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Mathematics

Quarter 4 - Week 8-9 Module 6: Formulating statistical mini-research

AIRs - LM

Mathematics 10
Quarter 4 – Week 8-9 Module 14-Formulating statistical mini-research

First Edition, 2021

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Target

This module will discuss how to develop simple statistical research. It will also assist you to deal with the task of research preparation and writing as well as develop your awareness in making research. In addition, you are given the opportunity to formulate and gain insights on the principles of research preparation and writing applying the concepts learned throughout the topics on statistics.

After going through this module, you are expected to attain the following objectives:

Learning Competency:

Formulates statistical mini-research. **M10SP-IVf-g-1**

Subtasks:

- Define research.
- Discuss the importance of research
- Enumerate the steps in conducting statistical mini-research
- Develop statistical mini-research paper using the suggested format
- Use appropriate proper measures of position in analyzing and interpreting research data

Before you start doing the activities in this lesson, find out how much you already know about this module. Answer the pre-test in a separate sheet of paper.

Pre-Assessment

Directions: Read and understand the questions below. Select the best answer to each item then write your choice on your answer sheet.

1. What is the process of gathering data or information to solve a particular or specific problem in a scientific manner?
   A. Inquiry
   B. Investigation
   C. Research
   D. Scientific

2. Research follows an orderly and sequential procedure that leads to the discovery of truth, solution of a problem, or whatever is aimed to be discovered. What characteristics of a good research is being referred to?
   A. analytical B. controlled C. empirical D. systematic

3. Which of the following is the first step in writing a research?
   A. Presenting the research proposal
   B. Formulating the research hypothesis
   C. Selecting the participants of the study
   D. Identifying and selecting the research problem

4. Which of the following is **NOT** a characteristic of a good research title?
   A. The title must be brief and concise as possible.
   B. The title must contain the subject matter of the study.
   C. The title is formulated before the start of the research work.
   D. Use the terms "A study of…, An Analysis of…, and the like.

5. Which of the following research title is more concise and complete?
   A. High-School Dropouts of Luna National High School
   B. Factors Affecting Motor Performance in Kinder Pupils
   C. Achievement and Teaching Techniques in Mathematics 10
   D. Relationship Between Divergent Thinking Scores and Selected Characteristics of Special Science Class Students

6. What term refers to the detailed written plan and a blueprint for looking into the problem systematically?
   A. abstract B. format C. proposal D. summary

7. What type of hypothesis is being tested and represents what the experiment doubts to be true?
   A. alternative B. directional C. hypothesis D. null

8. What part of the research proposal that provides the background of the study?
   A. introduction B. problem C. objectives D. title

9. Which of the following contains the sample research instruments and other supplementary materials related to the study?
   A. appendix B. problem C. objectives D. title

10. Which of the following contains the alphabetize list of books, researchers, articles, interviews and other reference materials used by the researcher?

A. appendix B. bibliography C. methodology D. objectives

11. What kind of variable that the experimenter manipulates or changes, and is assumed to have a direct effect on the dependent variable?

A. control B. dependent C. independent D. moderator

12. A researcher wants to find out the effect of diet and regular soda on blood sugar levels. What is the dependent variable in the statement?

A. amount of soda B. blood sugar levels
C. effect of diet D. type of soda

13. Archie wants to study the effects of computer-assisted instruction on the reading comprehension of Grade Six pupils. What would be the target population?

A. All Grade six pupils of Luna
B. All Grade six pupils of La Union
C. All Grade six teachers of La Union
D. All Grade six pupils of Nalvo Norte Elementary School

14. Which of the following is **NOT** consider in formulating research hypothesis?

A. Define the variables.
B. State for the statistical analysis to be used
C. State the problem that you are trying to solve.
D. Try to write the hypothesis as an if-then statement.

15. Which of the following question/s should be asked to help you in formulating a research hypothesis?

I. What is the relationship between your hypothesis and your research topic?
II. Does your hypothesis include both an independent and dependent variable?
III. Is your hypothesis testable? If yes, then how?

A. I only B. II and III C. I and III D. I, II and II

Jumpstart

Let us begin this lesson by assessing your knowledge on the different aspects of a research. This knowledge and skill will help you understand how to formulate a statistical mini-research.

Activity 1: UNSCRAMBLE ME!

Direction: Unscramble the letters to form the word or group of words that best describes each statement below.

1. **RRESEHCA**. The process of gathering data or information to solve a particular or specific problem in a scientific manner.

2. **CITAYSSMET.** Characteristic of a research that follows an orderly and sequential procedure that leads to the discovery of truth.

