Data Mining Lesson Plan

Grade Level: 5-12

Essential Questions

- What are the differences and similarities of weather and climate?
- What factors influence the weather patterns and climate of a location?

Standards

- **SC.5.E.7.3:** Recognize how air temperature, barometric pressure, humidity, wind speed and direction, and precipitation determine the weather in a particular place and time.
- **SC.5.E.7.5:** Recognize that some of the weather-related differences, such as temperature and humidity, are found among different environments, such as swamps, deserts, and mountains.
- **SC.5.E.7.6:** Describe characteristics (temperature and precipitation) of different climate zones as they relate to latitude, elevation, and proximity to bodies of water.
- **SC.6.E.7.4:** Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.
- **SC.6.E.7.6:** Differentiate between weather and climate.
- **SC.912.E.7.3:** Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.
- **SC.912.E.7.5:** Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.

Student Objectives

- Students will be able to discuss the connections and relationship between different weather variables.
- Students will be able to identify the difference between weather and climate.
- Students will be able to list factors that influence local weather and climate

Materials

- Data Analysis Handout
- Computer w/Internet Access
- Pencils
- Notebook Paper
- Graphing Paper
- Colored Pencils

Key Terms

- **Climate** - distribution of weather over a long period of time.
- **Weather** - the atmospheric conditions, over a short duration, at a place for a certain time and defined by different variables.
- **Köppen Climate Classifications** - a classification system that provides information about temperature, precipitation and vegetation for a specific area.
- **Temperature** - the measure of molecular motion or the degree of heat of a substance. It is also the degree of hotness or coldness. In surface observations, it refers primarily to the free air or ambient temperature close to the surface of the earth.
- **Precipitation** - Any and all forms of water, liquid or solid, that falls from clouds and reaches the ground. This includes drizzle, freezing drizzle, freezing rain, hail, ice crystals, ice pellets, rain, snow, snow pellets, and snow grains. The amount of fall is usually expressed in inches of liquid water depth of the substance that has fallen at a given point over a specified time period.

Engage

This lesson plan is designed to engage students in data literacy activities through the WeatherSTEM Data Mining Tool.

Start off by engaging the students with a geography lesson. Have the students identify different oceans, continents, or topographical features. Teachers will show the tutorial video or demonstrate how to access and use the WeatherSTEM Data Mining tool, using their school's station (or closest) for their example.

Data Mining Tutorial Video: https://www.youtube.com/watch?v=F__uDO7rliU

Explore

Students will use the WeatherSTEM Data Mining tool to complete the WeatherSTEM Data Analysis. For an additional activity, have the students select stations from outside of their current county and repeat the instructions on the activity sheet. Students can compare their observations and analysis (graphs and calculations) to illustrate different climates.

Explain

Students will share their findings with the class and be able to connect the data/analysis to what they are learning. Any misconceptions that were mentioned by students during the Engage and Explore portion of the activity will be addressed.

Elaborate

Tie back to the Köppen Climate Classifications and explore the WeatherSTEM educational resource on differences and similarities between weather and climate.

Evaluate

Will be done throughout the lesson through discussion and interaction with students.

General Procedures:

1. Students will either work independently or in pairs for this activity.
2. Each student/pair will be given a WeatherSTEM station across the network as their study station.
3. Using the "Data Mining" tool, students will answer a series of questions on the provided handout activity for their selected study station.
4. Students will then share their findings with the class and teacher or students will record them to refer to during the remaining part of the activity.

Integration with Other Subject Areas

- Mathematics: Middle School
  - Mean, Median and Mode
    - **MA.6.S.6.1**: Determine the measures of central tendency (mean, median, mode) and variability (range) for a given set of data.
    - **MA.6.S.6.2**: Select and analyze the measures of central tendency or variability to represent, describe, analyze, and/or summarize a data set for the purposes of answering questions appropriately.
    - **MAFS.6.SP.1.3**: Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
    - **MAFS.6.SP.2.5**: Summarize numerical data sets in relation to their context.
  - Graphing Data
    - **MAFS.5.G.1.2**: Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
- Mathematics: High School
  - Standard Deviation
    - **MAFS912.S.3.4**: Calculate and interpret measures of variance and standard deviation. Use these measures to make comparisons among sets of data.
  - Distribution Analysis
    - **MAFS912.S-ID.1.2**: Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

Additional Resources

- Simple Statistics and WeatherSTEM Data:
  https://learn.weatherstem.com/modules/learn/lessons/104/index.html
- Hygrometers:
- https://learn.weatherstem.com/modules/learn/lessons/101/index.html
- Measuring Precipitation:
  https://learn.weatherstem.com/modules/learn/lessons/114/index.html
- Difference between Weather and Climate:
  https://learn.weatherstem.com/modules/learn/lessons/88/index.html