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ABSTRACT

Three lesson plans to adapt mathematics education for middle school students, including deaf students, are presented. The first lesson, "How Do I Identify Myself," teaches students to participate in a survey, conduct a survey, weigh results, convert results to ratios, convert ratios to percentages, construct a circle graph, and write a paragraph interpreting the graph. In the second lesson, "M & M Graphs," students learn: to predict which color of M & M occurs most frequently; to collect data from several samples; to record data on an organizer or on a computer spreadsheet; to use a calculator or computer to find the total and average for the data; to create several types of graphs to display results; to interpret the graphs; to write a business letter to confirm findings; and to state the effect of sample size on their findings. In the third lesson, "Keeping Track of Progress on Functional Skills," students learn how to: chart individual objectives met on functional mathematics tests and identify areas of need; create stem and leaf graphs for class results; create box and whisker plots for class results; plot scores on line graphs; and keep a journal of interpretations. Each lesson plan includes modifications for less able students. (CR)

# DEAF CHILDREN: THREE IDEAS FOR ADAPTING CURRENT TRENDS IN MATHEMATICS EDUCATION

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CEC Convention, April 1996



## Lesson 1: How Do I Identify Myself?

Student Learning Objectives: Students will -

1) participate in a survey
2) conduct a survey of other students
3) weigh results of the survey according to importance
4) convert results to ratios
5) convert ratios to percentages
6) construct a circle graphs to display results
7) write a descriptive paragraph interpreting the graph

Description of Activities:

INTRODUCTION:

The teacher begins by writing some nouns that describe her on the overhead projector. She explains that today the class will look at how students in the room identify themselves. As a class, the teacher elicits possible nouns that students may use to describe themselves. All brainstormed ideas are listed on the overhead projector. Nouns used may include:

| | | |
|---|---|---|
| son/daughter | brother/sister | grandchild |
| student | cheerleader | football player |
| cook | basketball player | girl/boyfriend |
| artist | reader | Deaf person |
| African American | Hispanic American | etc. |

Students are asked to restate any non-nouns as nouns.

SELF-IDENTIFICATION:

Students are then asked to write ten nouns that describe themselves on a piece of paper. Of those nouns, the one that the student feels is most important to his/her identity is given the value of 5 points. The next most important noun gets 4 points, and so on until students have assigned values to the five most important nouns. A student's listing may have been:

| | |
|---|---|
| Daughter | 5 pts. |
| Student | 4 pts. |
| Cheerleader | 3 pts. |
| Sister | 2 pts. |
| Basketball Player | 1 pt. |



CLASS IDENTIFICATION:

After individually assigning point values, the class works as a large group to categorize all nouns used by the class. These categories may include nouns that identify the

person according to:

| | | |
|---|---|---|
| family | school | athletics |
| friendship | race | arts |
| deafness | sex | interests/hobbies |
| miscellaneous | | |

These categories are written on the chalkboard or on individual posters spread throughout the room.

Students then get up and go write the point value they assigned to each category on its poster. When everyone is finished, each student uses a calculator to tabulate the total number of points that the class assigned to each category.

WRITING RATIOS AND PERCENTS:

The teacher models how to convert each point value to a ratio (number of points given to a category over the total number of points assigned for all categories by the class). Since each student assigns a total of 15 points (5,4,3,2,1), the bottom number of the ratio will be 15 times the number of students in the class. For example, if one category receives 35 points the ratio will be 35/number of students times 15. Students work in pairs to write ratios for each of the categories.

Next the teacher models how to convert the ratios to percentages by dividing on a calculator. Students work with their partners to find percentages for each category.

CONSTRUCTING A GRAPHIC REPRESENTATION OF RESULTS:

The teacher then models how to construct a circle graph based on the percentages by multiplying each percent times 360 degrees to find out how large each section of the graph must be. Students work with their partners to calculate, construct, and label each portion of the circle graph.

INTERPRETING THE GRAPH:

A class discussion should be held concerning what the graphs show about how students in their class identify themselves. English is involved when students write a descriptive paragraph about the survey as based on the circle graph data. Students use a writing process approach, starting by using a graphic organizer like the one included, to plan the paragraph. Next they write a rough draft, use an editing checklist to revise their work, and re-write their final draft.

