

Mathematics: The Language of STEM

Bar Graphs

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CONTENT AND TASK DECISIONS

Grade Level(s): 2nd

Description of the Task:

Students will be presented with a number of different choices for a potential class field trip. Students will vote on which field trip they would most likely want to attend. The students will then be responsible for organizing the data that is collected. At the end of the lesson, they will be responsible for explaining how they organized the information in small-group and whole-group settings.

Indiana Mathematics Content Standards:

2.DA.1: Draw a picture graph (with single-unit scale) and a bar graph (with single-unit scale) to represent a data set with up to four choices (What is your favorite color? red, blue, yellow, green). Solve simple put-together, take-apart, and compare problems using information presented in the graphs.

Indiana Mathematics Process Standards:

PS.1: Make sense of problems and persevere in solving them.

PS.3: Construct viable arguments and critique the reasoning of others.

PS.5: Use appropriate tools strategically.

PS.7: Look for and make use of structure.

Mathematics Content Goals:

Students will construct a visual representation of collected data.

Language Objectives:

Students will summarize the way they organized the collected data in pairs and in whole group discussion.

Materials:

Math Tools (snap cubes, counting bears, manipulative money, rulers, etc.)

Scrap Paper

Markers

PowerPoint of Field Trip Options

“Amelia Bedelia’s First Field Trip,” by Herman Parish

THE LESSON

Before:

- Student Actions:
 - Students will be actively engaged during the read aloud.
 - Students will participate in class discussion about field trips.
 - Students will participate in turn and talks to better understand the content in the read aloud.
- Teacher Actions:
 - Activate Prior Knowledge:
 - How many of you have gone on a field trip before?
 - Where have you gone on your field trips?
 - What has been your favorite field trip? Why?
 - What was it like before you went on your very first field trip? What were you expecting?
 - After asking several questions, introduce the book, “Amelia Bedelia’s First Field Trip,” and explain that what Amelia Bedelia is expecting is far from what she experiences on her first field trip.
 - Be sure the problem is understood
 - Ask: Where might you want to go for a field trip? Why?
 - Present a slideshow presentation of different ideas for where you could go on a field trip. (i.e. the zoo, a play, a farm, Chicago, a museum, an aquarium)
 - Have students do a quick write to explain where they would want to go on their trip and why. You can also encourage them to share with a partner when they are done! As students are sharing, go around and collect the data by writing down the names of the students who wanted to go to each destination. DO NOT record the information in a graph or picture form; rather, create a list of names under each destination.
 - A good sentence frame for EL students might be: I would like to go to _____ on our field trip because _____.
 - Display the list under the document camera so that all students are able to see it. You can ask questions like: What do we notice? Can we compare and contrast using this list?
 - Ask: If someone asked you about the results of our pole on which destination our class voted for, how would you give them the information? (Allow for responses...but don’t give too much time to this because you want each student to develop this idea on their own!)
 - Say: I want you to consider how you might organize the data that we collected using only a visual representation – something that you can draw. I don’t want you to use numbers or names of people!
 - Establish clear expectations
 - Say: When I dismiss you, you will go back to your seat where you will find a basket. In the basket, you are going to find a blank piece of paper and math tools. I am expecting that each of the mathematicians in this class are going to use the paper to help make their picture or visual representation. You can use markers, pencils, colored pencils, or crayons to help you organize your thoughts! You will also notice that there are a lot more pieces of paper than there are people. If you make a mistake, feel free to get a new piece of paper!
 - Say: You will also find a bunch of math tools in the basket, too! Those are for

you to use! It will be up to you on how you use them, or if you use them!

- Say: The last thing is: I will give you time to talk to a partner about your thinking, but for right now I want you to work on your own! I'm going to be walking around to help you as you brainstorm some ideas, but I want you to be careful to not share your ideas, yet! I will make sure to keep our data on the board for you to work with! Have fun, mathematicians!

During:

- Let go:
 - Dismiss students back to their seats and let them begin to work. Remember to encourage them to keep their ideas to themselves. The goal is for students to determine how to organize the data themselves, not to have a partner come up with the idea for them.
- Listen actively:
 - As the students are working, walk around to watch as students are drawing out their thinking. REMEMBER, they are not to use names or numbers. Encourage them to be creative and watch for students who are organizing information in a creative way!
- Provide appropriate support:
 - As you are walking around to assist students, know that some will get stuck. The goal is to allow them to struggle in order to come up with a solution themselves. If they ask questions about expectations, answer them appropriately, but if they ask questions because they cannot come up with a picture representation, ask questions to get them thinking, instead of asking questions to help them come up with the answer. For example: Have you ever used a picture to help explain something? What was in that picture? What did it look like?
- Provide worthwhile extensions:
 - For students that have completed the task, ask them to either write out their thinking or have them come up with more visual representations.

After:

- Promote a mathematical community of learners
 - On the bottom of the page that students have drawn their picture or visual representation on, give them time to do a quick/quiet write where they will summarize and explain their thinking.
 - To support EL learners, a sentence stem could read: I organized my information by _____.
 - After you've given them time to write down their thinking, have them pair up (whether you want them to do this randomly or strategically is up to you) and share their ideas and quick write with their partner.
- Listen actively without evaluation:
 - As students are comparing their strategies with a partner, be there to listen and ask questions that help them further explain their answer, but do not tell them if they are right or wrong.
 - Ask for a few volunteers to share with the whole class. Display their picture under the document camera and allow for them to explain their thinking. Have the other students ask questions and challenge their thinking.
- Make connections:
 - Ask:
 - What has been the same about the pictures that we've seen?
 - What has been different about the pictures that we've seen?

- What made a picture easy to understand?
 - What made a picture hard to understand?
- Summarize main ideas:
 - Say: Today you guys did some really hard work and accomplished a lot! Tomorrow we are going to start talking about picture graphs and bar graphs! These are helpful math tools that we use to make organizing data easier to do and easier to understand!

ASSESSMENT

- Observe:
 - You will be observing throughout the lesson, including when students are working independently, when they are sharing with a partner, and when you have volunteers share with the entire class.