3. **MPILACRIE.** A characteristic of research in which all procedures employed and the data gathered are perceived in the same manner by all observers.

4. **LACITYLANA.** Research has critical analysis of all data used so that there is no error in their interpretation.

5. **GINALORI ORWK**. Data gathered in research come from primary sources except in historical research.

How did you find the activity?
What concept/s of research are being presented in the activity?
Now think of this! What is the relevance of research to our present situation?

Discover

Formulated in a more comprehensive manner, **research** may be defined as "a purposive, systematic and scientific process of gathering, analyzing, classifying, organizing, presenting, and interpreting data for the solution of a problem, for prediction, for invention, for the discovery of truth, for the expansion or verification of existing knowledge, all for the preservation and improvement of the quality of human life."

Why Research Is Necessary and Valuable in Our Daily Lives

- It's a tool for building knowledge and facilitating learning.
- It's a means to understand issues and increase public awareness.
- It helps us succeed in business.
- It allows us to disprove lies and support truths.
- It is a means to find, gauge, and seize opportunities.
- It promotes a love of and confidence in reading, writing, analyzing, and sharing valuable information.
- It provides nourishment and exercise for the mind.

Three major parts of a research

1. Pose a problem/question
2. Collect data to answer the problem/question
3. Present the solution of the problem/question

Steps in conducting statistical mini-research

1. **Define and develop the research problem**

   The research problem comes up with the ongoing phenomenon or issues. A researcher may investigate to answer the questions, for examples, *"How technology affects the socialization process?" "How COVID-19 pandemic affects economic status?"*

2. **Know and find background information**

   Review the existing research evidence and to clarify that to study the available research resources related to the problem.

3. **Formulate a hypothesis**

   What the researcher intends to test? What is the relationship between variables? Specify your Independent & Dependent variables.

   - **Independent variable**
     - ✓ Is the variable the experimenter manipulates or changes, and is assumed to have a direct effect on the dependent variable
   - **Dependent variables**
     - ✓ Is the variable being tested and measured in an experiment, and is 'dependent' on the independent variable. In an experiment, the researcher is looking for the possible effect on the dependent variable that might be caused by changing the independent variable.

Example 1: Null hypothesis (H_o): "Various social classes have an effect on knowledge improvement".
Independent variable: various social classes
Dependent variable: knowledge improvement

Example 2: Null hypothesis (H_o) "Organizational structure has an effect on customers' satisfaction".
Independent variable: organizational structure
Dependent variable: customers' satisfaction

4. **Plan the methodology (Research Design)**
   Decide how the research materials will be collected. For example, experiment, survey, interview, case study or observation.
5. **Gather data (Carry out the Research Process)**
   When you collect data, you need to know the effective techniques of data collection in order to gather necessary and relevant information with regard to research.
6. **Apply analysis or statistical method (measures of position)**
   Interpret your research results in order to report the findings.
7. **Conclude and present the solution (Reporting Research Findings)**

Suggested Format in Writing Statistical Mini-research Paper

I. Title Page

- The title must contain:
  - ✓ the subject matter of the study
  - ✓ the locale of the study
  - ✓ the population involved
  - ✓ the period when the data were gathered

- The title must be as brief and concise as possible.
- Avoid using the terms "An Analysis of…," " A study of….," "An investigation of…," and the like.
- It must be written like an inverted pyramid, all words in capital letters.

Example of a complete title:

THE TEACHING OF SCIENCE IN THE HIGH SCHOOLS OF PROVINCE A AS PERCEIVED BY THE SCIENCE TEACHERS AND STUDENTS DURING THE SCHOOL YEAR 2020 – 2021

Let's have more examples for better understanding.

Original	Restatement
1. Creativity of Junior High School Students	1. Relationship Between Divergent Thinking Scores and Selected Characteristics of Junior High School Students
2. High-School Dropouts	2. An Ethnographic Study of School Environment of SARDOs to Determine Factors Related to Potential Dropout
3. Achievement and Teaching Techniques	3. Effects of Three Teaching Techniques on Mathematics Achievement of Special Science Students

II. Introduction/Rationale:

a. Statement of the Problem
   - ✓ State the research question you are trying to answer
   - ✓ State the reason why the question is important
   - ✓ State the issues involved
   - ✓ State why we should be concerned with resolving whatever issues involved
   - ✓ State how answering the question will help us
   - ✓ State the implications and consequences of dealing with or resolving the issues involved

b. Definition of Terms

c. Hypothesis

III. Body

a. Background of the Study

b. Presentation and Analysis of data

   i. Slovin's formula

      1. Sampling method (Systematic Random Sampling)

Slovin Formula: $n = \frac{N}{1+Ne^2}$

where:

n = the sample size
N = the total population
e = margin of error (5%)

