

STEAM Education & Leadership Workshops

Student Activity Lesson Plan - The Climate Challenge: Exploring Earth's Future

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Age range

10-12 years old

Learning objectives

- Students will be able to understand the causes and effects of climate change, focusing on greenhouse gases and global warming.
- Students will be able to explore how climate change impacts natural systems (e.g., weather patterns, wildlife, and ecosystems).
- Students will be able to identify ways humans contribute to climate change and discuss actions to reduce these impacts.
- Students will be able to investigate local climate challenges and connect them to global issues.
- Proposing solutions to climate-related problems in their community will allow students to develop leadership and critical thinking skills.

Structure of the lesson

- Introduction to Climate Change (0-20 Mins)
- Greenhouse Effect Experiment (20-45 Mins)
- Impact on Natural Systems (45-60 Mins)
- Brainstorming Actions (60-85 Mins)
- Global Connection (90-110 Mins)
- Reflection and letter to self (110-130 Mins)

Duration

130 minutes

Note to Educators

Start with Relatable Examples

Begin by asking students about local weather changes they've noticed, such as hotter summers or irregular rainfall. Connect these observations to global climate trends to make the lesson relatable and engaging.

Foster Critical Thinking with Experiments

Use the greenhouse effect experiment to show how heat is trapped by greenhouse gases. Encourage students to relate their findings to human activities, such as burning fossil fuels, to deepen understanding.

Link Learning to STEM Careers

Explain how climate science connects to STEM careers like meteorology, environmental engineering, and renewable energy. This broadens their understanding of real-world applications.

Connect Human Actions to Natural Systems

Discuss how climate change impacts ecosystems, wildlife, and biodiversity. Use visuals like melting polar ice or endangered species to evoke empathy and highlight the interconnectedness of human actions and natural systems.

Promote Local and Global Action

Guide students to brainstorm actionable steps to reduce their carbon footprints, such as conserving energy or planting trees. Emphasize how small local actions contribute to mitigating global climate impacts.

Timing	Facilitator's actions	Students outcomes	Technical notes
0-20 min	<p>Introduction to climate change</p> <p>Slide 2: Introduce the concept of climate and weather using the images of human activities that change the earth's temperature.</p> <p>Slide 3: Ask a question from students to think independently: Have you noticed changes in weather patterns or seasons where you live?</p>	<p>Mastery</p> <p>Environmental literacy, critical thinking, ability to think independently, and creativity</p> <p>Begin by asking students about the difference between climate and weather, using relatable examples of local weather patterns. For instance, discuss short-term changes (e.g., a rainy week) versus long-term trends (e.g., consistently hotter summers). Encourage reflection on how recent seasons differ from the past, such as comparing summers from three years ago to today.</p> <p>Guide students to analyze their observations and connect them to broader environmental concepts like global warming. Discuss how individual actions—such as energy use or waste generation—impact the environment. This fosters critical thinking and empowers students to adopt sustainable behaviors.</p>	<p>Create a safe and inclusive environment for sharing. Use a world map or a simple infographic on changing global temperatures to provide context. Display a timeline (e.g., "3 years ago vs. now") to guide comparisons.</p>
20- 45 min	<p>Slide 4: Greenhouse Effect Experiment</p> <p>Demonstrate how greenhouse gases trap heat by mimicking the greenhouse effect. Students will work in groups to set up the experiment and observe temperature differences between sealed and open containers over time.</p> <p>Slide 5: Group Work</p> <p>Students will use problem-solving skills to analyze why the sealed container traps heat, drawing parallels to how greenhouse gases warm the Earth. They will also discuss how human activities, like burning fossil fuels, increase these gases and contribute to global warming.</p>	<p>Agency</p> <p>Focus: Problem-solving, Curiosity, and Self-Efficacy</p> <p>Students take ownership by setting up the experiment and making observations, fostering responsibility and connection to real-world climate solutions.</p> <p>Curiosity: Practical learning sparks curiosity as students explore why the sealed container gets warmer and how it relates to Earth's atmosphere.</p> <p>Problem-Solving and Self-Efficacy: Analyzing results helps students understand heat-trapping mechanics and environmental impact while conducting the experiment and builds confidence in their scientific skills.</p>	<p>By asking questions like "Why does the sealed container get warmer?" and "How does this relate to Earth's atmosphere?" students develop curiosity to explore and connect scientific concepts to real-world applications. This curiosity extends beyond the classroom, encouraging them to observe local weather patterns, and temperature changes, and conduct simple outdoor experiments, making learning relevant to their daily lives.</p>
45-60 min	<p>Impact on Natural Systems Understanding the Effects of Climate Change</p> <p>Slide 6: How climate change affects natural systems</p> <p>Particularly wildlife and ecosystems. This slide aims to make students aware of the connections between human actions, environmental changes, and their broader impacts on biodiversity and natural resources.</p>	<p>Awareness and Agency</p> <p>Students will learn that climate change is a global issue driven by the collective actions of individuals, industries, and governments. Its impacts, such as species extinction and habitat loss, affect the entire planet.</p> <p>By understanding how climate change disrupts natural systems and the connections between human actions, biodiversity, and ecosystems, students will internalize values of collective responsibility, empathy, and acting locally while thinking globally. These values will inspire them to adopt sustainable practices, advocate for climate policies, and contribute to a more equitable and sustainable world.</p>	<p>Showing videos or images of polar ice melting, floods, or endangered species will help students witness climate change's real-world impact. These visuals evoke empathy, connect global issues to local challenges, and inspire students to take action in their communities, reinforcing the idea of acting locally and thinking globally.</p>

