Making Conjectures and Planning Studies

6697

Introduction

This activity introduces students to the concept of collecting and analyzing data and using conjectures to formulate new questions.

Grades 6-8

NCTM Data Analysis and Probability Standards

- Develop and evaluate inferences and predictions that are based on data
- Use conjectures to formulate new questions and plan new studies to answer them

Files/Materials Needed

Distance_Data.act, Memory_Data.act

PART 1 ESTIMATING LENGTH

1

Provide each student with a piece of string of the same length (between 20 and 40 feet) and instruct him or her to use it to mark off a distance at home. It is important that each student marks off the same length. Tell students to ask as many people as possible to view the distance and estimate its length to the nearest foot. A time limit should be set for estimating the distance and people should not be allowed to walk the distance or attempt to measure it in any way.

2

a. When students return to class, ask them to enter each person's estimate in L1.
b. Have each student log into NavNet on their calculator.
c. Load the *Distance_Data.act* activity settings file into Activity Center.
d. Students should select **SEND** to submit their list to Activity Center.
e. Stop the activity and click **Configure** and select the **Existing activity lists** check box. By starting the activity again, each student will receive the entire class data set.
f. Stop the activity and have students exit NavNet.

3

a. Using the regular calculator functions, instruct students to graph a histogram of L1 using window settings that will show the minimum and maximum guess (Xmin = minimum guess; Xmax = maximum guess) as well as all values in between.
b. You can also create a histogram directly in Activity Center by clicking the **Frequency Plot** icon. You can adjust the **Style** as well as the axis values and the interval width.
c. Use **Screen Capture** to view student histograms. The histograms should approximate a normal distribution in which most responses are clustered somewhere around the mean guess. Questions that can be asked of the class include:
   - *What does the shape of the graph tells us about people's estimating skills?*
   - *How do people's guesses compare with the actual distance?*
   - *How might this graph look if significantly more people participated?*
   - *Can you think of another source of data that might have a similarly shaped graph?*

PART 2 THE MEMORY TEST

4

Send each student home with a list of random numbers from 0 to 9. Ask them to find four people to participate in a memory test. For each person, read the first 2 digits on the list and ask them to repeat them.

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Number of digits (L1)	First person # Correct	Second person # Correct	Third person # Correct	Fourth person # Correct	Average # Correct (L2)
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Record how many digits were correctly repeated in the table. Then, read the next 3 digits in the list, ask them to repeat them, and record the number correct in the table again. Repeat this process until you have read 12 digits in a row to them. Ask students to average each row of responses for the four people tested and enter the first and last columns of the table in L1 and L2, respectively.

5

a. When students return to class, have them log into NavNet again.

b. Load the *Memory_Data.act* activity settings file into Activity Center and start the activity.

c. Instruct students to select **SEND** to submit their list to Activity Center. A scatter plot of the combined class results will be displayed in Activity Center. The data should show that most people were able to remember a small number of digits, but eventually there was a limit to how many digits they could remember. Questions that can be asked of the class include:

- *Describe the shape of the graph. Explain what happens as the number of digits increases.*
- *Is the graph predictable? Are there any conclusions you can draw from this experiment?*
- *Do you think there is a limit to how many numbers a typical person can remember?*
- *Why do you think some people were able to remember digits better than others?*
- *How might you modify or extend this experiment?*

Extension

6

The results of parts I and II in this activity are based on a fairly small sample size. This activity could be extended to a large portion of the student body, if not the entire school. Results could be tabulated and graphically displayed in the same manner in which they were done in this activity. It is likely that the results will appear to follow a more predictable pattern. This provides a good opportunity to discuss the idea of large sample sizes and the tendency for experimental data to resemble theoretical calculations.