A Matter of Perspective



Overview

Children observe images from very close up and from far away to establish what they can learn from different perspectives and how different perspectives change the way we look at things. They will consider types of information you can gather up close and by satellite, using the Colorado Black Forest fire as an example, and finally, students will identify a geologic feature in an image of Mars.

What's the point?

Seeing things by satellite gives us information about features of Earth that we could not easily see from the ground, up close, or even from an aircraft.

We need all types of information using different perspectives to make informed decisions about how to handle a crisis (like a fire) or geologic hazard (like a flood).

Satellite instruments can give information about some things that cannot be seen with eyes alone, for example, heat from a fire.

We use information from satellites everyday. Good examples are weather satellites that look at large patterns globally to help predict weather locally and communications satellites that transmit television, cell phone, and radio signals.

Recommended ages

8-11

Learning goals

After doing this activity, students will be able to:

- Explain what an instrument is, in general.
- Explain how looking at things from different perspectives helps us understand an object.
- Identify that a satellite can help us fight a fire or identify geologic features.

Time

1 hour

Materials

- White board and markers or large chart paper to record student ideas
- A projector and screen



- A Matter of Perspective .pdf slideshow
- Everyday objects of your choosing, one type per group
 - Examples: rocks, leaves, grass, fruit, foam, cloth, loose change, etc.
- Masking tape
- One medium tipped permanent marker (sharpie or similar)
- Copies of the student sheets

Per team of two students:

- Two magnifying glasses of different magnifications *Example: 6X and 10X*
- White printer paper, one sheet

Preparation

- Gather materials
- Make copies of student sheets
- Set up projector to display slideshow
- Label the magnifying glasses with their magnification using a piece of masking tape and a permanent marker
- Place one kind of "everyday object" on a sheet of paper, and set aside. You may choose to put like-things on one sheet of paper or just one single item (e.g. several different rocks or a single rock).

Alternate ideas

- If a projector and screen are not available, print in color, per pair of students:
 - 1. One set "Different Perspectives" images
 - 2. One set "River" images
 - 3. One set "Black Forest Fire" images
 - 4. One image of "Mars"
- Instead of gathering an "everyday object", have students collect them.
- Instead of using an "everyday object" students can use hands, clothing, a friend's face, arms etc.



- Access the Internet and show a macro photography website, such as Andrey Pavlov's whimsical ant photography: <u>http://www.pavlovants.com/</u>
- If you have Internet access, a computer, and projector, download GoogleEarth and explore Earth, the Moon, and Mars using the tools provided.

Procedure

1. Display the first slide of "Different Perspectives" and ask students to guess what the objects are of, before revealing them on the next slide. Explain: The word perspective means "point of view." We can look at things surrounding us in different ways and we get different information about the world based upon how we look at things. Let's look at the magnified image of the butterflies. What things do you notice about butterflies by looking at them with this perspective (free response)? Do you see those same features from this other perspective (show slide with answers and allow for free response)?

2. Show the "River" sequence of images, but pause before revealing the Mississippi River on the map to ask students, "Can you guess what this body of water is?" Next, show the sequence of satellite images of the Mississippi river. Ask students at each, "What do you see, what do you notice?" Record student ideas about the types of information we can get from looking at the river up close and from space.

3. Show the Black Forest fire sequence. Ask: "How do you think the aerial photos helped fight the fire?" Ask: "What can you see in the satellite image that you couldn't see from an airplane?" For the global map of fire, ask: "What do you think that information could be used for?" and "Do you think it was useful for fighting this fire?"

4. Pass out the "Everyday Objects" on the sheets of paper, and one magnifying glass per pair of students.

5. Have students refer to the "Observations" student sheet and follow instructions

6. Have students verbally explain what they learned from observing their objects up close and far away. Explain that satellites have instruments onboard, tools that help us understand things like temperature of the ground as in the Black Forest fire or moisture in the air to help us know if it will rain etc. Eyes, hands, ears, and nose and mouth are all instruments we use everyday, however; young students may be unfamiliar with the word "instrument." Ask: "Did you use "instruments" to explore your objects?" and "What types of things can we learn looking up close and far away?" and "Why do you think both can be useful?"



7. Lastly, show an image of a winding river on Mars. Ask: "What do you think this feature of Mars is, and how do you know?" *Note: This is a dry riverbed on Mars.*

Recommended Extension Activity

The Mars Match Game http://phoenix.lpl.arizona.edu/pdf/lesson_6.pdf

Inspiration for this activity provided by:

Does What you See Depend on Where you are? http://missiongeography.org/k4mod1inv1.htm

Project SPECTRA! Patterns and Fingerprints http://lasp.colorado.edu/home/education/k-12/project-spectra/

The Mars Match Game http://phoenix.lpl.arizona.edu/pdf/lesson_6.pdf

Ground Truth Studies Teacher Handbook second edition <u>http://wayback.archive-</u> <u>it.org/5717/20140812004344/http://www.agci.org/dB/PDFs/Publications/1992_GTSHB.pdf#page</u> <u>=63</u>



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A Matter of Perspective Student sheets

In groups of 2 people, stand 2 feet (60 cm) away from your object.



Use a magnifying glass. Place your eye up to the magnifying glass and get close to the object until it comes into focus.



Compare your results with a teammate. Did you both have the same magnification?

Different perspectives: Name these Images





Photophilde, Share Alike 2.0 Generic



b)

e)

ruurmo, Share Alike 2.0 Generic











Reinhard Kirchner, Share Alike 3.0 Unported

Different Perspectives: Answers



a) Dew on a leaf



d) Mud cracks



ruurmo, Share Alike 2.0 Generic

b) Peanuts



e) Sand Dunes



Bruce Marlin, Share Alike 3.0 Unported

c) A butterfly's head.



Piotr Kuczynski, Share Alike 3.0 Unported

f) A cantaloupe

Can you guess what this river is? from the ground...

Andrew Allen, Creative Commons Attribution-Share Alike 4.0 International

Can you guess what this river is? from an airplane (aerial view)...

Can you guess what this river is? from the International Space Station...

Can you guess what this river is? from a satellite...



The Mississippi River!



The Colorado Black Forest Fire from the ground



The Colorado Black Forest Fire from the ground, but at a distance away

US Airforce

The Colorado Black Forest Fire from an airplane (aerial view)

US Military US Airforce

The Colorado Black Forest Fire from a satellite



Data from a satellite showing all the fires in the world on June 11, 2013

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Data from a satellite showing all the fires in the world in the month of June 2013



A spacecraft image of the surface of Mars



NASA.gov