Dino Drool

Summary

In this activity students build a water cycle model and monitor it for a 2-week period helping them to understand that water changes state as it moves through the cycle.

Time Frame

2 class periods of 60 minutes each

Group Size

Small Groups

Materials

Instructional Procedures

- *Building a Water Cycle Model*
- *Fill the Water Cycle Model*
- *The Water Cycle Process*

  2-liter bottles
  Scissors
  Transparent tape
  Cotton strips
  Potting soil
  Grass seed
  Measuring cup
  Hand shovel
  Ruler (cm)

Family Connections

- *You Have Been Deputized letter*
- *Water conservation packet*
- *Tickets*

Additional Resources

Books

The Water Cycle, by Trudi Strain Trueit; ISBN 0-531-16220-6
The Snowflake-A Water Cycle Story, by Neil Waldman; ISBN 0-7613-2347-3
A Drop of Water -- A Book of Science and Wonder, by Walter Wick; ISBN 0-590-02319-5
A Drop Around the World, Barbara Shaw McKinney; ISBN 1-883220-72-6
A Teacher's Guide to A Drop Around the World, by Bruce and Carol Malnor; ISBN 1-883220- 77-7
The Life and Times of a Drop of Water, by Raintree Press; ISBN 1-4109-1956-0
The Magic School Bus -- Wet All Over, by Joanna Cole, Scholastic Inc; ISBN 0-590-50833-4

Organizations

National Science Teachers Association

Background for Teachers

Earth's water system is finite; the same water we are drinking today has been cycled over, on, and under Earth's surface for thousands of years. This continual movement of water, the water cycle, collects, purifies and distributes the water we need to live. Because water does move in a never-ending cycle, the water we are using today is the same water prehistoric creatures used for sustenance. The model in this activity illustrates the water cycle on a global level. The total amount of water inside the model is constant, like the total amount of water on Earth is constant.

The model is constructed using three clear two-liter bottles with caps. These bottles will need to be prepared beforehand by removing labels and cutting one bottle just below the curved top, (you can use a drywall screw to make a starter hole for the scissors). Label this bottle "A" with a permanent marker on the side of the bottle. Cut the other bottle just above the curved bottom; label this bottle "B" with a permanent marker on the side of the bottle. Label the third bottle "C." A quarter inch hole should be drilled in one of the bottle lids.

This activity will require a minimum of two 50-60 minute periods.

Intended Learning Outcomes

1. Use science process and thinking skills.
2. Communicate effectively using science language and reasoning.

Instructional Procedures

Invitation to Learn

The teacher invites the class to have a drink of water. As the class is sipping their cups of water, the teacher asks 5 students to each open a numbered envelope and read the contents. Each envelope contains a factoid about the water cycle that has previously been discussed in class. The fifth envelope is opened and the student reads aloud from the card, "Mr./Mrs./Ms._______, do you know you are drinking dinosaur drool?" The teacher either pretends to choke or spits out the water in a "dramatic" fashion. "How is this possible?" exclaims the teacher, "It tastes like clean, fresh water, it looks like clean fresh water, it smells like clean fresh water, how did the dino drool get in here? It is time for an investigation!"

Instructional Procedures

Introduce this activity of building a water cycle model to the students with a review of evaporation, condensation, and precipitation. Introduce the terms transpiration and percolation and discuss their meanings.

Divide the class into groups of 4. Each group will work together to make one model.

Give each group a copy of *Building a Water Cycle Model* instruction sheet and instruct the students to follow the written directions.

When each team has completed assembling their model, give them a copy of *Fill the Water Cycle Model* instruction sheet.

At the conclusion of each team filling their model, give them the *The Water Cycle Process* label handout. Have each team tape the labels to the model where they think each part of the water cycle is being represented in the model. Then have each student draw the model in their science journals and label the parts in their journal. Check for accuracy.

Have each individual student write a prediction in their journal about what will happen in their team's model. Ask them: What is their hypothesis about the grass seed? The water? What are they observing in this model that they can relate back to the water cycle on a global level? What purpose does the soil have in the water cycle? Water is stored as it passes through the water cycle. What bodies of water does the collector in bottle "B" represent?

