



Successfully Communicating about Climate Change

Lesson Plan for Grades: 9-12 Length of Lesson: 90 min
Authored by: UT Environmental Science Institute Date created: 10/1/2022
Subject area/course: <ul style="list-style-type: none">• Environmental Science
Materials: <ul style="list-style-type: none">• Beakers• Heat Lamps (can be substituted by using a sunny window)• Thermometers• Plastic Wrap• Rubber Bands• Water• Ice• Timer• <i>Greenhouse Gas Lab Packet (attached)</i>• <i>Successfully Communicating about Climate Change Reflection Sheet (attached)</i>
TEKS/SEs: §112.37. Environmental Systems (3) Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to: (A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student; (9) Science concepts. The student knows the impact of human activities on the environment. The student is expected to: (D) describe the effect of pollution on global warming, glacial and ice cap melting, greenhouse effect, ozone layer, and aquatic viability;
Lesson objective(s): <ul style="list-style-type: none">• Students will be able to explain the greenhouse effect.• Students will be able to evaluate common misconceptions related to climate change.• Students will be able to assess the effect of effective communication on their comprehension of climate change.
Differentiation strategies to meet diverse learner needs: <ul style="list-style-type: none">• The teacher should ask students whether they prefer to read or watch videos to learn about concepts; then have students learn in their preferred learning style. However, the teacher may assign students certain methods to improve their skills. For example, if a student prefers



reading, teachers may have them watch a video and take notes to improve their listening skills.

- ELL students and students with learning disabilities should have multiple forms of instruction including visual and written instruction sheets as well as a verbal instruction and demonstration.

ENGAGEMENT (20 minutes)

- The teacher starts the lesson by asking the class to list the components of weather to create a working definition for it.
- The teacher will explain that weather and climate, while related, are different. The main difference is the timeframe the two terms measure. Then, the teacher will share the definition for each term and what span of time they describe.
 - Weather: the state of the atmosphere at a place and time as regards heat, dryness, sunshine, wind, rain; looks at single day or week.
 - Climate: the weather conditions prevailing in an area in general or over a long period; looks at data over 30-year increments.
- “Now that we have solidified our understand of the difference between weather and climate, let’s focus now on climate, more specifically, climate change.”
- The teacher will ask the class to share what they have heard about climate change through personal conversations, social media, and other platforms.
- “Today we’re going to get to the bottom of what climate change is and before diving into our lab let’s take a look at this video that very concisely explains global warming, an important component of climate change, and then dive into our lab to understand climate change.”
- The teacher will now play part of *Hot Science At Home* “Successfully Communicating about Climate Change” video from 23:14 to 24:22 at <https://youtu.be/ZS2zsUTMkBM>.

EXPLORATION (30 minutes)

- Students will create groups of 3-4. Each group will be given two beakers filled with ice water, two thermometers, two rubber bands, plastic wrap, a heat lamp. Each student will be given a *Exploration Handout: Greenhouse Gas Lab Packet*.
- Each group will follow the instructions laid out in the lab packet and collect temperature data from the beakers to identify differences in the control and variable beaker’s temperatures.
- Students will fill out following questions in the *Reflection* section of their *Greenhouse Gas Lab Packet* after recording all their data.
- The teacher should continue to walk around the room during exploration, prompting groups to have conversations on how what they are seeing through the lab lines up with what they learned in the video and how the results of this experiment are important when thinking about our own lives.

EXPLANATION (20 minutes)

- The teacher will prompt a class discussion about their lab results: “Which beaker ended up getting hotter faster?”, “Why do they think caused it based on the what the class learned about climate change?”.
- The teacher will ask students to discuss with their groups what this simulation is representative of in relation to the Earth’s climate over time.



- The teacher will say, “Climate change seems very straight forward based on the video we watched at the beginning of class, the data of our representative experiment, and our class discussions. Why do you think there are so many myths and misunderstandings about climate change?”
- The teacher will write student responses on the chalkboard or SMART board during class discussion over what they perceive to be behind so many myths and misunderstandings about climate change
- Students will engage a think-pair-share. Students will first be given 2 minutes to independently think about why they think climate change is important in relation to their own life. Students will then group up into teams of two with students outside of their lab group. Once paired, groups will have 5 minutes to discuss what they thought was interesting about their learning experience and why they think climate change is important to their own lives.

