Climate and Weather

http://commtechlab.msu.edu/sites/letsnet/frames/subjects/science/index.html

Focus on Inquiry

The student will focus on inquiry by gathering their own local data and using current and archived weather facts from the national weather database and other online sites. The student will also work collaboratively online with students from other schools to collect weather data.

Lesson Overview

This unit was designed to introduce students to variances in temperature relative to time of day and time of year. As part of the Climate and Weather Unit, students will also examine 3 factors that help to determine weather and climate: latitude, elevation, and nearness to large bodies of water.

Duration	Setting	Grouping	PTI Inquiry Subskills
3 – 50 minute class periods	Classroom or computer lab	Small groups	1.3, 2.1, 3.1, 3.2, 3.3, 3.7, 3.8, 4.3, 4.4, 5.2, 5.3, 5.4, 5.6, 6.2, 7.2, 7.3

Lesson Components	Estimated Time	Inquiry Subskills Used	Technology Used	Level of Student Engagement	Brief Description
Lesson One: Where to Look	50 min.	1.3, 3.1, 3.2, 3.3, 3.7, 3.8, 4.3, 4.4, 5.2, 5.3, 6.2, 7.2, 7.3	Internet	3	Students become familiar with online weather sources and weather terminology by using websites. They will also practice using and interpreting a weather database, determining the effects of time of day and time of year on temperature
Lesson Two: Is Temperature Affected By How Close You Are To The Equator?	50 min.	1.3, 2.1, 3.1, 3.3, 3.7, 3.8, 4.4, 5.2, 5.3, 5.4, 7.2, 7.3	Internet, email, listservs	3	Students participate in a collaborative project to gather data from other schools to see how average daily temperature is affected by how close a place is to the equator.
Lesson Three: What Causes Irregular Temperature Patterns?	50 min.	3.1, 3.3, 3.8, 4.3, 4.4, 5.2, 5.3, 5.4, 5.6, 7.2, 7.3	Internet	3	While examining the weather and climate database, students recognize a general relationship between latitude and temperature (for a given month).

Level of Student Engagement

1	Low	Listen to lecture, observe the teacher, individual reading, teacher demonstration, teacher-centered instruction
2	Moderate	Raise questions, lecture with discussion, record data, make predictions, technology interaction with assistance
3	High	Hands-on activity or inquiry; critique others, draw conclusions, make connections, problem-solve, student-centered

National Science Education Standards – Inquiry

Design and conduct a scientific investigation.
Use appropriate tools and techniques to gather, analyze, and interpret data.
Develop descriptions, explanations, predictions, and models using evidence.
Think critically and logically to make the relationships between evidence and explanations.
Communicate scientific procedures and explanations.

National Science Education Standards – Earth Science

The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day.

Louisiana Grade Level Expectations – Inquiry

Gr. 8, Inquiry GLE#4 – Design, predict outcomes, and conduct experiments to answer guiding questions (SI-M-A2)
Gr. 8, Inquiry GLE#6 - Select and use appropriate equipment, technology, tools, and metric system units of

measurement to make observations (SI-M-A3)
Gr. 8, Inquiry GLE#7 – Record observations using methods that complement investigations (i.e. journals, tables, charts) (SI-M-A3)
Gr. 8, Inquiry GLE#9 – Use computers and/or calculators to analyze and interpret quantitative data (SI-M-A3)
Gr. 8, Inquiry GLE#12 – Use data and information gathered to develop an explanation of experimental results (SI-M-A4)
Gr. 8, Inquiry GLE#13 – Identify patterns in data to explain natural events (SI-M-A4)
Gr. 8, Inquiry GLE#16 – Use evidence to make inferences and predict trends (SI-M-A5)
Gr. 8, Inquiry GLE#18 – Identify faulty reasoning and statements that misinterpret or are not supported by the evidence (SI-M-A6)
Gr. 8, Inquiry GLE#19 - Communicate ideas in a variety of ways (e.g., symbols, illustrations, graphs, charts, spreadsheets, concept maps, oral and written reports, equations) (SI-M-A7)
Gr. 8, Inquiry GLE#22 - Use evidence and observations to explain and communicate the results of investigations (SI-M-A7)

Louisiana Grade Level Expectations Earth Science

Gr. 8, GLE#29 - Make predictions about future weather conditions based on collected weather data (ESS-M-A12)

Materials List (per group)

- Computer with Internet Access (All lessons)
- Science Journals (All lessons)
- Thermometers (Lesson 1)
- Weather data (Lesson 1) (This can be downloaded from one of the weather organizations listed below – see #4 under Advance Preparation)
- World map (Lesson 2 and 3)

Advance Preparation

1. Before lesson one, have students bring in magazines, newspaper articles, and library books related to weather.
2. Before lesson two, design a spreadsheet/database that includes information such as: city, state, latitude, longitude, elevation, and average temperatures for each month.
3. Before lesson two, locate another class via e-mail that is willing to work collaboratively with you on this project. There are listservs that you can join to post an interest in a particular subject, idea, or project. See the Internet Resources on the activity website for these resources.
4. Each school will need to call their local weather station and ask for the 30-year average temperature data for 12 months.
5. Explore the activity website to familiarize yourself with the unit and its corresponding activities and resources. You must click on the “Climate & Weather Unit” on the right to begin.