That night's homework assignment is that each student surveys 5 students outside of this class to discover how others identify themselves.

GROUP PRACTICE:

The following day, students form groups of 4-5 students to compile data from the homework assignment. Each student is given the attached specification sheet for grading and an organizer. Students work with their groups to combine data and repeat yesterday's activity based on the new information. Grades are given as specified on the student group specification sheet.

MODIFICATIONS:

More able students may want to create and conduct their own surveys independently. Survey topics may include favorite sports, favorite sports teams, hobbies, etc. Students may collect and categorize information, and graph and interpret results. Interpretations, written in English, can be displayed with the graph. After students have completed this project, the teacher can set up a "gallery walk" where all projects are displayed and students have an opportunity to view and discuss them.

For younger or less able students, the teacher may opt to simply do the group graph with the class and use the rest of the time to focus on the descriptive paragraph.

**LESSON 2: M&M GRAPHS**

There are many resources for variations of this lesson. Two are the AIMS integrated learning activities for math and science and a computer program entitled LabQuest - Labs for Learning.

Student Learning Objectives: Students will -

1) predict which color of M&M occurs most frequently
2) collect data from several samples of M&Ms
3) record data on an organizer or on a computer spreadsheet
4) use a calculator or the computer to find the total and average for their data
5) create several types of graphs to display the results of their investigation
6) interpret the graphs in written English
7) write a business letter to confirm their findings
8) state the effect of sample size on their findings

Description of Learning Activities:

INTRODUCTION:

The teacher holds up a small bag of M&Ms and asks the class to predict which color will appear most frequently if they were to open the bag and count each color. Students are asked to write their predictions on a sheet of paper.

BAR GRAPHS:

Each student is given a small bag of M&Ms, asked to open it, and count each color to confirm his/her prediction. Students are then asked to use the M&Ms themselves to make an edible. Students must record the number of each color on the bar graph before eating M&Ms!

SMALL GROUP ACTIVITY - TOTAL AND AVERAGES:

At this point, students may be introduced to a computer program with which they may record results and generate statistics and graphs. An excellent program is LabQuest's Labs for Learning program.

If you are working without benefit of a computer program, students will work in groups of 4-6, using a calculator to complete the chart provided. Instruction on totalling or finding averages may be required at this point, if students have not practiced these skill previously.

GRAPHIC REPRESENTATIONS AND INTERPRETATION/VERIFICATION:

Activities for More Advanced Students:

Graphs - More advanced students may either generate a variety of graphs on the computer or receive specific instruction on how to make a bar graph, a line graph, and a circle graph to display the group's averages. They then work in their groups to create these graphs.

Interpretation - When the graphs are finished, students individually read and respond in written English to the questions for each type of graph.

Verification - Students receive large group instruction in the form of a business letter. Students independently write business letters, in English, to the M&M Mars Company requesting information on the percentages of each color M&M produced by the company. Planning, first draft writing, editing (perhaps with a COPS checklist) and final draft writing or word processing may all be part of this activity. Emphasis is on the use of English sentence structure when editing. (Teachers may want to write to M&M Mars ahead of time. The company has put together a wonderful packet of fun and useful information, including the actual percentages for the colors.)

Activities for More Limited Students:

Graphing - Students who are functioning on a lower level may simply want to create a class pictograph/bar graph by coloring and cutting out small circles to match their own individual sample and pasting them on a class graph. The class graph may be made out of a strip of bulletin board paper put up in a hallway, with colors listed along the Y axis so that they will make horizontal bars.

Interpretation - Even a simple fill-in the blanks paragraph may be used to have students express their interpretations of the class graph. Students may merely have to fill in the appropriate color names and complete a sentence about their favorite part of the activity.

Verification - Instead of individual letters, the teacher may opt to do a class letter to M&M. Students may contribute ideas as to what will be included, which will be written on an organizer on the overhead projector or chalkboard. Students may form a rough draft as a group. They may then either come up with a final draft as a group or they may do individual editing (such as SpellCheck) and typing of the final draft on the computer.

