

Unit 3 Lesson Plan developed for Grade(s): 11 & 12

Title: The Truth about Climate Change???

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Applies to Lesson(s) 8 & 9 Global Climate Change from <http://cimss.ssec.wisc.edu/climatechange/>

Objective: To get students thinking about what are truths/facts about global climate change and what are the lies/misconceptions. To have students demonstrate what previous knowledge and/or misconceptions they may have about global climate change before working through a unit on it.

Total Time Expected: initially, one 30-45 minute period of time for poster set up

Overview: This activity is meant to be an introduction to a global climate change unit or chapter. The students will randomly be given an index card with either a truth or a misconception about global climate change. As an individual, they will need to make a decision as to whether or not the statement they are holding is either a truth or a misconception. Once determined, the student will then post their index card on either the "Truth" side of the poster or the "Misconception" side of the poster. Once everyone has posted their index cards on the poster, the class will then review the columns as a large group and determine if any index cards need to be moved at this time. The poster will remain in the classroom during the climate change unit, and revisited at appropriate times to see if any index cards need to be readjusted.

Sequence:

1. Set up poster paper by dividing it in half and labeling one column as "Truth" and the other as "Misconception".
2. Cut up the 16 statements and tape/glue them to index cards.
3. Randomly pass out the statements throughout the classroom.
4. Ask students to think about whether the statement they are holding is a truth about global climate change or a common misconception people have about it. No looking up answers!
5. When students have come to a conclusion for themselves, have them tape their index card in whatever column they believe it best fits.
6. Once all cards have been posted, read aloud each card in a column making sure to stop and ask the entire class whether or not they agree with where it is located. Open the floor for discussion and poll the audience if a move has been suggested.
7. Once all of the index cards have been addressed, tell the students that the poster will be hung in the classroom throughout the remainder of the unit

and revisited from time to time to check whether or not the truths and misconceptions were properly identified.

Supplies or references required:

- Index cards
- Tape or glue
- White poster paper
- Scissors
- Markers
- Sheet of truths and common misconceptions about global climate change (Brouzas, 2007).

National Science Standards addressed:

Energy in the Earth System – Content Standard B (grades 9-12): Global climate is determined by energy transfer from the sun at and near the earth's surface. This energy transfer is influenced by dynamic processes such as cloud cover and the earth's rotation, and static conditions such as the position of mountain ranges and oceans.

Natural Resources – Content Standard C (grades 9-12): Humans use many natural systems as resources. Natural systems have the capacity to reuse waste, but that capacity is limited. Natural systems can change to an extent that exceeds the limits of organisms to adapt naturally or humans to adapt technologically.

Environmental Quality – Content Standard C (grades 9-12): Natural ecosystems provide an array of basic processes that affect humans. Those processes include maintenance of the quality of the atmosphere, generation of soils, control of the hydrologic cycle, disposal of wastes, and recycling of nutrients. Humans are changing many of these basic processes, and the changes may be detrimental to humans.

Materials from human societies affect both physical and chemical cycles of the earth.

Natural & Human Induced Hazards – Content Standard D (grades 9-12): Normal adjustments of earth may be hazardous for humans. Humans live at the interface between the atmosphere driven by solar energy and the upper mantle where convection creates changes in the earth's solid crust. As societies have grown, become stable, and come to value aspects of the environment, vulnerability to natural processes of change has increased.

Some hazards, such as earthquakes, volcanic eruptions, and severe weather, are rapid and spectacular. But there are slow and progressive changes that also result in problems for individuals and societies. For example, change in stream

channel position, erosion of bridge foundations, sedimentation in lakes and harbors, coastal erosions, and continuing erosion and wasting of soil and landscapes can all negatively affect society.

Science & Technology in Local, National, and Global Challenges – Content Standard E (grades 9-12): Humans have a major effect on other species. For example, the influence of humans on other organisms occurs through land use—which decreases space available to other species—and pollution—which changes the chemical composition of air, soil, and water.

Related URLs or recommended reading: See attached word document & reference page

Common Misconception

Global warming is the same thing as the greenhouse effect. (Fraser)

Ozone is always a good thing.

