Facts About Numbers

Unit Summary

This Unit provides students with meaningful learning experiences for them to be to appreciate the importance of Statistics in making decisions.

Working in groups, students act as members of a marketing research division of a shampoo company. Their task is to identify and propose in which nighttime television series program they should schedule the commercial of their product. To accomplish this task, each group conducts a simple survey on the television series preference of people in their neighborhood. Knowing the most preferred or the most watched nighttime television series will help each group decide where to schedule the commercial.

In the process of doing this, students learn to develop a simple survey questionnaire, use a particular sampling technique, conduct a survey, organize and process their data using spreadsheet, describe their data using mean, median and mode, and present their proposal in class, supported by the results of their survey.

After the presentations of the proposal of each group, the teacher then discusses further the results of the survey applying some measures of variability that will help describe more accurately the data.

At a Glance

Grade Level: 10 (4th year high school)
Subject: Mathematics
Time Needed: 11 class meetings (one hour per meeting)

Things You Need

Standards
Resources

Curriculum-Framing Questions

- **Essential Question**
  Who decides for us?
- **Unit Questions**
  What does Statistics tell us?
  How does Statistics help us decide?

- **Content Questions**
  How is sampling done?
  What are the different sampling techniques used?
  How are data organized and presented?
  When do we use mean, median, and mode?
  How do measures of variability help us describe our data?

Instructional Procedures

A month before the Unit

- Check if the class(es) is/are knowledgeable already in using a spreadsheet and a presentation software.
  - If not yet, request the computer teacher (if your class(es) have a computer subject) to teach your students how to use the above mentioned applications or teach them as they do their project.
  - If class(es) does not/do not have a computer subject, teach them as they do their project.

- Prepare the presentation on the overview of the Unit and the project.

- Develop activities on:
  - variables and data types
  - mean, median, and mode
  - range and standard deviation

- Run through each activity for proper sequencing and to check if activities are designed and planned well.

- Coordinate with the person in-charge of the schedule for the use of the computer laboratory for your class.

- Send a letter to the parents informing them of the project.

- Prepare also a letter for students' barangays, requesting for permission for the students to conduct the survey. Approved copy of this letter can be shown to the respondents as your students do their interview.

- Plan how students will be grouped for the project. Group students such that different groups have different respondents. This can be done by grouping students coming from the same barangay or who are from neighbouring barangays.

Class Meetings 1 to 2

Venue: Classroom with teacher computer and multimedia projector or in the computer lab

- Present an overview (PPT 93.5KB) of the unit – what the unit will cover, what activities students will do in the course of the unit, and the outputs students need to come up with in doing the activities.

- Start the lesson with a motivational activity – for example, show students some articles with data in graphs and tables then ask them how these graphs and tables help describe the data. This should be a session where the teacher is more of a facilitator asking students a series of questions leading them to realize the importance of statistics in giving meaning to a set of data.

- Briefly discuss the meaning, history, and elements of statistics.

- After which, introduce students to the types of variables and data. This is important in deciding what measure of central tendency to use in processing their data.

- Discuss with students the basic sampling techniques (random, stratified, systematic, and cluster). Start by presenting examples that make use of the different sampling techniques. Have an activity with students where different scenarios are presented and students identify which sampling technique is best to use and they also explain their choice of sampling technique.

- Present the groupings and the guidelines (PPT 61KB) for their group presentation, including the purpose of conducting the survey and what they should include in their proposal. At this time, present also the evaluation tools (DOC 38.5KB) to the students. This will guide the students how to create/develop their outputs such that it will meet the criteria stipulated in the evaluation tools. The rest of the time will be spent on planning for the project. Distribute a guide (DOC 88KB) on how students should conduct the survey.

Class Meeting 3
Venue: Classroom or in the computer lab

- This meeting will be devoted to further planning, like each group designing their simple questionnaire for the survey.

- Monitor progress of the plan of each group and check if each group is doing the right thing especially in sampling and in making their simple questionnaire.

