepts, such as "blowing," "swirling""and scattering." Some children may need assistance with breath control and may need a demonstration of how to blow gently but with enough force to move the color through the water.

For a child who is physically disabled:

If needed, transfer food coloring to larger squeeze bottles for easier grasping. Secure the basin with masking tape on the table or wheelchair lap tray.

For a child who has learning/emotional disabilities:

Create a step-by-step chart using pictures and words to help your daughter focus on the experiment. Review the chart before and after each step. Being able to manipulate the materials and think creatively will engage your child in the experiment.

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