



Designing “Green” Solutions

Connections to Africa

Grade Levels

Grades 4-6

Engage and Explore

This activity is designed to start your students in recognizing themselves as scientists and thinking critically about problem-solving. The goal is to teach concepts through discovery and to encourage using scientific thought processes. As with all lessons provided, please feel free to adapt them according to your students’ abilities. You may find it more successful to lead activities and discussions as a whole group rather than using individual Research Plan sheets. Certain scientific vocabulary may or may not be appropriate for your students’ level of understanding. Take these ideas, make them your own and your students will have a greater chance at success.

What is a simple, effective, energy-efficient solution to transporting water from a source to a village in rural Africa?

1. Begin this lesson by gathering images of animals at a water hole in Africa and people transporting water in jerry cans in rural Africa. What do your students see in these images? What do they think when they are seeing these images together? Work with your students as a large group and record their thoughts and ideas.

Explain

2. Share with your students the following information: Water is a precious natural resource in arid Africa. It is used by animals and people alike. Villagers in rural areas of Africa do not have water pumped into their houses, but instead travel to a water source to collect the water and transport it home. Living very near these water sources would be quite convenient but also poses the risk of having wildlife near the homes, which could result in conflict.
3. Based on this additional information, do your students view the images differently? Record any new thoughts and ideas.

Expand

4. Break your students into small groups. If they were students living in one of these rural villages, how much water would they be able to transport each day? Is this enough for everything they need to use water for? (If you want your students to really understand the issues involved with carrying water in this manner, get a jerry can or other 5-gallon container and fill it with water.) How far away would your students want to live from a water source that could attract wildlife? Could your students carry one, or possibly more, of these containers that distance each and every day?
5. Ask the students if they can design a better way to get water to their village home than what they see in the images. They can be as creative as they want to be, but keep in mind that electricity may not an option in these rural areas.
6. After students have designed their transport method, have them create a sales pitch to market their invention to investors. Again, they can be as creative as they would like, from creating a poster board to a commercial or advertisement to a web page for their product.

Assess

7. When students have completed their designs and sales pitches, have them share their work with the rest of the class. Allow time for student critique and comments.
8. Conclude the lesson by looking back at the original research question. Could these designs benefit the lives of villagers in rural Africa? Can the students' think of ways they could make this happen?

Standards

Ohio Academic Content Standards
Grade 5 Physical Science Topic: Light, Sound, and Motion The amount of change in movement of an object is based on the weight of the object and the amount of force exerted

Next Generation Science Standards
Engineering Design 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions MS-ETS1-2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem



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Supplemental Materials

My Research Plan

1. Questioning
State the problem.
Make a hypothesis.

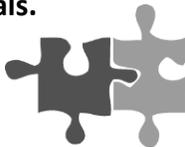


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2. Planning
Make a plan by asking
these questions
(think, talk, write)



3. Implementing
Gather the materials.
Follow the
procedures.
Observe and
record the results.



4. Concluding
Draw a conclusion.



5. Reporting
Share my results
(informal)
Produce a report
(formal)