Other Information

Objectives

The learner will:

- locate online weather sources.
- gather and interpret weather data.
- work collaboratively online with other schools to collect weather data.
- write about the cause of temperature inconsistencies in various locations according to any of the three principles covered: latitude, elevation or nearness to large bodies of water.

Prior Knowledge Needed by the Students

- None

Procedure

Lesson One: Where to Look

Engage

- Students are introduced to climate and weather by visiting several Internet resources found under the “Activity Description” section of their choosing.
- Use the available Internet resources listed, such as EARTHSTORM’s Online Weather Glossary, to review basic weather terminology such as temperature, average temperatures, and precipitation with the students.
- Have the students identify the units of measurement for temperature and precipitation by selecting one of the Internet resources listed.

Explore

- Students explore a weather database to find the ranges, extremes, and patterns in the data.
- Introduce students to the NOAA website and explain how NOAA keeps detailed records of weather observations from hundreds of locations over a long period of time.
- Students make predictions and form hypotheses based on their existing knowledge of weather.
- Students test their hypotheses against the data available, or students can gather their own data to find the temperature changes during a twenty-four hour day.

Explain

- Students form conclusions based on information and data provided and write their conclusion in their journal.
- Students discuss their findings and conclusions with whole class.

Expand

- Discuss whether sources students used as evidence to support their conclusions were reliable sources.
- Discuss what makes a reliable source and emphasize the importance of using reliable sources and accurate data when forming a conclusion.

Evaluate

- Student journals of their exploration and conclusions can be used as assessment.
- Student discussions of their findings can be used as assessment.

Lesson Two: Is Temperature Affected By How Close You Are To The Equator?

Engage

- Students locate their state on a world map, followed by a discussion on weather that might include the following items:
    - Would it be warmer or colder as you move south along the same longitude?
    - What would happen if you move North? What happens as you get closer to the Equator, as you move farther away?
    - Is temperature affected by how close you are to the equator?
- Encourage students to notice the latitude numbers as they move from the North Pole towards the South Pole.
    - Can they make a prediction about the relationship of temperature and latitude?
    - Do cities located along similar latitudes have the same weather?

Explore

- Students form a hypothesis based on their prediction and design an experiment to test their hypothesis.
- Instructions regarding the necessary requirements for the database, as well as how to locate another class to collaborate with and the gathering of data can be found under the “Activity Description” section in Lesson Two.

Explain

- Students report all information in their Science Journals. They discuss their findings and conclusions with the whole class.

Expand

- The process of manipulating the data to solve the problem is very important! Allow the students to figure out how to sort data and to choose the appropriate information needed, etc.

Evaluate

- Student reports in Science Journals can be used as assessment.

- Student discussion can be used as assessment.

Lesson Three: What Causes Irregular Temperature Patterns?

Engage

- Review the latitude principle with students. Focus on trends and patterns they may notice.

Explore

- Students sort the data on latitude: include the location and the months: January and July.
- Students calculate the Maximum - Minimum temperatures by finding the difference between the average temperature of the hottest month and the average temperature for the coldest month.

Explain

- Students discuss the following:
  - Are there certain areas where the difference is more extreme, less extreme?
  - Locate these areas on the map.
  - Encourage students to make inferences as to why some locations are more extreme than others.
  - Do you notice any similar characteristics in the locations?
  - Are there some areas which seem to be less extreme, or temperate? Locate these areas on the map and make inferences about a possible explanation.

Expand

- Earth Maximum Tilt Toward and Away From The Sun: In general, do the temperatures increase all the way to the equator? Is summer different than winter? How would you explain your findings?
- Elevation Principle - Are there differences in temperature at different elevations?

Evaluate

- Provide students with a map, and several sets of data (be sure to include examples that show inconsistencies in the climate norms as a result of latitude or nearness to large bodies of water).
- Have students locate the areas and write their interpretation as to the cause of temperature inconsistencies in those locations, according to either of the following principles:
  - As latitude decreases, temperature increases (from lesson 2).
  - If an area is near a large body of water, the high and low temperatures are less extreme.
- Students should write their explanation as to why they interpreted the example the way they did.

Blackline Master

1. None

Supplementary Resources

A variety of resources are available on the activity website.

Copyright Information