Instruct students to observe their model on a daily basis for two weeks and record their observations in their journal. Divide two journal pages into six sections with the headings, *evaporation, condensation, precipitation, collection, percolation*, and *transpiration*. Encourage the students to record their observations specific to the components of the water cycle. Ask them to articulate what is happening at each stage in their model. To accommodate all students, observations can be written, expressed verbally to the teacher or drawn in their journal.

Ask students if they understand why we are drinking dino drool!

Extensions

Curriculum Extensions/Adaptations/ Integration

To illustrate the effects of pollution on ground water add 10- 15 drops of blue food coloring onto the growing grass seed. Wet each "lawn" thoroughly using the water bottle. This is to simulate rainfall. Within a minute or so, the food coloring should begin to circulate downward into the groundwater (Bottle A). Discuss with the students what dangers chemicals may pose to our water supply.

Ask students to remove one of the components of the water cycle, i.e. light (energy source) or the water in bottle "A". Ask them to write a hypothesis about what they think will happen inside their model. Observe the model over the next week, recording observations. At the conclusion of the week have students compare their hypothesis to what they observed.

Visual Arts -- Utah State University International Office for Water Science Education sponsors a contest for elementary school students. Students from all over the state are invited to send in pictures depicting their interpretation of how they can conserve and protect our water supply. The winning entries are developed into a calendar. Each year has a different theme. The 2007-08 calendar's theme was Water and Me. This is a beneficial opportunity for students to share their water knowledge in a non-linguistic representation. For more information contact the USU Water and Science Education office. (See site address under Web Sites)

Math -- Have the student teams create a graph for a two-week period and measure the water that collects in bottle "B". The measurement can be in millimeters, centimeters or inches. They can empty the collector every other day so there is a baseline for each measurement. Have students take away the energy source (light) and see if the amount of precipitation is affected.

Dramatic Arts -- Students can design puppets, create characters, or use other props to act out the water cycle process.

Family Connections

Let students take their model home and give a lesson to their parents and family. Have students include how important it is to conserve and save water. Have the students report back to class on their experience.

"Deputize" your students and have them be "Water Waster Watcher" police officers at home. Provide "tickets" to hand out to family members who are "caught" using water unwisely.

Assessment Plan

Photograph interview. Take photos of the students building their models and the models "in progress." After the activity is completed (a week later) show the students the pictures and ask questions. You can do this as a group or individual interviews. As students observe the pictures, some questions that can be asked are:

- What were you doing when this picture was taken?
- What did you learn?
- What more have you learned about the topic since the day of this picture?
- How did you use what you learned?
- What is happening in this picture as it relates to the water cycle?

Depending on the students and the experience being assessed some questions may be more pertinent than others. The teacher can create the questions that are the most important to measure student understanding. This type of assessment benefits students who may struggle with writing or expressing themselves with the written word. An oral assessment allows them to demonstrate science vocabulary and concepts without getting mired in the process of writing. This type of assessment can make science learning visible by having students recall facts, concepts, applications and actions. A rubric can be created to measure the completeness of the students' answers.

Team Evaluation -- Ask each team member to evaluate their participation in the model building

process and what they learned. (See *Team Evaluation* sheet.)
Use the *Water Cycle Assessment Test* sheet to measure student understanding at different levels. The teacher can determine how many points constitute a letter grade.

Bibliography

Research Basis
Ash, D., & Kluger, B. B., (1999). Identifying Inquiry in the K-5 Classroom.
Instructional models engage students in scientific questions, provide opportunities for students to explore those questions, and require students to interpret data to create explanations. Good science inquiry involves learning through direct interaction with materials and phenomena. One important sign of inquiry is the relative level of control that the students have in determining various aspects of the learning experience.
Marzano, R. J., Pickering, D. J., Pollock, J. E., (2001) *Classroom Instruction That Works: Research-based Strategies for Increasing Student Achievement*. Alexandria, VA: ASCD.
Scientific thinking is enhanced through instructional methods such as identifying similarities and differences; summarizing and note taking; non-linguistic representation; cooperative learning; setting objectives and providing feedback; generating and testing hypotheses; and questions, cues, and advance organizers.

Authors

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