

# **On Your Own Time!**

## **An Inquiry-Based Lesson Plan**

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#### **Engage**

RING!!! The last bell of the day has rung. You and your classmates will soon head in different directions. Some of your classmates are on the same team or in the same club as you. Some of them are not. Do you know how much time your classmates spend on their favorite activities? You could guess the answers to the last question, but a more accurate method of finding the answers would be to collect real data.

For this unit project, you will survey 25 of your friends and classmates. You can choose the survey subject, such as how much time your classmates spend on sports. You will organize and graph the data. Then you will present your findings to your class.

#### **Explore**

##### Activity 1: Collecting

Choose a survey topic. Identify seven or eight responses for students to choose. Decide how to organize the responses of your 25 friends or classmates. Collect and record the data in a table or chart.

##### Activity 2: Analyzing

Order the responses of your classmates by popularity. Find the mean, median, and mode of the data using Excel. Determine which measure is more typical of the responses. Explain why.

Change your raw data into fractions and percents. Which representation is easiest to use in bar graphs? Pie Graphs? Line Graphs? Why do you think so?

##### Activity 3: Displaying

Display the data from your survey in three different ways.

- Consider different graphs as well as some type of table or chart.
- Which method do you think expresses the information best? Why?
- Are there any ways you shouldn't display the data? Why or Why not?

#### **Explain**

As a group, discuss the answers to the above questions. Students should then explain why statistics are necessary in our everyday life. The discussion should include an explanation of when statistics are used and how statistics are important.

### **Evaluate:**

Make a presentation to the class that displays your survey results neatly and accurately. Explain which of the three methods of displaying the data you feel is best and why you feel that way. Make sure your display includes your chosen topic, the choices, and the data you collected, as well as the mean, median, and mode of your data. Be sure to include your raw data as fractions and percents.

### **Reflect and Revise**

Review your project with a friend or someone at home. Are your graphs complete and accurate? Would a different type of graph be more appropriate? Are any of your graphs misleading? How might the information you collected and graphed be used? If necessary, make changes to improve your project.

### **Extending the Project**

One common activity many students enjoy is listening to music. Conduct a survey to find what type of music is most popular. Display your findings in a graph. Then research the origin and elements of the most popular type of music found in your survey. Include the research with your display.

### **Project Checklist**

Have you done all of the following?

- Organized your chosen topic, the choices, and the data you collected.
- Found the mean, median, and mode of your data using Excel.
- Changed your raw data to fractions and percents using Excel
- Used at least TWO appropriate graphs created using Excel
- Used an appropriate tool to display all of your data (Poster board, website, etc.)

### **Project Rubric**

- 20 You correctly used three different display methods to show the data you collected. Your displays are attractive and self-explanatory. You identified both the best display method and the best averaging method. You have reasons to support your choices. All data calculations are correct
- 15 You created three displays of your data and calculated the mean, median, and mode. Either your displays or your explanations are not as complete or neat as they could be. Most data calculations are correct.

10 Your survey data is complete, but you only completed two displays of the data. Either your displays are not self-explanatory, or you neglected to compare display methods or averaging techniques. Calculations were not formatted in Excel

0 Major elements of the project are incomplete or missing.

	<b>Very little or no information complete.</b>	<b>Some or half the information complete.</b>	<b>Most information completed.</b>	<b>All information completed</b>
	<b>5 points</b>	<b>10 points</b>	<b>15 points</b>	<b>20 points</b>
<b>Completed Math Survey Table</b>				
<b>Completed Spreadsheet</b>				
<b>Completed Charts/Graphs</b>				
<b>Completed Math Survey Questions</b>				
<b>Open-Class Discussion Participation.</b>				
<b>Total Points from Project</b>				

**Self Evaluation:** Evaluate your work based on the rubric

**Helpful websites:**

[http://www.internet4classrooms.com/excel\\_survey.htm](http://www.internet4classrooms.com/excel_survey.htm)

[http://www.internet4classrooms.com/excel\\_picto\\_chart.htm](http://www.internet4classrooms.com/excel_picto_chart.htm)

[http://www.cvgs.k12.va.us/DIGSTATS/main/Guides/g\\_3mxcel.html](http://www.cvgs.k12.va.us/DIGSTATS/main/Guides/g_3mxcel.html)

[http://spreadsheets.about.com/od/excelformatting/ss/number\\_format\\_3.htm](http://spreadsheets.about.com/od/excelformatting/ss/number_format_3.htm)

## **Reflection Using Excel in Education:**

This student project was adapted from our textbook, but I added using a spreadsheet to aid in the data collection by the students and for creating graphs and tables. This project addresses the concerns of calculating statistical data (mean, median and mode), changing data to fractions and percents, and using a spreadsheet to create different types of graphs. These are important concerns because students are faced with these Big Ideas across grade levels and are expected to perform these operations on standardized tests. In the past, students spent much of their time focusing on completing the calculations and rarely focused on the analytical values.

Using a spreadsheet allows students to see the reasoning behind the calculations and why we use statistical representations to support real world problem solving. Instead of worrying about making a calculation error, students can focus on analyzing the data and synthesizing what the data is actually conveying. Using Excel, students can also manipulate data and see almost instantly how those manipulations affect the graphs they have created. Students can stretch the graphs, change x and y values to see why some graphs are misleading, and customize data points to create different types of graphs, including 3D graphs that display graphs in a whole new way. There are given a wide variety of choices to design their tables and graphs and can choose color, font styles, chart titles, customized legends, and so much more than they could do with simple graph paper and colored pencils. Utilizing this tool gives students a deeper understanding of the calculations within a given set of data and supports their learning by giving them the opportunity to maneuver data points in real time to view how the graphs are rearranged to account for the changes. This is important because it teaches students how to interpret graphs, along with the ability to create them.

I would introduce this project by first modeling how to conduct a survey. I would ask students to list specific sports that they may play after school. Using my computer and overhead projector, as students listed the activity, I would type it into column A in Excel. By a show of hands, I would place the number of students who do that activity in column B. I would explain to students that using this simple data table, I can find the mean, median and mode, and also change my raw data to fractions or percents. I would show students how to complete these calculations. I would then model how to create a graph and how to manipulate it by changing the variables, the axes and stretching and shrinking it. An example of what our activity may look like is shown at the left. The students will then complete their own surveys and create data tables, appropriate graphs, calculate the mean, median and mode, and change their data into fractions and percents using Excel.

I used Excel to create a rubric which I converted to a table in word using the paste options. The rubric I created can be found both above in the project description or below the graphs as an Excel object.

While experimenting with Excel and creating (as well as manipulating) graphs I found that this tool can not only optimize the visual aspects of collecting and organizing data, but it also enhances the conceptualization of the problem the students are solving. Indeed, calculations are certainly important to understand and students should be able to perform them without the use of a calculator or spreadsheet function, however, given the opportunity to utilize these resources to understand the underlying meaning behind the calculations creates a powerful mechanism for student engagement and understanding. Students then have the answer to the ever-so-popular question: Why do I have to learn this and when will I ever use it? Fascinating!