SENIOR HIGH SCHOOL

Department of Education
National Capital Region
SCHOOLS DIVISION OFFICE
MARIKINA CITY

Practical Research 2

Second Quarter-Module 6
Data Analysis Using Statistics and Hypothesis Testing

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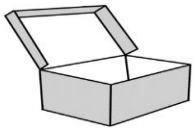


What I Need to Know

Hello Grade 12 researchers! In this sixth module for the 2nd grading period, you will learn how to:

Plan data analysis using statistics and hypothesis testing (CS_RS12-IIa-c-6)

You can say that you have understood the lesson in this module if you can already:

1. define the terms used in data analysis;
2. differentiate the methods of hypothesis testing; and
3. create a data analysis plan.

What I Know

Answer the following questions. Select your answers from the options provided. Encircle the letter of your choice.

1. What type of inferential statistics is used to determine if there is a significant difference between the means of two groups?
   A. Mean
   B. Median
   C. t-test
   D. z-test

2. Which term refers to the difference of the highest value and the lowest value in the data set?
   A. Mean
   B. Median
   C. Mode
   D. Range

3. What statistical term measures how widely values are dispersed from the average?
   A. Average
   B. Chi-square
   C. Standard deviation
   D. z-test

4. Which of the following does NOT belong to the group of parametric tests?
   A. Analysis of variance
   B. ANOVA
   C. Pearson's r
   D. Spearman's rho

5. Which of the following refers to the assumption that can be tested?
   A. Descriptive statistics
   B. Hypothesis
   C. Research problem
   D. Statistical testing

Lesson 1 Data Analysis Tools

What's In

Before we start with the lesson, let us first review the Four Levels of Measurement (nominal, ordinal, interval, and ratio). Below are examples of different variables, identify its level of measurement by writing your answer on the space provided before each number.

_____1. Gender

___ Male

___ Female

_____2. What is your weight in pounds?

___ Less than 70

___ 70 – 120

___ 121 – 150

___ More than 150

_____3. How satisfied are you with our product?

___ Very Satisfied

___ Satisfied

___ Dissatisfied

___ Very dissatisfied

_____4. Rate the healthcare in the Philippines from 0-5

___ 5-Best health care

___ 4

___ 3

___ 2

___ 1

___ 0-Worst health care

What's New

A. Before Reading Activity

You are tasked by your teacher to check how many are present in your section. How will you know the number of students present?

_____

_____

B. During Reading Activity

Put a check (✔) mark for discrete (countable) data and cross (✗) mark for continuous (measurable) data before each number.

1. Shoe size
2. Number of teachers in faculty room
3. The weight of new born puppies
4. The temperature of a room
5. Speed of the train
6. Number of female students in a class

C. After Reading Activity

Why is knowing the different types of data important in quantitative research? Explain your answer.

_____

_____

_____

What is It

Plan Data Analysis in Quantitative Research

In this module, you will learn how to plan what different data analysis tools will be used in your quantitative research. You must remember that quantitative research requires statistical analysis of data which involves series of examinations, classifications, and mathematical calculations. Therefore, a thorough and advance planning is needed for this integral part of your study. A review of your Statistics and Probability subject is highly recommended.

Statistical Methodologies under Applied Statistics

1. **Descriptive Statistics**
   Used to treat the collected quantitative data to show the patterns and variability that describe the population or sample. In performing Descriptive statistics, the data must be organized by creating a frequency distribution table. Descriptive statistics requires calculation to show the computed summary of:

   A. Measures of central tendency - the way of representing a collection of observations by single value, and to facilitate the comparison of two or more data sets.
   - **Mean** – the sum of all observed values divided by the number of observations (average). Frequently used with continuous data than discrete data.

- **Median** – the measure occupying the positional midpoint of the array of distribution when arranged in order of magnitude. This statistical tool cannot be identified for nominal data.
- **Mode** – is the observed value that appears the greatest number of times in a table of distribution. However, in some cases absence of mode in continuous data may happen, the use of median or mean is recommended.

B. Measures of dispersion – a descriptive summary measure that helps you characterize the data set in terms of how varied the observations are from each other.

- **Range** – measure the difference between the highest and the lowest observations in a data set.
- **Variance** – the average of the squared differences from the mean
- **Standard Deviation** – the square root of variance that describes the normal curve showing spread out of numbers.

2. Inferential Statistics

Used to test the inference to reach the conclusion, from the data collected to more general conditions that answers your hypotheses. Below are some statistical tools that you can use in testing your research hypothesis:

A. Parametric Inferential – used when the dependent variable is continuous, and when the data is normally distributed and is on an interval or ratio scale. It assesses group means.

- **z – test** – used when the population is large and the population variance is known.
- **t – test** – used when the population variance is unknown, and sample size is small (n<30).
- **Pearson's r** – used to measure the strength or magnitude of the relationship and direction of the relationship of two continuous variables and of the association between interval and ordinal variables**.**
- **Analysis of Variance (ANOVA)** – used to test the significant difference between the means of more than two variables**.**
- **Regression Analysis** – used to model the strength of dependency of dependent variable to one or more independent variables.

