

Mandatory 3: Data...and Math Are Everywhere

Nebi Salim Bakare

NASA Endeavor STEM Teaching Certificate Project

Math Connections in the STEM Classroom

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Dr. Ben-Jacob

Data

The NASA resource I adapted to create this lesson was MY NASA DATA Lesson: Cloudy vs. Clear. This lesson includes images of a mostly clear sky and a cloudy sky. It also includes a data set that compares energy from the sun in China when the sky is clear vs. cloudy during the same months throughout the year (<https://mynasadata.larc.nasa.gov/docs/L122compgraph.pdf>).

The lesson can be found at https://mynasadata.larc.nasa.gov/lesson-plans/lesson-plans-elementary-educators/?page_id=474?&passid=122.

Clear Sky Image



<https://mynasadata.larc.nasa.gov/images/clearsky.jpeg>

Cloudy Sky Image



<https://mynasadata.larc.nasa.gov/images/cloudsky.jpeg>

Engaging Context

Students used authentic NASA data to engage in line plot data analysis. Students also used their prior knowledge of how the Sun's energy heats Earth's land, water, and air to draw conclusions based on the data.

Measurable Objectives

Students will be able to:

- analyze authentic line plot data collected by NASA. (Level 2)
- draw conclusions about the changes in the amount of energy from the sun on cloudy vs. clear days. (Level 3)

Related Standards

Math: Common Core

CCSS.MATH.CONTENT.2.MD.D.10

- Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

Science: Next Generation Sunshine State Standards

Big Idea 7

- Earth Systems and Patterns Humans continue to explore the interactions among water, air, and land. Air and water are in constant motion that results in changing conditions that can be observed over time.

SC.2.E.7.2

- Investigate by observing and measuring, that the Sun's energy directly and indirectly warms the water, land, and air.

Evidence

How did you collect evidence?

I took anecdotal notes during the class and team discussions. I also interviewed each team and used a teacher-created rubric to assess student learning. All teams scored an Excellent (3) or Satisfactory (2) on the rubric. Since the class completed a data analysis unit in math and a weather unit in science prior to this activity, they felt well prepared to analyze the line plots, answer questions, and draw conclusions.

Rubric

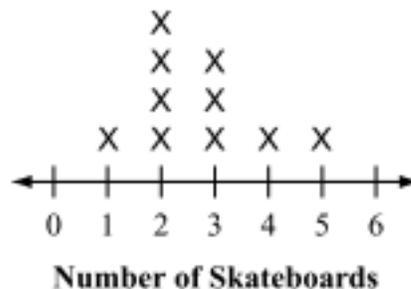
Excellent	Satisfactory	Needs Improvement	Unsatisfactory
3	2	1	0
The data analysis was thorough and accurate. Specific data and science concepts were cited to draw accurate conclusions about the changes in the amount of energy from the sun on cloudy vs. clear days.	The data analysis was sufficient and accurate. General data and science concepts were cited to draw accurate conclusions about the changes in the amount of energy from the sun on cloudy vs. clear days.	The data analysis was partially accurate or incomplete. Little data and science concepts were cited to draw limited conclusions about the changes in the amount of energy from the sun on cloudy vs. clear days	The data analysis was inaccurate or missing. No data or science concepts were cited to draw conclusions about the changes in the amount of energy from the sun on cloudy vs. clear days

Did it enhance the understanding of the concept?

This activity enhanced students' understanding of line plots and how data can be used to support scientific knowledge. Prior to completing this activity, my class completed a weather unit in science. The big idea questions were as follows:

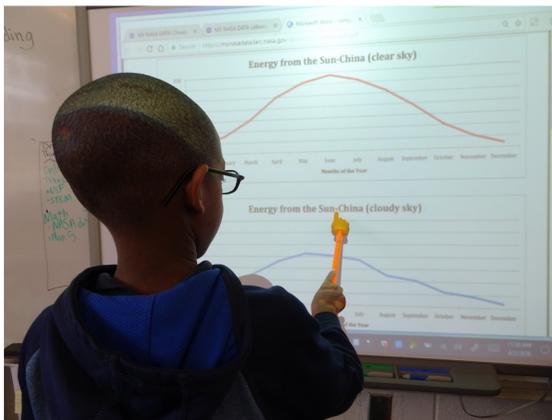
- How does the sun affect Earth?
- How does weather change?
- How is weather measured?

When completing this activity, I displayed the NASA images of clear vs. cloudy days. Then I asked, “How might the temperature be different on cloudy vs. clear days the same month of the year?” Students accurately explained that the temperature may be cooler on a cloudy day because the clouds may block some of the sunlight. Next, I displayed the “Energy from the Sun – China (cloudy)” and “Energy from the Sun – China (clear)” line plots. As predicted, the students did not recognize the displayed data as a line plot, because the line plots they learn to analyze in 2nd Grade look like the line plot below.



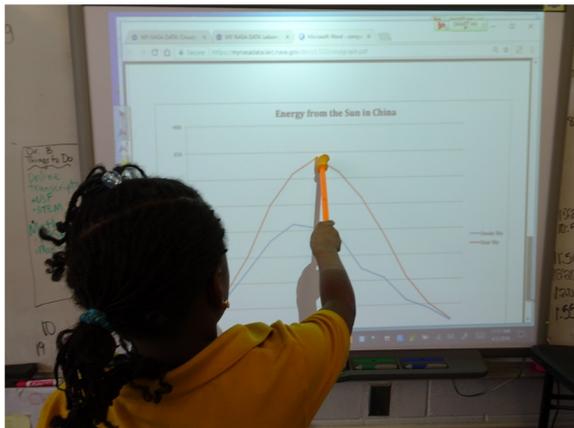
However, the students were able accurately analyze the line plots. They identified the title and labels. When asked to compare the plots, the students felt it was difficult to do so since the graphs were in two different places. I then displayed the double line plot. Although 2nd grade students aren't typically exposed to double line plots or graphs, they had virtually no difficulty analyzing the graphs. In fact, they felt it was easier to analyze the double line plots, rather than look at two different line plots. They were easily able to compare the differences between the energy from the sun in China on cloudy vs. clear days. Each team accurately drew conclusions about the similarities and differences in the amount of energy from the sun on cloudy vs. clear

days. They were also able to analyze the line plot and accurately identify months with similar amounts of energy (January, February, November, and December). Furthermore, each team accurately identified June as the month with the biggest difference in energy. At the end of the activity, students used the line plot data and the science text to support their thinking that the temperature would be hotter on clear days and cooler on cloudy days, because clouds block some of the energy from the sun.



Identifying the title and labels on the line plot.

Working with partners to analyze the double line plot.



Analyzing the double line plot.

Referring back to the science text to support their thinking.

Source:

Schnekser, B. (n.d.). MY NASA DATA Lesson: Cloudy vs. Clear. Retrieved from https://mynasadata.larc.nasa.gov/lesson-plans/?page_id=474?&passid=122