Situational Data

Summary

Activities involving yeast help students learn to construct graphs of data.

Main Core Tie

Mathematics Grade 6

Strand: STATISTICS AND PROBABILITY (6.SP) Standard 6.SP.4

Group Size

Pairs

Materials

The Data Song

- *The Data Song*

Data Dice

- *Data Dice*
- *Situational Data*

Graphing Yeast

Erlenmeyer flasks
Yeast
Sugar (Variety)
Warm water
Balloons
Masking tape

Background for Teachers

Graphs are found in so many aspects of everyday life that it is vital that students can read, analyze, and create them. Graphs are used in many subjects in school, as well. Social studies, math, science, and language arts rely on graphs to present information that would otherwise be difficult to understand or boring to read. Since graphs are so important in different subject areas, it is easy to integrate math in multiple subjects.

As yeast is combined with sugar and water, it produces carbon dioxide. This is what makes bread rise. Yeast is microscopic. One gram of yeast has about 25 billion cells.

There are variations on the scientific process. The following steps keep it simple for students and encourage discovery based upon previous results.

Step 1: Question
Step 2: Predict
Step 3: Plan (discuss)
Step 4: Observation (claim and evidence)
Step 5: What I learned
Step 6: Wonderings/questions

Intended Learning Outcomes

5. Connect mathematical ideas within mathematics, to other disciplines, and to everyday experiences.

Instructional Procedures

Invitation to LearnThe Data Song

"The Data Song" goes to the tune of *"We Will Rock You"* by Queen. This song was chosen because it requires students to create the rhythm. After singing it a couple of times, have students join in. The lyrics can lead to a great beginning discussion and is an informal way to ascertain student background knowledge about data and graphing.

Instructional Procedures

Data Dice

First, students need to have a pretty good knowledge of the different types of graphs (bar, line, line plot, scatter plot, circle, and stem-and-leaf plot) and their purposes. To accomplish this, have students create a simple semantic map in their math journals, such as the following:

	Points	Lines	Bar or X	Good for Comparing	Good for finding trends/tendencies
Bar Graph			X	X	
Double Bar			X	X	
Stacked Bar			X		
Line Plot			X	X	X
Circle Graph				X	
Scatter Plot	X				X
Stem-and-Leaf Plot				X	X
Line Graph	X	X			X
Double Line Graph	X	X		X	X

Your class may come up with additional categories.

Students will cut and paste their cubes. Pass out the Situations worksheet.

Students will work in pairs. One student will roll the newly made die and will graph the data given with whichever graph was rolled. While they are creating their graph, their partner will also create a graph with the same data, but they may choose whichever graph best suits the data.

The pair will switch off until they have completed the graphs for the data.

Instructional Procedures

Graphing Yeast

Explain to students the experiment that will be conducted. As a class, come up with a graph that will be used. A line graph would be ideal. Be sure to include labels and a title.

You may give each student (or pair of students) the choice of what type, and amount of sugar they will use (up to 10 teaspoons or about 40 grams). Make sure that at least one student uses the ideal amount of sugar. Students will put the sugar in their Erlenmeyer flask.

**Teacher info: The ideal amount of sugar is 5 teaspoons of sugar (about 20 grams)

Put about 75 mL of warm water in each student's flask. The water should be 95-105° F (35-40° C). Have students swoosh around sugar/water mixture until dissolved.

Give each student 1.25 teaspoons of yeast (5 grams), which is 12 of a packet. Students will put the yeast in a balloon. This is best accomplished by one student holding the balloon open while the other carefully pours the yeast in.

The student will put the balloon on around the top of the flask. They will then use masking tape to seal the flask, if desired.

Every minute, they will measure the height from their desk to the highest part of the balloon. Students will record their data on a chart and on their graphs.

Extensions

Curriculum Extensions/Adaptations/ Integration

A possible extension would be for students to create their own experiments that can be graphed.

Family Connections

Students will look for graphs in newspapers, magazines, books, or the Internet and bring examples to show the class.

Assessment Plan

Give students situations and data and have them graph the data. Their score is based on the appropriateness of the graph used, labels and title of the graph, and if the data was graphed correctly.

Bibliography

Research Basis

Klentschy, M. (2005). Science Notebook Essentials. *Science & Children*. 43(3) 24-27.

Notebooks and journals can be an effective tool to further scientific understanding. As students follow the six essential steps for journals, especially in their experiments, they will have a deeper understanding of the scientific process; they will be more motivated to continue investigating and learning.

McKinnon, D. H. & Others (1997). *Curriculum innovation involving subject integration, field-based learning environments and information technology: A longitudinal case study of student attitudes, motivation, and performance*. Paper presented at the Annual Meeting of the American Educational Research Association (Chicago, IL, March 24-28, 1997).

This was a longitudinal study conducted in New Zealand to determine the effectiveness of integrating subjects. Technology, mathematics, history, and language arts were integrated for 3 years. Academic achievement was higher than the control group in science, math, and English, and students enjoyed their experience more.

Authors

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