Sticky Water

Description

Students will use a classic science demo to practice using Prediction and Observation skills, as well as using new scientific language (cohesion, adhesion) or demonstrating the concepts the language describes (water is sticky – to itself, and to other materials)

Materials

DEMO

- Large mason jar, wide mouth
- Square of screen or mesh to fit over mouth of the jar
- Elastics
- Water bottle or measuring cup of water
- Bucket or similar to catch water
- Optional: Index card

STUDENT STICKY WATER DEMO

- Variety of lightweight containers
- Mesh
- Elastics
- Water bottle or measuring cup of water
- Index card
- Bucket or similar to catch wter

PIPETTE WATER EXPLORATION

- Cups of water
- Pipettes (alternatively, syringes)
- Plastic sheets, waxed paper, paper towels, fabric, tissue, etc.

WALKING WATER

- Container or cup of water (optional: colour the water with food colouring)
- Empty cup
- Paper towel strips

Explicit Teaching Points	Specific Expectations
• Prediction: the process of using process of using prior learning, experiences, familiar patterns, and observations to make an informed guess about an outcome or product. This means that the guess has some kind of logical foundation based on prior knowledge. This promotes logical thinking, questioning, exploring, and understanding inquiry and scientific methodology. You can explain it to your student by explaining that a prediction is our best guess, and that we take time to think about our predictions by remembering similar experiences we've had. • Observation: using our senses (seeing, hearing, touching/feeling, tasting, smelling) to understand objects, events, or changes. Sometimes, some of our senses aren't a good choice for science (especially tasting!), but that using our eyes and ears especially can be helpful for us to gather information and evidence in our investigations. Noticing, seeing, and hearing are all helpful terms to prompt your students in their observation. • Cohesion & Adhesion in water: cohesion refers to the property of water where the molecules stick to each other, basically meaning that water is attracted to itself through hydrogen bonds and it sticks to itself (think of the way water beads on a plastic surface). Adhesion	1.6 – demonstrate an understanding of explicitly taught vocabulary, including commonly used and specialized words, and begin to develop morphological awareness when communicating messages and ideas 13.1 – use a variety of strategies to solve problems, including problems arising in social situations 14.1 – state problems and pose questions while engaging in scientific investigations and engineering design 14.2 – make predictions and observations while exploring, investigating, designing, and creating 15.1 – ask questions about and describe some natural occurrences, using their own observations and representations

refers to the property of water where water molecules are attracted to other materials as well, allowing it to cling to things, spread, “walk” or “climb”. Demos will be helpful to give your students a deeper understanding, but in its most simple form, cohesion means water sticks to itself, and adhesion means water sticks to other materials.	

Provocation (Introductory Book, WOW Demo, etc)

Teacher-led Sticky Water Demo

You’ll start the lesson by performing the sticky water in a jar experiment for your students. Alternatively, you can show the demo from the accompanying video to your students instead of doing it for them. We encourage you to try the demo yourself!

Scientific Background: Water molecules are attracted to each other because of their shape and charge, and this is COHESION, or water sticking to itself. It’s what creates surface tension. When you flip your jar upside down, surface tension across the mesh screen holds most of the water inside, even though the holes in the mesh make it look like it should pour out. Water also sticks to lots of other materials, even though it doesn’t necessarily feel sticky like glue or honey. This is adhesion; the water is sticking to the threads or wires of the mesh.

Learning Plan

After the whole-class demo, you can choose to divide students to participate in centre rotations, investigate each station together as a whole class, or engage in smaller, teacher-led groups for the investigations.

STUDENT STICKY WATER DEMO

Students will investigate the same demo the teacher performed, using similar materials. You may want to swap the large, heavy glass jar for smaller jars or plastic containers. Students can also use an index card or piece of cardboard/cardstock to keep the water in the jar as they flip it over,

especially if flipping the jar can be a bit tricky. Make sure you have a bucket or container they can stand over to catch any water that does escape. Encourage their observation and prediction by asking questions about why they selected the materials they did, their strategies for flipping the container, and what they notice happened. You can also encourage the use of cohesion and adhesion in their descriptions, and asking what the water is sticking to as they describe what they see.

PIPETTE WATER EXPLORATION

Students will use pipettes or syringes to drop water onto a variety of materials, exploring times when water sticks to itself, and when it sticks to other materials. This is an open investigation, and you can explore logical thought and scientific reasoning by asking them to make predictions, compare to their peers, and describe what they observe by asking why each material reacts with water the way it does. You may also encourage documentation of their observations but encouraging them to write their observations, or record a short video with their explanation.

WALKING WATER

This station allows students to observe adhesion as the water travels from one container to another. Ask them why they think the water is moving, and encourage the use of the term adhesion, or the description that the water is sticking to the paper towel. You can encourage scientific methodology by having them make predictions, identifying the previous knowledge or experiences that led them to this "best guess", asking them to describe their observations, and repeating the experiment while changing variables such as length or thickness of paper towel, temperature of water, etc.

Consolidation/Extension

- Use different kinds of mesh (plastic, fabric, metal) and compare the results! You can also use a variety of shapes of containers, such as a bottle with a more narrow neck like a pop bottle, to see what happens!
- Switch up the materials in the pipette station – sponges, felt, fabric scraps are other ideas as well! You can also encourage students to record their observations (write, draw, take pictures or videos and narrate, etc.), and use those observations to assess their learning!

- You can make your walking water a rainbow by lining up a cup of red water, an empty cup, a cup of yellow water, an empty cup, and a cup of blue water. The paper towel between red and yellow should produce a cup of orange water, and the paper towel between the yellow and blue should produce a cup of green water! This adds more visual interest, and the opportunity to observe and compare how the different colours of water travel through the paper towel!

Notes/Context/ Reminders

- You might want to use an index card or piece of cardboard to keep the water in the jar as you flip. This will be especially helpful for the students exploring this demo, but can help you as well! A fast flip of a heavy, water-filled jar is hard, so help yourself and use a tool!
- Walking water doesn't move? Use room temperature or warm water, and make sure the paper towel is well immersed in the water cup. You might also want to cut the paper towel into strips instead of folding, for faster travel!

Assessment and Evaluation

Pedagogical Documentation – observation, student questions, action plan for next steps

Success Criteria

Students will:

- Practice using explicitly taught scientific vocabulary, such as prediction, observation, cohesion and adhesion
- Use problem-solving strategies to independently investigate
- State problems and ask questions while engaging in science, including predicting and observing
- Describe their observations and natural occurrences, and make connections