

Brandy Nguyen

Water Filtration Experiment Grade Level?



Objective: Students will recognize and understand water pollution and how clean water is a basic human right. Students will experiment with different materials to filter dirty, polluted water.

Big Idea

How can you filter water? What materials filter water the best? Why is clean water important?

Setting the Stage: Students need to understand the importance of clean water. Millions of people around the world don't have access to clean water and they are forced to drink, bathe, and cook with polluted water. Students need to understand the health issues that are related with using polluted water. It is a basic human right to have access to clean water, however, in our world there are many injustices occurring that force these people without clean water to have to use polluted water to survive. In today's experiment, students will create a water filtering system with different materials that might help people who don't have access to clean water.

Next Generation Science Standards:

Disciplinary Core Ideas:

- ESS3: Earth and Human Activity
- ETS1: Engineering Design
- ETS2: Links Among Engineering, Technology, Science, and Society

Science and Engineering Practices:

- Asking questions (for science) and defining problems (for engineering)
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Engaging in argument from evidence
- Obtaining, Evaluating, and Communicating Information

Crosscutting Concepts:

- Cause and effect: Mechanisms and Explanation
- Structure and **Function**

Commented [SFB1]: Excellent detail of the NGSS included in your lesson!

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- Scale, Proportion, and Quantity

Background Knowledge: Students already know that clean water is a necessity. They know that clean water looks transparent without any debris. Students also know how to collaborate in groups and they know how to use the scientific method when conducting investigations.

Commented [SFB2]: How do you know this. Have they shown you prior knowledge evidence?

Materials to make polluted water:

- Water
- Dirt
- cat/dog hair
- Vegetation (grass, food, leaves)

Materials per group:

- Two water bottles
- Scissors
- Coffee filters
- Sand
- Gravel
- Cotton balls
- Clay
- Cup of polluted water
- Cheesecloth
- Rubberband
- Funnel
- Activated charcoal

Roles:

- Materials Manager/Spy
- Checker
- Recorder/Reporter
- Observer/Illustrator

Commented [SFB3]: How will students learn about the expected social skills and habits of mind? How will you energize and encourage team performance?

The instructor/facilitator begins this activity numbering students 1 through 6. All the 1's will be in one group, all the 2's will be in one group, and so forth. Each group will have 4 students. Then, the instructor will assign the materials manager/spy, checker, recorder/reporter, illustrator/observer by starting with the student whose birthday comes first in the year and then moving clockwise.

Commented [SFB4]: An efficient plan

The 5-E Framework

Engage: Show students a picture of polluted water. Ask the students if they would want to bathe in this water, drink this water, or cook with this water. Tell students that every day millions of

Commented [SFB5]: Will you provide a voice-level chart for the students to know what the expectations are throughout the lesson?

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people around the world are forced to use polluted water like the one in this picture because they don't have access to clean water. Say to students, "What if I told you that there are thousands of people in the United States who do not have clean water?" Tell students that Flint, Michigan has been without clean water since April, 2014. That's five years without clean water now. Today, we will explore how we can filter water to help those in need. The **materials manager** will get the materials needed for the experiment.

Explore:

Developing questions - Students will understand that they will conduct an investigation: "What materials can be used to make a water filtering system that will filter polluted water to make clean water?"

Observe and ask questions - *What questions do the students have about the water filtering items?* The **recorder** will write down the questions on the lab sheets. Students will discuss their questions. The **spy** will go around to other groups to see what questions and answers other groups have.

Form and record a hypothesis: Students will write an "if and then" hypothesis to the following question: What materials filter water the best and how should those materials be put together?

Explain: All students in the group will plan a fair test. Students will each come up with a plan to create a water filtering system. Once all students have thought about or drawn out the plan, each student will explain their plan within their group. Students will be reminded to disagree with ideas and not with the person. As a group, students will vote on the plan that they will go forward with. Students will be able to tweak that plan as needed. The **illustrator** will then draw the final construction plan for the water filter. Students can then begin the construction of their water filtration device.

Elaborate: Inform the students that having different levels of filtration devices within their water filter will improve the outcome.

Evaluate: Students will then draw conclusions and communicate results. Students will observe the glass of polluted water and the outcome of the water that was put through their filtration device. The **recorder** will record these observations on their lab sheets. Each group will then share their findings with the class. Each group will share whether their water filter was successful, what worked, what didn't work, and what they would do differently if they constructed another water filter. Once every group has shared, we will go around again and another person in each group will explain how their creation can help people around the world. Once every group has shared, students will complete a group assessment.

Commented [SFB6]: Thank you for sending along the lab sheet that is well-prepared.

Commented [SFB7]: Great to include the traveler.

Commented [SFB8]: Important!

Commented [SFB9]: I like that you have included the engineering design aspect of this lesson—just like real engineers—In addition it shows evidence of student problem solving and engagement in higher-order thinking.

Commented [SFB10]: Remember that this level of 5e is intended to promote student discussion and extension of their thinking. It is not only the teacher that provides elaboration.

Commented [SFB11]: Will the self-evaluations be made visible at the outset of the lesson?

Commented [SFB12]: I like that you are promoting elaboration at this point in the lesson. Do consider lining up the filtered water from each group to then have a group determination of how the "cleanest" water might be further treated....