B. Non-parametric inferential – used to test when the dependent variable's level of measurement is nominal or ordinal. It assesses the group medians.

- **Spearman's rho** – used to test the dependence of the dependent variable on the independent variable**.** It measures the strength and direction of association between two ranked variables.
- **Chi-square** – used to evaluate the relationships between categorical (nominal) variables.

Will errors in doing data analysis be eliminated by planning the right statistical tools to be used in a research? Explain your answer.

_____

_____

_____

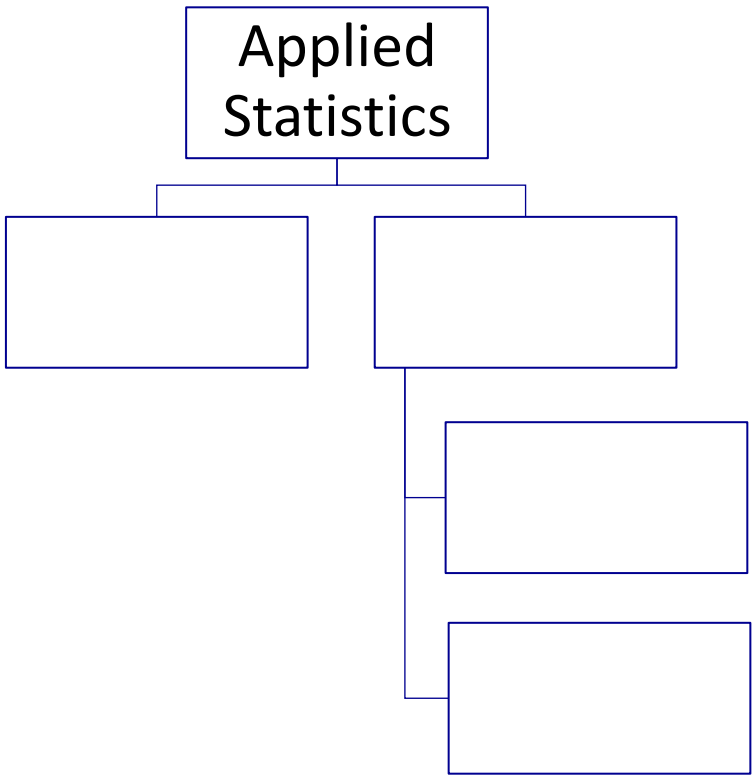
_____

What's More

Answer the activities that follow to practice your knowledge and skill about the topic.

Activity 1

Illustrate the fields of statistics based on the above discussion.



Activity 2

Using the table below, complete the statistical tools.

	Parametric	Non-parametric
Measure of central tendency		**Median**
Correlation test	**Pearson's r**	
Independent measure of 2 groups		**Mann-Whitney test**
Independent measure of more than 2 groups		**Kruskal-Wallis test**
Measurement Level	**Interval or Ratio**	

Activity 3

Answer each of the following concisely. Use the lines provided for your answer.

1. Explain briefly the role of applied statistics in quantitative research?

   _____
   _____
   _____
   _____

2. When would you use a parametric test?

   _____
   _____
   _____

3. How will you compare and contrast t-test and ANOVA?

   _____
   _____
   _____
   _____

4. Explain what correlation is.

   _____
   _____
   _____
   _____

5. Which statistical tool would be best in testing the hypothesis if the frequency table is composed by nominal variables? Explain your answer.

   _____
   _____
   _____
   _____

What I Have Learned

In this module, you have studied different statistical tools. Express what you have learned by answering the questions below.

1. What are the two major areas in applied statistics?

   _____
   _____

2. What must be used to test the hypothesis?

   _____
   _____

3. Why is planning what statistical tool to be used important in quantitative research?

   _____
   _____
   _____

What I Can Do

Apply what you have learned in this module by doing this activity. Examine your research and answer the following questions. Provide the following information of your research and plan the needed statistical tool/s.

Research Title:

_____
_____

Statement of the Problem:

_____
_____
_____
_____
_____

Research Questions:

_____
_____
_____
_____
_____
_____

Research Hypothesis:

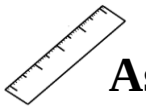
_____
_____
_____
_____
_____

Data Analysis:

_____
_____
_____
_____
_____

Rubrics

	Excellent (15-20 points)	**Good (8-14 points)**	**Needs Improvement (1-7 points)**	**Total**
Data Analysis	Clear description of data; clear plan with discussion of needed statistical tools	Insufficient description of data; insufficient plan of needed statistical tools	No clear idea about the data; no clear indication of needed statistical tools.	



Assessment

Answer the following questions. Select your answers from the options provided. Encircle the letter of your choice.

