Web Unit Plan

Title: Beat the Heat

Description: Student scientists investigate the effect of greenhouse gases on climate change around the world.

At a Glance

Grade Level: 6–8

Subject sort (for Web site index): Science

Subject: Earth Science

Topics: Ecology, Environment

Higher-Order Thinking Skills: Analysis, Argumentation, Problem Solving

Key Learnings: Greenhouse gases, climate change

Time Needed: 15 class periods

Background:
http://educate.intel.com/in/ProjectDesign/UnitPlanIndex/Beat+the+Heat/index.htm

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Unit Summary

In this project, student-scientists investigate the global impact and causes of climate change. Students learn about environmental issues like the greenhouse effect and climate change by conducting chemical investigations in the lab, doing research, and surveying their neighbors, parents, and friends to gauge awareness and feelings about climate change. Students speak to experts to gain a more informed perspective on their research. They use a wiki to develop and share knowledge about the environmental issues, and a class blog to share thoughts, debate responses, and reflect on their learning. As a culminating project, students develop a product to create awareness and encourage discussion in their community about climate change.

Curriculum-Framing Questions

- **Essential Question**
  What effects do our choices have on the world around us?
- **Unit Questions**
  How do my actions contribute to climate change?
  What should be done in response to climate change?
  What is the impact of climate change on me and my community?
- **Content Questions**
  What is climate change?
  What are the causes of climate change?

What does climate change mean to different parts of the world?

Instructional Procedures

Preparing for the Unit

Before you begin the unit, set up the online tools students will use, and practice manipulating the features. Set up practice sections for students to use to learn about the tools, and take special note of any help feature, such as tutorials and multi-language resources, if you have non-native speakers in your class. The tools students will use in this unit include:
- Wiki
- Blog
- Online spreadsheet
- Online survey

Arrange for experts to work with student groups. Before you contact these individuals, think carefully about the following points, so you can plan for a good experience for your students and community members:
- What are the time frames for the videoconferences?
- What kind of feedback will the experts be asked for?
- What preferences might the experts have for interacting with students?
- How much time can they expect to spend on the project?
- What special circumstances need to be clarified before the project, such as students with disabilities or other special needs?

You will also want to review the NASA* web site for temperature data that students will be using as part of their research. This will ensure students get the most out of the online search tool.

Unit Introduction

Divide students into groups of 4 or 5, and ask them to brainstorm their thoughts about the Essential Question, *What effects do our choices have on the world around us?* Before beginning, review the discussion rubric with students to emphasize the criteria for effective discussion participation.

After students have brainstormed for 10–15 minutes, ask them to refine their discussion by addressing the following questions:
- How do our choices affect our local environment?
- How do our choices affect the environment of faraway places?
- What information do we need to have to understand the impact of our choices on the world?

Gauging Student Needs

While students are in the same groups, explain that they are beginning a project on climate change. Ask them to complete the K (Know),W (Wonder), and H (How to learn) columns of their K-W-L-H charts in their groups. Conduct a large-group

discussion of their charts. Introduce the following Content Questions during the discussion:

- *What is climate change?*
- *What are the causes of climate change?*
- *What are the impacts of climate change on different parts of the world?*

Ask students to respond in their journals to the following prompts:
- How well did my participation in the discussion meet the standards in the Discussion Rubric?
- What goals can I set to guide my learning for this project?

Conducting Research

Place students in groups of 4 or 5, and provide time to explore the basics of climate change through Internet research. Review rules for use of Internet and online resources, including online etiquette, language, laws, and requirements for documentation.

Outline the following process for conducting group research:

1. Individually spend 10–15 minutes exploring the topic of climate change, taking brief notes on the topics you find and recording good information sources for future reference.
2. Meet as a group and decide on an individual topic or two for each group member to research.
3. Review the research checklist and decide on a format or process for taking notes.
4. Conduct research individually and take notes on findings.
5. Synthesize research information.

Introducing the Class Climate Change Wiki

Explain to students that they will be using a wiki in the project. Demonstrate the different features of the class climate change wiki*.Point out any resources, such as help links or tutorials, to help students use the online tool, and create a practice wiki page where students can experiment using the features of the site.

Share the wiki rubric to set expectations for their work, and invite student additions or revisions. Assign each group a page on the wiki where they summarize and interpret their research on climate change. Distribute the wiki storyboard to help students plan their wiki pages. Students will use the wiki feedback checklist to give feedback to peers on their wiki pages.

Data Analysis

Conduct a discussion about how students think temperatures vary around the globe and how these differences might be affected by climate change. Ask students what kind of information would be useful for drawing conclusions about this phenomenon.
- What sets of locations should be used?
- What kinds of information would be best for comparison?

Use information from the NASA* website to demonstrate how to use and interpret data to answer questions about climate change. Ask students to discuss the following questions in small groups and follow up with a large-group discussion:

- How far back should you check to look for trends?
- To compare temperatures in two different areas, what data would you use? Point out that they must use the same month when comparing temperatures over years since the temperature will fluctuate naturally through the seasons.
- What kinds of locations around the world would be best to compare? Similar climates? Different climates? Similar latitudes?
- What might they learn from different locations?

