

K-8 CURRICULUM

As with the university and high school teach-in models, this brief lesson plan is only an example of the kinds of projects and curricular goals that you can include in your Teach-In. With administrative support, you can plan to cancel regular classes school-wide and host a multi-level, multidisciplinary educational event. If this is impractical for your setting, consider incorporating ideas or projects from this lesson plan into your classroom for one or more days during the week of February 5th, 2009, and join the hundreds of institutions who are committing to positive and critical education about global warming.

HOW TO USE THIS: These ideas are only suggestions and guidelines, and can all be adapted to the needs and levels of your primary school students. Under the *Projects* heading, you will find a number of activities and things to do with your students in and outside of the classroom. They are organized according to age and difficulty, from preschool games and stories to advanced experiments and construction projects for older learners. Feel free to use and share any materials or concepts you find here, and to provide feedback or ideas of your own!

OBJECTIVE: to introduce young learners to the concepts behind climate, to familiarize them with the mechanisms and results of human-induced climate change, and to educate them on the steps and practices necessary to reduce our negative impact.

WARM UP	
Goals:	<p>Get students thinking about what climate is, and how it's important to us. How is it geographically unique? How do we interact with it? In what ways does it influence our culture (clothing, food, language, behaviors)?</p> <p>After the projects, students should be able to answer the question: Where does weather come from?</p>

Projects

Brainstorming Session

Ask students to describe the weather outside today.

- What are other weather words?
- How do we describe the weather?
- What are the seasons?
- What do we wear during each season?
- What kinds of activities do we do in each season?
- What is the weather like in...? (brainstorm other places and climates)

This discussion allows students to explore their own knowledge of weather patterns, and to learn about places where the weather is very different; consider discussion seasonal differences – the existence of only three seasons in some parts of the world, for example: winter, summer, and monsoon; or two seasons: dry and wet.

* Read “The Windy Day,” by G. Brian Karas. (1998, Simon & Schuster).

Weather Vocabulary Session

Make a list of unusual weather words and their environments – explore the difference between categories of storms, for example, or the distinction between typhoons and hurricanes.

Free Write Session

What can't you do in/on...

- The snow
- A torrential rain
- A sunny, hot day
- A big wind

Have students write a short story in which they try to do one of those things and imagine the difficulties they'd run into.

Invite Experts Session

Ask a meteorologist, a storm chaser, or a forest ranger to come in and talk a little bit about weather influences or effects.

- Deforestation
- Desertification
- Forest fires
- What makes wind?
- Why is it colder in the winter and warmer in the summer? Why isn't the longest day of the year the hottest?
- Where do storms come from?
- Brainstorm influences, from the sun and the tilt of the earth to mountains, rain-shadow effects, and the presence or absence of forests.

INTRODUCTION

Goals:

Introduce the concept of “atmosphere;” clarify the positive and negative aspects of “The Greenhouse Effect” and what it does for our climate. Illustrate the effects of CO₂ emissions in the atmosphere.

Project 1

Here are two projects for modeling the effect of CO₂ and other “greenhouse gases” on the Earth’s temperature:

The Black Box

The purpose of this experiment is to show how sunlight alone is not the sole cause of changes in the Earth’s temperature, and to illustrate the insulating effect the atmosphere has on the planet.

1. Take two shoe boxes and line them with black construction paper.
2. Find a place outside where you can set them down side by side, and turn them so that sunlight is entering the boxes, but at least one wall in each box is in the shade.
3. Tape a thermometer inside each box on the shaded wall.
4. Check to make sure each thermometer reads the same temperature. Make a note of the temperature, and mark it on a graph with temperature on the y-axis and time on the x-axis.
5. Cover one box with tightly-fitting plastic wrap.
6. Check every minute to see if the temperatures are the same. Mark each temperature.
7. After some minutes, the covered box should be reading several degrees warmer than the open box. Compare the charts in the classroom, and discuss what it means.

The plastic acts like the greenhouse gases in the atmosphere: it allows solar energy to pass through to the earth, but then absorbs the energy and releases it back to the earth, not allowing it to escape into space, so the air inside the atmosphere warms up.

Project 2

The CO₂ Box

This experiment demonstrates the same principle, but does so much more literally, and involves the creation of gas, which is always fun. Older students can create their own charts, take responsibility for the outcome of their experiments, and report on their results.

1. You will need an aquarium for this project - if the aquarium is old, make sure the edges are still sealed.
2. Create a partition out of cardboard or plywood, and split the aquarium into two halves. Be sure to seal the edges of the partition with lots of tape, so no air can leak through between the chambers.
3. Find two thermometers that read the same temperature. Put one in each compartment and shield them from light with a piece of newspaper. Be sure you can read them both from outside the aquarium.
4. Pour vinegar and baking soda into a large bowl. This will create carbon dioxide. Place the bowl into one of the chambers and allow it to fill with CO₂.
5. Take two identical bright lights and shine one at each compartment from equal distances.
6. After a minute, take a reading from each of the thermometers and chart the temperatures.
7. Continue taking readings from each thermometer for 10 minutes, and then have students present their results and conclusions based on their understanding of the principles.