ELABORATION (15 minutes)

- Students will be given the *Elaboration Handout: Successfully Communicating about Climate Change Reflection Sheet*.
- Before working on the sheet, teacher will play part of *Hot Science At Home* “Successfully Communicating about Climate Change” video from 9:51 to 16:30 at <https://youtu.be/ZS2zsUTMkBM>.
- Students will answer reflective questions about how their experience and understanding might have been different if it wasn't for viewing the video at the beginning of class and the importance of successful communication about climate change.

EVALUATION (throughout entire lesson)

- Formative assessment will be performed throughout the lesson. As the students are working in their groups during the Explore and Elaboration stages, the teacher will be walking around assessing the students and the connections they continue to make to the content. The teacher can take note of intriguing connections made by students to bring up during the elaboration section.
- A summative assessment can be implemented at the end of the class, having students write down what Climate Change means to them after going through the day's lesson as an exit-ticket activity. Additionally, all materials written on can be collected to assess student learning and overall acquisition of knowledge.

SOURCES AND RESOURCES

- Dr. Michael Ranney *Hot Science At Home #1.15*, “**Successfully Communicating about Climate Change**”, <https://youtu.be/ZS2zsUTMkBM> or at <https://www.esi.utexas.edu/talk/successfully-communicating-about-climate-change/>
- **EPA, Global Greenhouse Gas Emissions Data**, <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>



Exploration - Student Handout

Greenhouse Gas Lab

Objective:

As the world's climate continues to change it is important to understand what exactly is at the bottom of this shift. To understand the greenhouse gas effect, an important component of climate change, this lab will present a small-scale model that simulates the phenomenon. Each beaker will represent an environment enclosed with its own atmosphere, being heated by a heat lamp or sun to simulate the Earth receiving the Sun's radiation.

Materials:

- Beakers
- Thermometers
- Plastic Wrap
- Rubber Bands
- Water
- Ice
- Timer
- Marker
- Heat Lamps (can be substituted using a sunny window)

Procedure:

1. Fill 2 beakers with equal amounts of ice water.
2. Place a piece of plastic wrap at the top of each beaker. Cover the opening at the top with extra on the sides.
3. Use a rubber band on each beaker to fasten down the plastic wrap and create a tight seal.
4. Using a marker, label one beaker "A" and one beaker "B" on the plastic wrap cover.
5. Wrap the uncovered sides of beaker "B" in plastic wrap five times around. Use another rubber band to fasten the plastic wrap to the sides of the beaker, making beaker "B" covered in plastic wrap everywhere except the bottom.
6. Place the two beakers 2 inches away from the powered heat lamp (or a sunny window).
7. Set a timer for 3 minutes and leave the beakers untouched during their exposure to heat.
8. When the timer goes after off, unseal the plastic wrap on top of the beaker and measure the temperature of the water inside each beaker using a thermometer. Record the temperature of the water in each beaker in the *Data* table.
9. Reseal the beakers by placing the plastic wrap back on top and fastening it down using rubber bands.
10. Repeat steps 5-7 two more times.
11. After completing step 8, answer the questions reflective of your experience with the lab in the next section.



Data:

	3 min	6 min	9 min
Beaker A			
Beaker B			

Reflection:

1. Which beaker ended up recording a higher temperature after 9 minutes?
2. Reflecting on what you learned in the video at the beginning of class, why did one beaker raise in temperature faster knowing that the plastic wrap in the simulation was representative of greenhouse gases in the atmosphere?
3. If Beaker B were to have more plastic wrap around it, what do you believe would be the resulting effect of that change?
4. What real-world scenario is simulated by the increase of plastic wrap posed in Question 3? Why is this important today?



Elaboration - Student Handout

Successfully Communicating about Climate Change Reflection Sheet

After learning about successful communication of climate change in the segment of *Hot Science At Home* “Communicating About Climate Change”, reflect on your own experience learning about the climate in class today. Do you think the video showed to you at the beginning of class helped you understand climate change?

Why do you think it is important that people continue to talk about climate change and its effects?

According to the EPA Global Greenhouse Emissions Data, the leading cause of worldwide greenhouse gas emissions is energy consumption. What is something that you could do to reduce your contribution to rising greenhouse gas emissions and climate change?

Source: EPA Global Greenhouse Gas Emissions Data Source, www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data