Place students in groups and distribute the weather data analysis instructions. Ask students to complete the activity in an online spreadsheet, and add their chart and their conclusions to their wiki page. Before they begin working, review the collaboration rubric to set expectations for working in teams.

Blog

Explain to students that they will be using a blog in the project. Demonstrate the features of the Greenhouse Effect blog* and provide a practice entry and time for students to practice posting and responding. Point out any resources on the site, such as help links or tutorials, to help students use the blog features.

Place students in small groups and ask them to conduct further research on the following Content Questions and add any new information they find to their wiki pages:

- *What is climate change?*
- *What are the causes of climate change?*
- *What does climate change mean to different parts of the world?*

Facilitate a large-group discussion on the Essential Question (*What effect do our choices have on the world around us?*) as it relates to climate change. After the discussion, ask students to post their views on the question, *Are we responsible for climate change?* on the class Greenhouse Effect blog*. Share and explain the blog checklist. Instruct students to go through each other's blog entries and post comments.

Awareness Survey and Analysis

Ask student groups to create a climate change awareness survey* online for their parents, neighbors, and other community members. Ask students to analyze their findings using a graph or pie chart and add their results and conclusions to the class climate change wiki*.

Videoconference

Facilitate a large group discussion on the following Unit Questions:

- *How do my actions contribute to climate change?*
- *What is the impact of climate change on me and my community?*

Ask each group to share their research, survey, and analysis with an expert. Arrange a videoconference to discuss their findings and the Unit Question, *What should be done in response to climate change?* with an expert. Teach students how to participate in videoconferencing, record proceedings, and pose questions when speaking with experts online. Ask students to summarize what they learn from their videoconferences on their wiki pages.

Ask students to review the collaboration rubric and reflect on their teamwork skills in their journals.

Blog

Have students share their thoughts in response to the Unit Question, *What should be done in response to climate change?* on the class Greenhouse Effect blog*. Remind students to review the blog checklist before posting, and provide time for additional Internet research if needed. Instruct students to comment on each other's responses.

Awareness Campaign

Ask students to create a publication, such as a poster or newsletter, to create awareness of climate change. Distribute the publication scoring checklist and discuss the criteria with students, inviting student contributions as appropriate. After students complete drafts of their publications, ask them to use the scoring guide to self-assess their work, solicit feedback from peers and others, and revise as needed. Display the final publications in the school or in community locations.

Project Reflection on the Blog

Culminate the project by having students fill in the L (Learn) column of the K-W-L-H chart and reflect on the entire project in the class blog*. Encourage students to comment on other students' reflections. Ask students to reflect on their goals in their journals.

Prerequisite Skills

Conceptual Knowledge
- Basic knowledge of photosynthesis, pollution, gases such as CO2 and water vapor

Technical Knowledge
- Knowledge of Internet research
- Basic word processing and spreadsheet skills

Differentiated Instruction

Resource Student
- Provide daily time-management templates to help the student organize and track work
- Preselect relevant Web resources at the student's reading and ability level
- Create note-taking templates to facilitate the research process

- Create heterogeneous groups so students can support each other in their learning
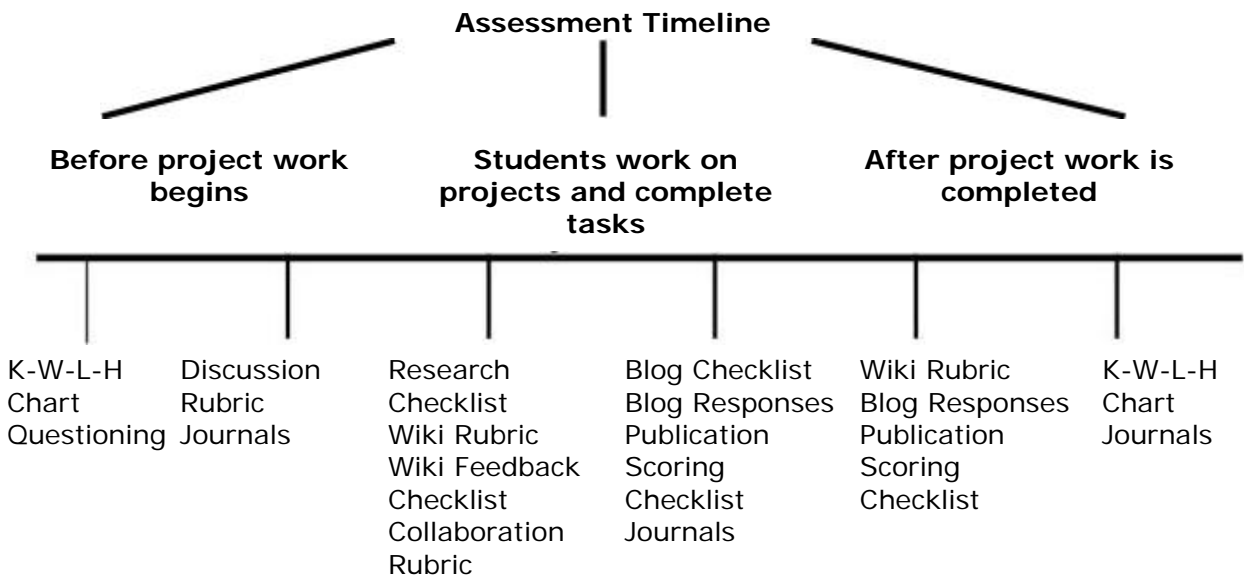
Gifted Student
- Encourage the student to create a 3-D graph/chart to summarize findings from lab investigation
- Provide options for creating multimedia products, such as videos or podcasts, as part of the awareness campaign
- Allow the student to create additional pages to the class climate change wiki for sharing further information about climate change
- Point the student toward online data sets related to climate change, and ask the student to use that data to draw further conclusions about the state of climate change in the world