CO₂ is heavier than air, so will stay in the chamber if undisturbed. This demonstrates the effect of CO₂ hanging in the atmosphere. The students should be able to show that the CO₂ remained in the chamber, and at the end of the experiment, the temperature was higher in that compartment than the one only filled with air.

CAUSES	
Goals:	<p>Discuss the human-induced creation or release of greenhouse gases – burning fossil fuels, chlorofluorocarbons, methane, etc.</p> <p>This way, students will understand that, even though a thing may not require energy to work, the creation of the thing may have taken a lot of energy and contributed to global warming.</p>
Projects	<p><u>Introduce students to the idea of “energy”</u></p> <p>They are all familiar with how a TV doesn’t work if it’s not plugged in, for example, or a car doesn’t run without fuel. Brainstorm and divide objects in the class between those that require fuel to use, and those that don’t.</p> <p>Examples:</p> <ul style="list-style-type: none"> • a pencil - no fuel • a hand-cranked pencil sharpener - no fuel • an electric pencil sharpener - fuel • an overhead projector - fuel • a chair - no fuel
	<p><u>Introduce the idea of “carbon footprint”</u></p> <p>One way to do this is to trace the path of one object - a piece of paper, for instance - and consider what went into getting it to the form and place it’s in. For example:</p> <ul style="list-style-type: none"> • Forest • Cutting trees - saws, trucks, etc. • Transporting logs • Milling logs • Shipping the processed wood to a paper mill • Milling the paper • Packaging the paper • Shipping the paper to a distribution center • Shipping the paper to a store • Moving the paper to the school
	<p><u>Inquire</u></p> <ul style="list-style-type: none"> • Have students pick an object and try to imagine the path it traveled and the different ways fuel and water were consumed to create and transport it. • Have students look at the labels on their clothes; make a list of all the places the clothing was made in and shipped from. • Look at alternatives: bicycles and mass transit, reusing things, recycling, using and eating local foods and products, turning things off, using more energy-efficient objects, using and wanting <i>less</i>.

RESULTS	
Goals:	<p>Examine the effects of global warming on:</p> <ul style="list-style-type: none"> • Humans • Animals • Landmasses/physical environment
Projects	<ul style="list-style-type: none"> • The website http://www.globalwarming101.com/ has some excellent group activities to explore and peer-educate on issues of habitat for humans and animals, and the effects of global warming on different climatic regions - culturally and ecologically. • Read “How We Know What We Know About Our Changing Climate: Scientists and Kids Explore Global Warming,” by L. Cherry and G. Braasch. (2008, Dawn Publications).

FURTHER ACTION	
Goals:	<p>Learn about opportunities for action and ways in which groups of people come together to make changes in the world</p>
Projects	<p><u>Letter-Writing Campaign</u> Start a letter-writing campaign; have students write their own letters or postcards to local, regional, or even national legislators encouraging them to draft and adopt legislature that will contribute to global warming solutions.</p> <p><u>Adopt a Forest</u> Adopt a forest as a class, or start a tree-planting project or community garden in your neighborhood. Encourage student and family participation in the stewardship of the garden.</p> <p><u>Host</u> Host an all-local lunch showcasing foods grown within 150 miles or fewer, if possible. Alternatively, visit a community garden or local farm and see what foods <i>are</i> produced in your region.</p> <p>*Read “If Everybody Did,” by J. A. Stover (BJU Press, 1989). For very young students and readers.</p>

ASSESSMENT	
Goals:	Allow students the opportunity to process and express what they've learned by teaching other students.
Projects	<p><u>Organize Teach-in</u> Organize a peer-teaching session wherein students who've been studying about climate change have the opportunity to teach their families, friends, or other classes or schools about global warming and its possible solutions. Give them a choice between discussing:</p> <ul style="list-style-type: none"> • what is climate? how is it important to us? • what causes climate change? • what are some results of climate change? • what can we do about it?

RESOURCES

http://wings.avkids.com/Curriculums/Atmosphere/living_in_a_hothouse_howto.html

<http://www.emints.org/ethemes/resources/S00000463.shtml>

http://www.teachingk-8.com/archives/articles/our_changing_climate_by_kay_berglund_newhouse.html

<http://www.globalwarming101.com/>

<http://www.learningtogive.org/lessons/unit372/lesson1.html>

There is a tremendous collection of resources at the end of Cherry & Braasch, (2008).

CREDIT

This curriculum was drafted by Lara Messersmith-Glavin, and represents the hard work and ideas of a number of other dedicated educators, as well.