Represent and Interpret Data – Bar Graphs

Subject: Math

Grade Level: 3rd

Common Core State Standard: CCSS.MATH.CONTENT.3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.

Goal: The students will develop an understanding of how to draw a bar graph to represent a data set and how to interpret the data.

Objective: Given a data set and graph paper, the student will draw a bar graph to represent the data and answer questions requiring interpretation of the data missing making no more than two errors. (Bloom’s Taxonomy Applying Level/DOK Level 2)

A. Introduction/Motivation

1. Welcome the students to class.
2. Show the students an M&M Bar Graph. (Attachment #1)
   - Ask the students if they know what this is? Elicit the response – bar graph.
   - Ask the students if they know what a bar graph is used for?
   - (Assess prior knowledge)
   - (Health) Ask the students if M&Ms are considered to be a healthy thing to eat?
   - Show the students a package of M&Ms and ask them if they like to eat M&Ms.
   - Have a discussion about snacks that are either healthy or unhealthy to eat.
3. Inform the students that today they will be learning how to draw a bar graph and interpret the data that is on the bar graph.
4. Tell the students that by the end of the lesson they will be able to draw a bar graph from a given set of data and answer questions about it.
5. Inform the students that it is important to know how to draw bar graphs because bar graphs are good tools to use when trying to communicate information visually, and they help us show how something changes over time or to compare items.

B. Study Learning

1. Inform the students that a bar graph is great to use because it helps communicate information visually. For this reason, graphs are often used in newspapers, magazines, and businesses around the world. Sometimes, complicated information is difficult to understand and needs as illustration. Other times, a graph helps impress people by getting your point across quickly and visually.
2. Show the students the poster on bar graphs. (Attachment #2)
   - Tell the students that a **bar graph** (also called bar chart) is a graphical display of data using bars of different heights, and it is used to show how something changes over time or to compare items.
   - Tell the students that a bar graph is useful for comparing facts. The bars provide a visual display for comparing quantities in different categories. Bar graphs help us to see relationships quickly. Each part of a bar graph has a purpose. The parts of a bar chart are listed below in the chart.
     
     | title       | The title tells us what the graph is about. |
     |-------------|--------------------------------------------|
     | labels      | The labels tell us what kinds of facts are listed. |
     | bars        | The bars show the facts.                   |
     | grid lines  | Grid lines are used to create the scale.   |
     | categories  | Each bar shows a quantity for a particular category. |

3. Explain to students that bar graphs have an x-axis (horizontal) and a y-axis (vertical).
   - Typically the x-axis has numbers for the time period or what is being measured, and the y-axis has numbers for the amount of information being measured.

   - Discuss the data and how it was displayed on the bar graphs.
   - Perform a “think aloud” to show students the process of looking at the data on the graphs and answering the questions.
   - Go through all three examples.
   - (Health) For example 1 – discuss if the after school activities are healthy or not. Discuss what type of after school activities are healthy. For example 2 – discuss fruits and how eating fruit is healthy. Discuss how many servings of fruit should be eaten each day. For example 3 – Discuss the amount of sugar found in each of the foods.

   - Allow volunteers to come to the board and take turns answering the questions on the interactive quiz (under Your Turn at the bottom of the webpage).
   - Discuss the correct answers.

6. Tell the students that one common way to collect data to display on a bar graph is to take a survey.
   - Collect data from the students by asking the following questions about favorite foods:
     - Whose favorite food is pizza?
     - Whose favorite food is macaroni and cheese?
➤ Whose favorite food is oranges?
➤ Whose favorite food is chicken?
➤ Whose favorite food is green beans?
➤ Whose favorite food is fish?

• Record the students’ responses on a chart on the board or Smart Board.
• Demonstrate how to draw the x-axis and y-axis on the board
• Explain how to record data on the graph.
• Fill in the graph with the students data about their favorite foods.
• Ask the students questions, such as, how many more students prefer pizza over oranges?
• (Health) Discuss the students favorite foods and decide which foods are healthy or unhealthy.
• Show the students the “Food Pyramid” and place each of the foods in the appropriate category. (Attachment #3)

Guided Practice
7. Divide the students into two teams and have them participate in a relay race that consists of a sack race, jumping rope, carrying an egg in a spoon, dribbling a basketball, and walking a beam. (bodily/kinesthetic – P.E. Integration)
• Survey the students to see which event they liked the best - when you return to the classroom.
• Record the students answers in a chart on the board or Smart Board.
• Divide the students into small groups of 3 or 4.
• Give each student a piece of graph paper and markers.
• Instruct the students to work together to create a bar graph to display the results of our relay race survey.
• Allow time for students to work and share their graphs.
• Ask students questions related to the graphed data.
• (Monitor students as they work and provide feedback as needed.)

Independent Practice
8. Pair the students up with a partner and allow them to use their IPads or to visit the computer center to create their own bar graphs at http://nces.ed.gov/nceskids/graphing/classic/bar.asp.
• Provide the students with data concerning ph rating for soap to use when they create their graphs. (Attachment #4)
• (If IPads and/or computers are not available, allow the students to draw their bar graph on the grid provided on the handout with the data.)
• Allow the students time to work and share their bar graphs.
• Ask the students questions related to the graphed data.
C. Culmination
1. Review the information about bar graphs on the poster. (Attachment #2)
2. Review Example 1 on after school activities and go over how to draw a bar graph and display the data accurately.
3. Give each student a copy of the “Fat in Fast Foods” handout. (Attachment #5)
   - Instruct the students to study the bar graph and look at how the data is represented and answer the questions about the graph.
   - Allow time for students to work.
   - Go over the bar graph and the correct answers to the questions.
4. Clarify any questions or misconceptions at this time.

D. Follow-Up
1. Tell the students to clear their desks except for a pencil and markers.
2. Give each student “Calories in Fast Food” set of data and piece of graph paper. (Health) (Attachment #6)
3. Instruct the students to use the provided data and draw a bar graph on the graph paper.
   - Instruct the students to also answer the questions located on the handout with the data.
4. Tell the students to color their graphs when they finish and then turn in their papers.

Materials and Resources:
1. Computer, projector and/or Smart Board
2. M&M Bar Graph (Attachment #1)
3. Poster on bar graphs (Attachment #2)
4. “The Food Pyramid” handout (Attachment #3)
5. Graph paper
6. Markers
7. “PH Rating for Soap” handout (Attachment #4)
8. “Fat in Fast Foods” handout (Attachment #5)
9. “Calories in Fast Food” assessment (Attachment #6)
10. Dry erase board and markers
11. Pencil and paper

Adaptations for Lower Grades:
- Provide easier data sets and information.
- Omit creating the graph on the computer.
- Rather than having students draw a bar graph, simply have the students interpret the data on the graph and answer easier questions.
Adaptations for Upper Grades:
- Provide more complex data sets and information.
- Have the students draw double bar graphs horizontally and vertically.
- Have the students create and administer their own surveys.