NATIONAL GEOGRAPHIC

RESOURCE LIBRARY I ACTIVITY : 50 MINS

Plot It!

Students practice gathering, charting, and graphing simple data from the class weather station digitally. They then use these skills to graph climatic data gathered in the previous activity for a focal state that experiences their extreme weather type. Finally, students read to identify technological strategies for responding to the harm of extreme weather events.

GRADES

6, 7, 8

SUBJECTS

Earth Science, Climatology, Meteorology

CONTENTS

1 PDF, 5 Links, 1 Resource

OVERVIEW

Students practice gathering, charting, and graphing simple data from the class weather station digitally. They then use these skills to graph climatic data gathered in the previous activity for a focal state that experiences their extreme weather type. Finally, students read to identify technological strategies for responding to the harm of extreme weather events.

For the complete activity with media resources, visit:
http://www.nationalgeographic.org/activity/plot-it/

In collaboration with

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DIRECTIONS

This activity is part of the Climate Change Challenge unit.

1. Model and support students as they digitally chart and graph weather station data.

- Model the transfer of weather station data from the past three days into a digital spreadsheet, arranging days as rows, and the temperature in a single column.
- Prompt weather data collection groups to do the same with their weather variable.
- In an I do, we do, you do format, model how to create digital line graphs using their weather variable data:

    - Using the temperature data, encourage students to observe as you create a digital point/line graph of data for each day of data collection. Ask volunteers to name the axes and title of the graph.
    - Share an electronic copy of the temperature data with your students in their weather data collection groups. With each group working together on a single copy of the file, ask them to re-create a digital graph of the same data alongside you.

- Then assign weather collection groups to create a digital line graph of their weather variable. It should match the graph they have been creating by hand during the *Meteorological Models, Weather, Meet Climate,* and *Now and Then* activities.
- Prompt students to compare their hand-drawn and digital graphs, and take a moment to celebrate the professional look of their digital creations.

2. Model and support students as they digitally graph mean decadal temperature data.

- Return to the evidence-based comparison and digital chart of the summary statistics from the *Now and Then* activity, in which you recorded mean, median, and range of temperatures for your state over the earliest and most recent full decades available.
- Using only the "Decade" and "Mean Temp. (F)" columns of your chart, model once more how to create a digital point/line graph with decade on the x-axis and temperature on the y-axis, comparing the earliest and most recent decadal data. Explain how the graph supports the evidence-based comparison of these decades that students constructed in the previous activity.
- Prompt weather data collection groups to create similar point/line graphs. The graphs should compare the first and last decades of data for their focal state using their chart from the *Now and Then* activity.
- Briefly discuss the value of representing data in graphical form by asking:

    - *How does your graph support the evidence-based comparison you made in the previous activity?*

- Look for student responses linking their evidence-based statement to its visual representation in the graph.

    - *How is looking at data represented in a table or chart different from examining that same data in a graph?*

- Look for student responses comparing the ease or persuasiveness of examining data in these two forms.

3. Prompt students to examine strategies for responding to natural disasters influenced by global warming.

- Reminding students of their revised extreme weather models from the *Weather, Meet Climate* activity, ask students the following in a Think-Pair-Share:

    - *Given the graphs you made of temperature in your focal state, how do you expect the frequency of your extreme weather event to be changing there?* (Look for student responses linking their extreme weather models to changes in temperature, specifically.)
    - *How might people respond to these changes to stay safe and protect their communities?* (Student answers will depend on prior knowledge.)

- In their extreme weather groups, assign each student to read and annotate one of two articles about the response to their extreme weather event (such that, at least one student in each group reads each relevant article). Prompt students to underline each strategy that could help to keep people safe:

    - Hurricane s:

        - *Can Technology Hack Hurricane Relief?*
        - *Hurricane Safety Tips*

    - Tornadoe s:

        - *Tornado Safety Tips, Preparation, and Readiness*
        - *A Guide to Tornado Shelters*

- Drought s:
    - *5 Dramatic Ways California Is Tackling Drought*
    - *Understanding Droughts* (Preparing for Droughts section)

- When students have finished reading, direct them to work with their group to create a list of all of the strategies they discovered in their two articles. Specifically, strategies involving the use of technology in response to extreme weather. Clarify for students that examples of technology from the above articles can be as complicated as a drone with scientific equipment used for weather monitoring, and as simple as a basement storm shelter.
- Prompt student groups to choose at least three of these technologies and record them below their temperature graph.
- Distribute the *Weather Meets Climate Rubric* to each extreme weather group and assign groups to use the tool to self-assess their portfolio product, showing temperature trends in a state prone to extreme weather (data chart, evidence-based comparison, graph, and response technologies).
- Allow students time to incorporate their findings from the rubric, and ensure that each student saves a copy of their group's product with their name, for assessment and incorporation into their final project portfolio.
- Finally, lead a debrief discussion to revisit the class *Know and Need to Know* chart, prompting students to share any new insights related to their data analysis and visualization of changing temperatures in relation to extreme weather and climate.