-OR-

Ozone is always a bad thing. (Henriques, 2000)

Increases in greenhouse gasses will increase plant growth, counteracting any effects of global warming, since crops and forests will filter out more carbon dioxide from the atmosphere. (EPA)

The greenhouse effect is bad and will eventually kill everything on Earth. (Fraser)

The hole in the ozone layer is a hole in the sky. (Henriques, 2000)

Keeping beaches free of litter and protecting wild species of plants and animals will reduce the greenhouse effect. (Rosalind, 2004)

The greenhouse effect, the ozone hole, and atmospheric lead pollution are all the same thing. (Rosalind, 2004)

The use of lead-free gasoline will reduce global warming. (Rosalind, 2004)

Truth

The greenhouse effect is used to describe the process by which the atmosphere keeps the Earth warm, this making it hospitable. Global warming is the sudden increase in the magnitude of the greenhouse effect. (Fraser)

When ozone is in the atmosphere, blocking out UV radiation, it is good. However, ozone can be dangerous in the lower atmosphere since it is a large component of smog (Henriques, 2000)

Laboratory studies have shown that carbon dioxide does increase plant growth. However, the real dangers of global warming are its effects on our ecosystems. Studies point to an increased chance of drought due to global warming, which could destroy crops and forests, overriding any potential benefits of an increased level of carbon dioxide. Also, some food crops produce less nutritious products when exposed to excessive amounts of carbon dioxide (EPA)

The greenhouse effect keeps our atmosphere warm enough to facilitate life, without it humans Earth would not exist. (Fraser)

The ozone hole is an area in the atmosphere in which there are lower than normal levels of ozone. (Henriques, 2000)

These actions could possibly help the environment; they will not reduce the greenhouse effect. (Rosalind, 2004)

Though these three phenomena are all environmental issues, they are all separate problems.

Lead-free gasoline does not produce lead pollution as a byproduct, but it still releases lots of a greenhouse gasses when burned.

Reason for the Misconception

Both are often mentioned in the news at the same time without establishing the differences. (Henriques, 2000)

The fact that ozone can be detrimental to your health is not widely known fact.

It is easy to forget that there any many more variables in nature than there are in a laboratory experiment. (EPA)

There seems to only be bad press concerning the Greenhouse effect.

The existence of the ozone hole is often referenced without being explained.

This misconception is prevalent among younger children, who probably do not know exactly what the greenhouse effect is. (Rosalind, 2004)

87% of children believe this to be true; these concepts are not open to experimental learning, thus making them difficult concepts for children to grasp. (Rosalind, 2004)

87% of children also believe that this was true. Researches found that children found it difficult to make a distinction between various environmental issues. (Rosalind, 2004)

Resources

Driver, Rosalind, Ann Squires, Peter Rushworth, and Valerie Wood-Robinson. Making Sense of Secondary Science: Research Into Children's Ideas. New York: Routledge, 1994. 68-69.

Fraser, Alistair. "Bad Meteorology." Bad Greenhouse. The College of Earth and Mineral Sciences, Penn State University. 16 Jan. 2006 <<http://www.ems.psu.edu/~fraser/Bad/BadGreenhouse.html>>.

Henriques, Laura. "Children's misconceptions about weather: A review of the literature." Misconceptions about Weather (NARST 2000). 29 Apr. 2000. Science Education Department, California State University, Long Beach. 16 Jan. 2006 <<http://www.csulb.edu/~lhenriqu/NARST2000.htm>>.

Straight Talk on Global Warming." EPA Global Warming Site. Environmental Protection Agency. 16 Jan. 2006
<[http://yosemite.epa.gov/oar/globalwarming.nsf/UniqueKeyLookup/SHSU5BVRJU/\\$File/straighttalkongw.pdf](http://yosemite.epa.gov/oar/globalwarming.nsf/UniqueKeyLookup/SHSU5BVRJU/$File/straighttalkongw.pdf)>.

Background Picture taken from: <http://www.solarviews.com/raw/earth/earthaf.jpg>