English Language Learner
- Place the student in groups so the student can use language in natural contexts for meaningful purposes
- Identify relevant Web resources in the student's native language
- Set up online study groups with students from other schools who speak the same native language
- Provide instructions in writing and, when possible, locate online tutorials for the use of tools, such as blogs, wikis, and online spreadsheets, in the student's native language
- Refer the student to the Intel® Education *Help Guide for English Language Learners* for help with technology use

Assessment Processes

View how a variety of student-centered assessments are used in the Beat the Heat Unit Plan. These assessments help students and teachers set goals; monitor student progress; provide feedback; assess thinking, processes, performances, and products; and reflect on learning throughout the learning cycle.

Assessment Timeline

Before project work begins	Students work on projects and complete tasks	After project work is completed
K-W-L-H Chart Questioning	Discussion Rubric Journals	Research Checklist Wiki Rubric Wiki Feedback Checklist Collaboration Rubric	Blog Checklist Blog Responses Publication Scoring Checklist Journals	Wiki Rubric Blog Responses Publication Scoring Checklist	K-W-L-H Chart Journals

Assessment Summary

Students will be assessed with a mix of self- and peer assessment, and teacher feedback and grading. Use questioning, discussions, and observation throughout the unit to assess students' understanding of the Curriculum-Framing Questions as well as other important questions about the greenhouse effect and climate change. The teacher and students use the K-W-L-H chart at the beginning of the unit, to determine students' prior knowledge about greenhouse gases and climate change, and at the end of the project, to document what students have learned. Students use the discussion rubric to self-assess their discussion skills and the research checklist to guide their research. The class climate change wiki is used to monitor students' progress during the entire project, and the interaction section of the wiki is used to check for understanding of concepts. The wiki feedback checklist helps students give feedback to their peers about their wiki pages. As students prepare their blog responses, they refer to the blog checklist to guide their work. The publication scoring checklist guides students as they create their publications and is also used by the teacher to assign a grade.

Credits

This Unit Plan is adapted from the project idea implemented by Ms. Sinduja Sridhar, Inventure Academy, Bangalore, India.

Standards and Objectives

California Science Standards
Students will:
- Know the different atmospheric gases that absorb Earth's thermal radiation and the mechanism and significance of the greenhouse effect
- Construct appropriate graphs from data and develop quantitative statements about the relationships between variables
- Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence

National Educational Technology Standards (NETS)
Students will:
- Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media
- Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media
- Collect and analyze data to identify solutions and/or make informed decisions

21st Century Skills Standards
Students will:
- Assume shared responsibility for collaborative work, and value the individual contributions made by each team member
- Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact

Objectives

Students will be able to:

- Collaborate with peers to share information and resources and to accomplish tasks
- Identify the effects of greenhouse gases on the environment
- Accurately record and interpret data from an experiment on greenhouse gases
- Create visual representations of data that clarify meaning
- Conduct Internet research critically, efficiently, and ethically
- Evaluate the existing global scenario related to greenhouse effect and climate change
- Take and support a position on the impact of human behavior on climate change and an appropriate response
- Use print and online tools to communicate with peers and the community

Technology and Resources:

Printed Materials

- Resources on climate change

Internet Resources

- Global Warming and the Greenhouse Effect
  http://earthguide.ucsd.edu/earthguide/diagrams/greenhouse*
  Animated slideshow demonstrating the effect of greenhouse gases on Earth's climate

- Guide to Climate Change
  http://news.bbc.co.uk/2/shared/spl/hi/sci_nat/04/climate_change/html/greenhouse.stm*
  Information about climate change with an animation about greenhouse gases

- Climate Change Kids Site
  www.epa.gov/climatechange/kids*
  A site produced by the United States Environmental Protection Agency with information on climate change and greenhouse gases

Technology—Hardware

- Computers for recording and analyzing information and for using the Internet
- Internet connection for research and for using online tools
- Projection system for demonstrating tools and sharing research
- Videoconferencing equipment for conducting expert interview and presentation

Technology—Software

- Internet Web browser for conducting research and using online tools
- Word processing software for taking notes
- Spreadsheet for collecting, analyzing, and representing data graphically.