

Humanities and the Sunshine State: Teaching Florida's Climates,

Workshop: June 19-23, 2017

Lesson Plan Presented Friday June 23, 2017, Gainesville, Florida

Teacher: Brenda Breil

Grades: 6-8

Subject: Science

Title of Lesson: Identifying and Diagramming the Effects of Global Warming

Learning Objectives: Students will:

1. Create a causal loop diagram showing the interactions that take place when the planet warms.
2. Research to identify secondary effects of climate change and map these effects.
3. Identify the interactions between the atmosphere, geosphere, hydrosphere, geosphere, and cryosphere.

Standards Addressed:

SC.6.E.6.2	Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.
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SC.6.E.7.4	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere. <i><u>Cognitive Complexity/Depth of Knowledge Rating:</u> High</i>
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SC.7.E.6.6	Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water. <i><u>Cognitive Complexity/Depth of Knowledge Rating:</u> Moderate</i>
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Lesson Outline:

1. Prior Knowledge: Students would have learned about
 - a. global warming
 - b. phase changes
 - c. geosphere, hydrosphere, cryosphere, atmosphere, and biosphere
2. Identify consequences of global warming.
 - a. Individual brainstorm
 - b. Group share
 - c. Create class list (should include: warming ocean, sea level rise, increase in humidity, sea ice melting, glaciers melting, permafrost melting, etc)
3. Diagram the consequences of global warming.
 - a. Start with “surface temperatures” in the middle
 - b. Gradual release so student groups can complete the diagram
4. Quick quiz/exit slip to test if students can explain relationships
5. Next Steps (subsequent lesson):
 - a. Students each select one part of the diagram to research in more depth (secondary effects of warming). Examples could include the following.
 - i. Permafrost melt leads to sloping landscapes, shifting and collapsing structures, people being relocated, loss of culture, etc.
 - ii. Rising sea levels leads to erosion, loss of habitat, peoples being displaced, loss of culture, etc.
 - b. Each student researches independently and contributes to the group.
 - c. The diagram is extended.
 - d. Identify interactions between the different spheres
 - e. What can be done about it?
 - f. Products (rubric based on knowledge):
 - i. Presentation
 - ii. Write a story
 - iii. Write an article/editorial
 - iv. 24 word passages for each interaction

Systems thinking connection (learning habits and/or tools used):

- Applying systems thinking
- Drawing causal loop diagrams
- Systems study

Learning Strategies:

1. Brainstorming
2. Systems thinking and mapping

3. Cooperative learning

Science Concept(s):

1. Systems
2. Human impacts

Humanities Concept(s): This lesson prepares the work that will lead students to understand the effects of climate change on humans, such as human displacement, the spread of disease, agricultural shifts, etc.

Student Assessment Strategies:

1. Formative: Each student within the group will have a different color of marker to help identify the author of the work. Teacher circulates as students map and checks work/asks probing questions of individuals and the group.
2. Summative: Short quiz on identifying the relationships. (This lesson is just a stepping stone toward a larger objective which will be more thoroughly assessed.)

Benefit to my students:

1. Develop their systems thinking habits of mind
2. Deepen their understanding of the connectedness of the world

Resources and Materials (supplies needed for activities):

- Normal class materials are fine.
- Large whiteboards or large pieces of paper for mapping are helpful

Other standards that could be addressed within this and the subsequent associated lessons:

SC.8.N.4.1	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
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SC.7.N.3.2	Identify the benefits and limitations of the use of scientific models.
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	<u>Cognitive Complexity/Depth of Knowledge Rating:</u> Moderate
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SC.6.E.6.1	Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition. <u>Cognitive Complexity/Depth of Knowledge Rating:</u> Moderate
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SC.6.E.7.1	Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system. <u>Cognitive Complexity/Depth of Knowledge Rating:</u> Moderate
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SC.6.E.7.2	Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate. <u>Cognitive Complexity/Depth of Knowledge Rating:</u> High
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SC.6.E.7.3	Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation. <u>Cognitive Complexity/Depth of Knowledge Rating:</u> High
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SC.7.P.11.1	Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state. <u>Cognitive Complexity/Depth of Knowledge Rating:</u> Low
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SC.7.P.11.4	Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.
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	<u>Cognitive Complexity/Depth of Knowledge Rating:</u> Moderate
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SC.8.N.4.2	Explain how political, social, and economic concerns can affect science, and vice versa. <u>Cognitive Complexity/Depth of Knowledge Rating:</u> High
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