- At the end of this meeting, each group should submit a copy of their timetable of activities and their plan. Plan should include description of the sampling technique used and copy of their questionnaire. If the class will work without a computer, plans need not be encoded using a word processing software.

- After this meeting, each group can start conducting the survey.

Class Meetings 4 to 7
Venue: Computer lab and field

- In this meeting, students do a series of activities on the following:
    - how data are organized focusing on constructing a frequency distribution table for a set of data

- computing for the mean, median and mode

The activity will also allow students to do simple investigations such as:

- *What will happen to the mean, median, and mode if there are extreme values (or outliers)?*
- *What if the datum is increased by 3? Multiplied by 3? What happens to the mean, median, and mode?*

- Process the results of the activity. As students process their data, they also develop a coding scheme (DOC 31.5KB) for this which is also one requirement of the project as stipulated in the guidelines.

- Wrap up the session with a discussion on what are measures of central tendency and how they help us summarize a set of data.

- This time can also be devoted to demonstrating to students how to organize and graph data in a spreadsheet, how to get the mean, median, and mode using a spreadsheet, and in creating a simple presentation. This will be done especially if students have no knowledge on spreadsheet and presentation tools yet.

- Part of the time can be spent also on data collection.

- If some groups are done with the survey, they can start consolidating their data. Ensure that students have access to the computer laboratory during these meetings.

- Each group consolidates the data that each member collected then summarizes them in a table using spreadsheet. The worksheet (XLS 41KB) they will create using spreadsheet should contain the frequency distribution tables for their set of data and other results of their processed data.

- Part of the time will be spent also in developing the presentation of each group's proposal.

Class Meetings 8 to 9
Venue: Computer lab

- Presentation of each group. Proposal (PPT 286KB) must show their group's proposed time slot for their commercial supported by
  - findings of their survey (with graphs and tables)
  - how they conducted the survey
  - the sampling used and why, and
  - the questionnaire used.

  During the presentation, students can also present findings on the demographics of respondents which helped them also with their decision on the time slot, like most of the respondents who watched during this time are mothers who are the most likely to buy the shampoo, etc.

- Have an open forum after all the presentations.

- Recap by discussing commonalities of the findings of the groups, the proposed time slots and the rationale for such time slot.

- Each group submits a copy of their presentations.

Class Meetings 10 to 11
Venue: Computer lab

- Present to students a more accurate way of describing a set of data, that is, using the measures of variation. If possible, use data gathered by the students from their survey.

- Let students do an activity where they give the characteristics of their set of data using the measures of variation such as range and standard deviation. Select two to three groups to present their outputs. Collect the rest of the outputs of each student.

- As a way of wrapping up the unit, ask students the question:
    - *What does statistics tell us?*

  Follow it up with the question:
    - *How does statistics help us decide?*

  Let students reflect on the question and write their reflection on a piece of paper:
    - *Who decides for us?*

  Collect all reflections and have time to discuss answers to the last question.

  Ensure that the class will have enough time to process answers to three questions above.

- Summarize key points in the unit.

After the Unit

- Thank the computer laboratory person in charge and/or the computer teacher especially if the class(es) learned to use spreadsheet and a presentation software because of their help.

- Rate each project.

- Return any equipment used.

- Revise the unit plan based on implementation experience.

Prerequisite Skills

It would be better if students have knowledge in using a spreadsheet and a presentation software.

In addition, prior knowledge in:

- setting up and interpreting tables and graphs,
- constructing and interpreting graphs, and
- computing averages will help in introducing new Statistics concepts and skills in Statistics which they will learn from this Unit.

Differentiated Instruction

Resource Student

- Resource students can be given more homework activities in solving problems where they compute for the mean, median, mode, range and standard deviation. The teacher can also provide them with additional self-paced learning materials they can refer to as they study at home about measures of central tendency and measures of variation.

