Education and Research: Testing Hypotheses

What's the Big Picture?

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Summary

"Hot issues, such as climate change may not be subjects of contention within the scientific community, but it seems clear that the science is not being communicated in a way that has the necessary impact. Although art cannot directly communicate science or change minds, it can create a space for dialogue around difficult issues." (Kieniewicz)

In this lesson, students will combine art and science to interpret and illustrate graphs in order to convey the 'bigger picture' of climate change.

[TAGS: Climate Change, Analyzing and Interpreting Graphs, Art, Human Impact.]

Key Concepts

Next Generation Science Standards

- Crosscutting concepts - Patterns, Cause and Effect, Systems and System Models
- Life Sciences
    - LS2.A Interdependent Relationships in Ecosystems
    - LS2.C Ecosystem Dynamics, Functioning and Resilience
- Earth and Space Sciences
    - ESS2.C The Roles of Water in Earth Surface Processes
    - ESS2.D Weather and Climate
    - ESS3.C Human Impacts on Earth Systems
    - ESS3.D Global Climate Change

Objectives

Include clear, measurable statements of what students will be able to do, such as:

- ***Identify*** graph types and relate graph type to the data set.
- ***Observe*** and ***identify*** trends in data.
- ***Interpret*** data and imaginatively and creatively ***translate*** data trends into an artistic image.
- ***Demonstrate*** appropriate research methods to further understand and ***summarize*** data.
- ***Communicate*** big ideas in data trends in the form of writing and as a presentation.

Materials

- Different graphs for students to analyze
- Graph Analysis Sheet
- Computer Access
- Drawing materials, paper, color pencils etc.
- ***What's the Bigger Picture*** PowerPoint
- Artist images from http://www.jillpelto.com/#intro and exemplars
- ***What's the Bigger Picture*** summative rubric

Procedure

1. As a 'Do Now' or 'Hook,' have students view Jill Pelto's images (found both on the PowerPoint and the website http://www.jillpelto.com/#intro), and record observations about the images. Be sure to use images that have graphs incorporated in them.
2. Once students have had sufficient time to make observations, discuss what they have observed, the trends or patterns that exist, and what the image is trying to convey. If students have not already identified that a graph exists in the artwork, be sure to point that out.
3. Provide students with information about the artist, Jill Pelto. (See PowerPoint or http://www.jillpelto.com/#intro for more information)
4. Show students the 'artist statement' that accompanies each image (also available on the PowerPoint or website).
5. Discuss with the class the contents of the 'artist statement.' You may want students to annotate the statements and find commonalities between them. Lead students into identifying that the statements include a concise, scientifically-based description of the issue with appropriate references cited.
6. Give small groups of students a graph to analyze. There are many to choose from in the resource section. All of the graphs have data relating to climate change. ***Do not tell the students this at this time.*** Choose a group of graphs that you feel are appropriate for your grade level/ability level in your class.
7. Have students identify the trends/topics of their graphs. You may want to use the Graph Analysis Worksheet to help lead the students in this process.
8. Students should then research the topic of their graphs in more detail. Guide students in choosing scientifically accurate and appropriate websites for their research.
9. Once students have accurately interpreted and analyzed the graphs, tell students to decide upon an image (modeled after Jill Pelto) that would best communicate the issue in an imaginative and creative way that evocates an emotional connection.
10. Students should develop an 'artist's statement' (again modeled after Jill Pelto) to accompany their image. Remind students to include references.
11. Conduct a Gallery Walk of student work. As students are progressing through the gallery they should make observations, note patterns, and define problems. Encourage students to ask questions and clarify the concepts as they take notes.

Assessment

- **Formative:** As students are working with the graphs, ask probing questions to be sure students understand the graph, the trends, and the information that is being presented.
- **Summative:** Using the information the students gathered in their gallery walks they should answer the following question:
    - **"What is the Bigger Picture that is being presented in all the data? Support your claim with logical reasoning, relevant and accurate data, and evidence that demonstrates your understanding of the topic."**
        - What broader issue is the data illustrating?
        - What trends support your statement?
- ***What's the Bigger Picture*** summative rubric

Additional Resources

- The Movie, *Antarctic Edge: 70° South*, https://beyondtheice.rutgers.edu/ is a good resource of how the climate is changing in Antarctica
- Jill Pelto http://www.jillpelto.com/#intro
- Good sources of data and graphs for many different ecological regions
    - LTER (Long Term Ecological Research) https://lternet.edu/
    - NASA Climate Change http://climate.nasa.gov/
    - NOAA Clmate Change http://www.noaa.gov/climate
    - National Geographic - Climate Change is Here http://www.nationalgeographic.com/climate-change/special-issue/
    - National Geographic Climate Change http://environment.nationalgeographic.com/environment/global-warming/
- Gallery walk ideas
    - http://www.theteachertoolkit.com/index.php/tool/gallery-walk
    - http://serc.carleton.edu/introgeo/gallerywalk/how.html
- Adelie Penguins Decline Article http://news.nationalgeographic.com/2016/06/adelie-penguins-antarctica-climate-change-population-decline-refugia/
- Common Core English Language Arts Standards
    - Writing - Grades 6-8 http://www.corestandards.org/ELA-Literacy/WHST/6-8/
    - Writing - Grades 9-12 http://www.corestandards.org/ELA-Literacy/WHST/9-10/

Extensions or adaptations

- The movie, ***Antarctic Edge: 70° South***, can be shown as a good concluding activity to reinforce their understanding the changes in Antarctica.
- Students could create graphs instead of analyzing given graphs. (See Are Adelie Penguins Getting the "Cold Shoulder?")
- Alternate graphs / data for different topics could be used instead of climate related data.
- Students could use computers to create the artwork.
- Instead of a gallery walk, students could present their artwork to the class.