1. Which of the following statistical tools does NOT belong to the group?
   A. Chi-square
   B. Pearson's r
   C. t-test
   D. Z-test

2. What type of measurement shows the scatterings of the data?
   A. Descriptive statistics
   B. Measure of dispersion
   C. Non-parametric inferential
   D. Parametric inferential

3. In parametric data, what statistical tool can be used if there are more than two variables?
   A. ANOVA
   B. Pearson's r
   C. T-test
   D. Z-test

4. What term refers to the central value of an ordered distribution?
   A. Central tendency
   B. Mean
   C. Median
   D. Mode

5. You want to know which of those variables have impact. What statistical tool is most ideal to be used?
   A. Descriptive statistics
   B. Inferential statistics
   C. Regression analysis
   D. t-test

Additional Activities

Read any online research and identify what are the statistical tools being used by the researcher.

Post-test
Practical Research 2
Quarter 2- Module 6 Data Analysis

Write the letter of the correct answer on the space before the number.

1. The research will look on the significant difference between the NAT average performance of the students of private school and public schools in Marikina City. What statistical tool is the most appropriate to use?
   A. ANOVA
   B. Pearson's r
   C. Spearman's rho
   D. T-test

2. What type of inferential statistics is used to determine if there is a significant difference between the means of two groups?
   A. Mean
   B. Median
   C. t-test
   D. z-test

3. Which term refers to the difference of the highest value and the lowest value in the data set?
   A. Mean
   B. Median
   C. Mode
   D. Range

4. The daily rates of a sample of seven employees at NS Auto Supply are P 500.00, P550.00, P530.00, P490.00, P560.00, P590.00, and P520.00. What is the range?
   A. P100.00
   B. P530.00
   C. P490.00
   D. P590.00

5. What statistical term measures how widely values are dispersed from the average?
   A. Average
   B. Chi-square
   C. Standard deviation
   D. z-test

6. Which of the following does NOT belong to the group of parametric tests?
   A. Analysis of variance
   B. ANOVA
   C. Pearson's r
   D. Spearman's rho

7. A researcher will look for the significant differences among the perceptions of the groups of respondents. What statistical tool will you recommend that is appropriate to the given research question?
   A. ANOVA
   B. Mean
   C. Pearson r
   D. t-test

8. Which of the following refers to the assumption that can be tested?
   A. Descriptive statistics
   B. Hypothesis
   C. Research problem
   D. Statistical testing

9. Which of the following statistical tools does NOT belong to the group?
   A. Chi-square
   B. Pearson r
   C. t-test
   D. Z-test

10. What type of measurement shows the scatterings of the data?
   A. Descriptive statistics
   B. Measure of dispersion
   C. Non-parametric inferential
   D. Parametric inferential

11. In parametric data, what statistical tool can be used if there are more than two variables?
   A. ANOVA
   B. Pearson's r
   C. T-test
   D. Z-test

12. The researcher intends to find if there is a significant relationship between the teacher respondents' profile and their level of competency. What statistical tool is appropriate to use?
   A. ANOVA
   B. Pearson r
   C. T-test
   D. Z-test

13. You want to know which of the variables have impact. What statistical tool is
ideal to use?
   A. Descriptive statistics
   B. Inferential statistics
   C. Regression analysis
   D. T-test

14. What branch of statistics focuses on conclusions?
   A. Bivariate analysis
   B. Descriptive statistics
   C. Inferential statistics
   D. Multivariate analysis

15. What term refers to the central value of an ordered distribution?
   A. Central tendency
   B. Mean
   C. Median
   D. Mode

Answer Key

What I Know

1. C
2. D
3. C
4. D
5. B

What's In

1. Nominal
2. Ratio
3. Ordinal
4. Interval

***What's New* - Activity**

A. (Answers may vary)

B.

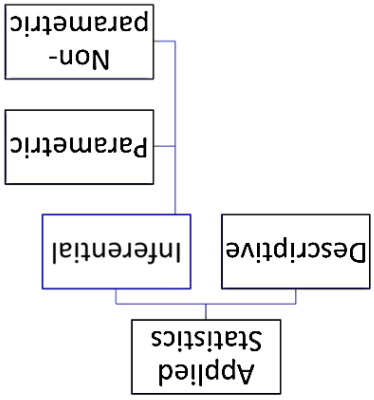
1. ✓
2. ✓
3. X
4. X
5. X
6. ✓

A. (Answers may vary)

Activity 2

	Parametric	Non-parametric
Measure of central tendency	Mean	Median
Correlation test	Pearson's r	Spearman's rho
Independent measure of 2 groups	T test	Mann-Whitney test
Independent measure of more than 2 groups	ANOVA	Kruskal-Wallis test
Measurement Level	Interval or Ratio	Nominal or Ordinal

***What's More*- Activity 1**



Activity 3

(Answers may vary)

What I Can Do

(Answers may vary)

Assessment

1. A
2. B
3. A
4. C
5. C

References

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