SAMPLE SIZE:

The teacher may lead a class discussion on the effect that sample size may have on investigation results. This discussion may be more effective when the response from M&M

Mars arrives and students compare their results to the true percentages manufactured. Students should understand that the bigger the sample size, the truer the results will be. They may go back and look at the contents of one bag, compare the percentages to the actual figures, and explain in ASL why there is a difference.

## LESSON 3: KEEPING TRACK OF PROGRESS ON FUNCTIONAL SKILLS

LEARNING OBJECTIVES: Students will -

1) chart individual objectives met on practice functional mathematics tests and identify areas of need
2) create stem and leaf graphs for class results on practice functional tests
3) create box nd whisker plots for class results on practice functional tests
4) plot scores on individual line graphs
5) keep a journal of interpretations of both class and individual graphs and goals for the next administration of the practice test

INTRODUCTION:

Many states require that students pass a functional math test in order to earn a diploma. By charting individual and class results, students can be motivated to improve scores and to learn how to zero in on problem areas.

Students are given a practice functional test previous to this activity. After tests are checked, the teacher tells the class that they are going to take some time to analyze the results of this test to determine areas of weakness and to make a plan to improve in these areas.

SELF-ANALYSIS AND RECORDING:

Students get back their tests, along with a checklist of skills. (Your school district may have something comparable. If not, this kind of chart can be custom designed to fit the skills measured by your state's functional mathematics test or other tests. See sample included.) The teacher explains that students are to color in the boxes on the chart that correspond with items they answered correctly on the test. After students are given ample time to do so, the class can discuss some of the areas where many students had incorrect answers.

CLASS STEM AND LEAF GRAPHS/BOX AND WHISKER PLOTS:

Stem and Leaf: The teacher draws the stem for a stem and leaf graph on the chalkboard. The stem extends from 0 to 100 to take into account all possible test scores. The teacher hands out score cards at random, each of which contains a student's score on the practice functional test. This is done to protect the anonymity of each student's score. She explains to the class that each of them has received the score of someone in the class and demonstrates how to place the score on the stem and leaf graph. Each

student then comes up one at a time and places the score from his/her card on the appropriate spot on the graph. The teacher then explains how to find the mode, median, and range for the graph.

Box and Whisker Plots: Next she demonstrates how to create a box and whisker plot for the same set of information. She explains how to order the data and locate the median score, along with the upper and lower quartile points.

Discussion and Class Goals: The class then discusses where they are as a class in terms of passing the functional test. They set a goal as a class to move the median score a specified interval closer to the passing mark. They may also want to set a goal that the range close in so that the lower scores move closer to the passing point.

JOURNAL WRITING AND INDIVIDUAL GOAL SETTING:

Students create individual line graphs of their scores on practice functional tests in a mathematics journal area of their notebooks. The graphs are set up so that the X-axis shows the date of the practice tests and the Y-axis shows scores from 0% to 100%. Each time students take a practice test, they plot their scores in the appropriate location. They then consider the information on the checklist of skills chart. Each student records the goal he/she has for the next administration of the test, using English sentence structure and citing the areas in which she needs review or extra help in order to be able to answer those types of questions next time. Students also write two or three English sentences interpreting the class graphs and discussing whether or not the class met its goal.

ONGOING MONITORING:

After each administration of a practice test, this process may be repeated. Students should be expected to make class plots and graphs with little assistance after the initial demonstration. The class can then check modes, medians, ranges, and quartile points. Discussion as to whether previously set goals were met and what new class goals should ensue in sign language.

Individual English journal entries are kept so that each student can go back each time and evaluate whether or not she has met her goal. New individual goals are recorded after each administration and the new score is added to the line graph so that students can see the trends in their scores.

MODIFICATIONS:

Younger or less able students may simply stick to the self-analysis and individual line graphs for charting progress. The extra time can be devoted to journal writing about individual goal setting and comparing current scores with previous scores, as well as identifying gaps in knowledge.

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