<p>60-85 min</p>	<p>Brainstorming Actions to Reduce Carbon Footprints Empower students to reflect on steps they can take individually or as a community to reduce their carbon footprints. This encourages critical thinking about the personal and collective impacts of climate change and prompts feasible actions to mitigate their environmental footprint.</p> <p>Slide 7: Individual Thinking Time Give students time to reflect on how their actions, both individually and as a community, can promote a greener, more sustainable school or neighborhood. Encourage simple changes like reducing energy use, minimizing waste, and using eco-friendly products to create a healthier environment.</p>	<p>Connectedness Growth mindset, setting short and long-term goals, and perseverance Students will set short- and long-term goals to adopt sustainable habits, fostering perseverance and resilience. By brainstorming actions to reduce carbon footprints, they will develop a sense of connection to their community and the world, understanding that collective actions can drive positive change and contribute to the global effort against climate change.</p>	<p>By focusing on local actions, students will gain the understanding that acting locally can have global benefits. They will learn that the individual and collective efforts of communities can create a ripple effect that contributes to the broader goal of reducing the carbon footprint and combating climate change. This reinforces the importance of thinking globally while taking local action.</p>
<p>90-110 min</p>	<p>Global Connection – The Interconnectedness of Climate Change Slides 8-10: These slides help students understand that climate change is a global issue with widespread effects, impacting regions differently. By discussing its global impact and using maps of extreme weather events (floods, droughts, wildfires, heatwaves), students will see how localized actions have far-reaching consequences. For example, a flood in one region can lead to global issues like migration, food scarcity, and economic disruption.</p>	<p>Connectedness This section fosters empathy, understanding inequity, and global-mindedness by highlighting the varying vulnerability to climate change across the world. Students will learn that low-income countries and island nations are disproportionately affected despite contributing less to its causes. This understanding encourages students to think globally and recognize that local actions, such as reducing waste, conserving energy, and advocating for policies, can collectively mitigate climate change and reduce its global impact.</p>	<p>How do you think families in flood-prone areas cope with losing their homes or livelihoods due to climate change? Such questions foster empathy and global awareness, encouraging students to reflect on the unequal burden of climate impacts. This helps them understand inequity and the need for fairness in addressing global challenges.</p>
<p>110-130 min</p>	<p>Reflection and Closing: Circle Time and Personal Commitments Slide 11: Sharing Learnings Reinforce student learning by reflecting on climate change and their role in creating solutions. Ask students to summarize key points: the greenhouse effect, climate change impacts, actions to reduce carbon footprints, and the importance of empathy and global connectedness. Encourage them to complete the sentence: "Today I learned... and I will... to help," sharing reflections in a supportive circle.</p> <p>Slide 12: Letter to Self Empower students to plan actions for a sustainable environment. Have them write a letter to their future self, starting with: "In the coming days, I will take these steps to make my school and community greener." Encourage actions like participating in a plantation drive, recycling, or raising awareness. Conclude with a brainstorming session to plan a mini-project, such as a community clean-up or starting a green club.</p>	<p>Agency Hope, ambition, self-awareness, and a sense of community Students envision themselves taking consistent actions for a greener future and they feel capable of influencing their environment positively.</p>	<p>Provide examples of impactful actions, such as school-wide recycling programs, community tree-planting, or student-led energy conservation campaigns, to inspire students and align with available resources. Highlighting these efforts shows the tangible impact of collective action and emphasizes the importance of their contributions, making students feel valued and part of a larger community working toward a shared goal.</p>

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