Tip

Step 1: The Teaching Channel also has a helpful video and article on how to use the *I do, we do, you do*. The video and article model completion of a novel task (such as using presentation software).

Rubric

Use the *Weather Meets Climate Rubric* to formally assess students progress towards NGSS PE *MS-ESS3-2*: Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

Extending the Learning

Step 3: Students may perform additional research to understand extreme weather response technologies in greater detail by creating a poster highlighting the history, benefits, and mechanism of a particular technology.

OBJECTIVES

Subjects & Disciplines

Earth Science

- Climatology
- Meteorology

Learning Objectives

Students will:

- Digitally graph climatic trends.
- Identify technological strategies to respond to the effects of extreme weather events.

Teaching Approach

- Project-based learning

Teaching Methods

- Lab procedures
- Modeling
- Reading

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
  - Information, Media, and Technology Skills

    - Information, Communications, and Technology Literacy
  - Learning and Innovation Skills
    - Communication and Collaboration
  - Life and Career Skills
    - Leadership and Responsibility
    - Productivity and Accountability
    - Social and Cross-Cultural Skills
- Critical Thinking Skills
  - Analyzing
  - Applying
  - Evaluating
- Science and Engineering Practices
  - Analyzing and interpreting data
  - Using mathematics and computational thinking

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

• **CCSS.ELA-LITERACY.RST.6-8.7:**
Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

NEXT GENERATION SCIENCE STANDARDS

• **Crosscutting Concept 1:**
Patterns
• **MS-ESS3-2:**
Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
• **Science and Engineering Practice 4:**
Analyzing and interpreting data

Preparation

What You'll Need

REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per pair, Monitor/screen, Printer, Projector

PHYSICAL SPACE

- Classroom
- Computer lab

GROUPING

- Large-group instruction
- Large-group learning
- Small-group learning
- Small-group work

RESOURCES PROVIDED: HANDOUTS & WORKSHEETS

- Weather Meets Climate Rubric

RESOURCES PROVIDED: ARTICLES & PROFILES

- National Geographic: Can Technology Hack Hurricane Relief?
- National Geographic: Hurricane Safety Tips
- National Geographic: Tornado Safety Tips, Preparation, and Readiness
- National Geographic: A Guide to Tornado Shelters
- National Geographic: 5 Dramatic Ways California is Tackling Drought
- Understanding Droughts

BACKGROUND & VOCABULARY

Background Information

Although some extreme weather events are expected to increase in frequency and intensity, there are many steps that people can take to keep themselves safe. For example, in areas prone to flooding during hurricanes, seawalls can help hold back water. In parts of the

country where drought occurs frequently, new irrigation techniques can reduce water use as it becomes scarce. Finally, in the case of tornadoes, advanced radar systems can help people get more accurate warnings of a storm's path.

Graphical representations help communicate the messages of data in visual form. Different types of graphical representations, such as bar and line graphs, are suited for use with different types of data. Labels help an audience interpret graphs. Typically, a graph should have a title, and each axis (x and y) should have a brief text description of the variable being measured.

Prior Knowledge

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Recommended Prior Activities

- None

Vocabulary

Term	Part of Speech	Definition
atmospheric pressure	*noun*	force per unit area exerted by the mass of the atmosphere as gravity pulls it to Earth.
climate	*noun*	all weather conditions for a given location over a period of time.
climate change	*noun*	gradual changes in all the interconnected weather elements on our planet.
cloud cover	*noun*	amount of sky covered with clouds.
humidity	*noun*	amount of water vapor in the air.
mean	*noun*	mathematical value between the two extremes of a set of numbers. Also called the average.
median	*adjective*	situated in the middle.
precipitation	*noun*	all forms in which water falls to Earth from the atmosphere.
range	*noun*	difference between the smallest and largest value in a set of numbers.
temperature	*noun*	degree of hotness or coldness measured by a thermometer with a numerical scale.

Term	Part of Speech	Definition
weather	*noun*	state of the atmosphere, including temperature, atmospheric pressure, wind, humidity, precipitation, and cloudiness.
wind	*noun*	movement of air (from a high pressure zone to a low pressure zone) caused by the uneven heating of the Earth by the sun.

For Further Exploration

Instructional Content

- National Geographic: Resource Library: Collection: Weather
- National Geographic: Resource Library: Collection: Catastrophic Weather Events
- National Geographic: Resource Library: Collection: Climate
- National Geographic: Resource Library: Collection: Climate Change