Gifted Student

- Gifted students can be assigned to learn about history and elements of statistics, types of variables and data, sampling techniques, measures of central tendency, and measures of variation by doing online treasure hunt activities.

Student Assessment

1. The students' outputs will be evaluated using the following rubrics:
    - Proposal Rubric (DOC 38.5KB) - will be used to assess the group's proposal in electronic presentation format and
    - Worksheet (DOC 38.5KB) - will be used to assess the group's spreadsheet file that contains their processed data.

2. Students' answers to the essential and unit questions in the oral recitation during the 10th meeting will also form part of the assessment. Students's reflections on the last question "*Who decides for us?*" will be submitted as a part of the reflection journal of students.

3. The results of the activities on mean, median, and mode, and measures of variability will also serve as bases for assessment.

Key Word Search

- Frequency distribution
- Mean
- Median
- Mode
- Measures of central tendency
- Measures of variation
- Random sampling
- Range
- Stratified random sampling
- Sampling techniques
- Standard deviation
- Statistics
- Survey

Credits

The first version of this Unit Plan was developed by Monalisa Sasing of UP NISMED as part of the Pedagogical Support System for 2005 MTs. It was implemented by Mr. Cesar Camayra, a 2005 MT of San Juan National High School. After classroom implementation and together with the reviewer from UP NISMED, the plan was revised. This is the enhanced version of Ms. Sasing's Unit Plan.

Note: The hyperlinked support documents are not part of the PDF. They can be downloaded and printed individually.

Designing Effective Projects: Facts About Numbers

Content Standards and Objectives

Targeted Philippine Basic Education Curriculum Competencies

This unit covers the following BEC learning competencies in Statistics for the topic:

Statistics

1. Define statistics and statistical terms such as sample and population; give the history and importance of the study of statistics.

2. Collect statistical data and organize in a table.
   2.1 state and explain the different sampling techniques

3. Analyze, interpret accurately and draw conclusions from graphic and tabular presentations of statistical data.

4. Read and understand tables and graphs containing statistical data.
   4.1 construct frequency distribution tables.

5. Find the mean, median and mode of given data: grouped and ungrouped data
   5.1 use the rules of summation to find sums
   5.2 find the arithmetic mean: ungrouped and grouped data
   5.3 find the median: ungrouped and grouped data
   5.4 find the mode: ungrouped and grouped data

6. Calculate the different measures of variability relative to a given set of data, grouped and ungrouped
   a. range
   b. standard deviation

   6.1 give the characteristics of a set of data using the measures of variability.

Student Objectives/Learning Outcomes

At the end of the unit the students should be able to:

1. explain the meaning of statistics and some statistical terms such as sample and population
2. relate the history of the study of statistics
3. classify variables as discrete and continuous
4. classify data as nominal, ordinal, interval, or ratio
5. state and explain the different sampling techniques (random, stratified, systematic, and cluster)
6. use a sampling technique before conducting a survey
7. gather statistical data and construct a frequency distribution table for the said data
8. compute for the mean, median and mode of gathered data
9. process and present statistical data in tables and graphs using spreadsheet
10. analyze, interpret and draw conclusions from the processed data
11. read and understand tables and graphs containing statistical data
12. describe a set of data using measures of variability (range and standard deviation)
13. use a multimedia presentation
14. appreciate the importance of statistics and
15. develop team work

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Resources

Materials and Resources

Printed Materials

- Bluman, Allan G. (1998). Elementary Statistics: A Step by Step Approach. Massachusetts: The McGraw Hill Companies, Inc.
- Weiss, Neil A. (1995). Introductory Statistics. 4th Ed. Massachusetts: Addison-Wesley Publishing Company, Inc.

Supplies

- Bond paper
- Ink
- Cartridge or toner for printing
- CDs or floppy disks

Technology – Hardware

- Computer(s)
- Internet Connection
- Printer
- Projection System

Technology – Software

- Database/Spreadsheet
- Multimedia
- Word Processing
- Web Browser