Example:

A researcher wants to conduct a survey. If the population of a big school is 5,000, find the sample size and the margin of error is 5%

Solution:

$$n = \frac{N}{1+Ne^2}$$

$$n = \frac{5{,}000}{1+5{,}000(0.05)^2}$$

$$n = 370.37$$

Since we are talking about population, our sample size is 370.

   ii. Statistical measures

      1. Measures of central tendency
      2. Measures of Positions

IV. Conclusion

a. Concluding statement

b. Recommendation

V. Appendices

Documentation

Explore

Work on the following enrichment activities for you to apply your understanding on this lesson.

Activity 2: Warm Up Your Mind!

Directions: Formulate the null hypothesis and identify the dependent and independent variables.

1. Do tomatoes grow fastest under fluorescent, incandescent, or natural light?
2. What is the effect of diet and regular soda on blood sugar levels?
3. How does phone use before bedtime affect sleep?
4. How well do different plant species tolerate salt water?
5. What is the impact of different plant fertilizers on how many fruits mango trees bear?

Activity 3: Formulate Me!

Directions: Restate the following into a research problem and then formulate a testable hypothesis based on your proposed problem.

1. My research problem is _____
2. The hypothesis I wish to investigate _____
3. This hypothesis suggests a relationship between at least two variables. They are:
   a. independent variable_____
   b. dependent variable_____

Excellent! You just able to apply the concepts you have learned.
Answer the next activity to deepen your understanding in the concepts you have studied in this module.

Deepen

Activity 4: Research Me!

Directions: Conduct a mini-research on students' performance in the final examination in Mathematics or any available grades in their written works or performance tasks. Follow the suggested format in writing statistical mini-research paper.

Procedures:

1. The mini-research study will be done individually. Can be handwritten, printed or electronically submitted in 8.5" by 11" size of bond paper.
2. Select a random sample among the Grade 10 learners applying the Slovin's Formula and the systematic random sampling method.
3. Distribute the set of questions to proper and target participants and gather their responses
4. Contact the teacher to avoid problems in computation and interpretation of the gathered information. If you wanted to do it yourself, make sure to apply the measures of central tendency, measures of position and other statistical methods in analyzing your data.
5. If you have arrived at a conclusion or generalization from the data you gathered, work on writing on the body of the paper and finalize the conclusion
6. Re-read and proof-read your work upon finalizing and then prepare for the written report of the research.
7. Present your research and illustrate how the measures of position has applied in the process of arriving at the conclusion/generalization.

Scoring Rubrics

Category	3	2	1
Title	The title of the study is brief and concise. It contains subject matter, locale, population, and period of the study.	The title of the study is brief and concise but one of the elements is missing.	The title of the study is too long and some of the elements are missing
Introduction	Research statement/ question was present and clear. The objectives of the study were coherent, well organized and complete which give clear overview of the study.	Research statement/question was present but not clear. The objectives of the study were well organized and complete but lack coherence to give clear overview of the study	Research statement/question was not present. The objectives of the study were present but not explained. Organization and coherence needs improvement
Presentation	Background of the study was clear and very helpful in in creating the conclusion. Well defined key terms, formulas, charts or diagrams. Mathematical computation and interpretation of results were correct and well explained	Background of the study was present but not clear. Well defined key terms, formulas, charts or diagrams. Mathematical computation and interpretation of results were correct but not well explained	Background of the study was not complete. Some key terms, formulas, charts or diagrams are inconsistent. Mathematical computation showed a lot of errors.
Conclusion	Research statement/question was answered. Substantial evidence was present and recommendation for further study was given	Research statement/question was vaguely answered. Evidence was weak and recommendation for further study was given.	Research statement/question was not answered. Evidence was invalid and recommendation for further study was not given.

Gauge

Post-Assessment

Directions: Read and understand the questions below. Select the best answer to each item then write your choice on your answer sheet.

1. Which of the following is the first step in writing a research?
   A. Presenting the research proposal
   B. Formulating the research hypothesis
   C. Selecting the participants of the study
   D. Identifying and selecting the research problem

2. Research follows an orderly and sequential procedure that leads to the discovery of truth, solution of a problem, or whatever is aimed to be discovered. What characteristics of a good research is being referred to?
   A. analytical B. controlled C. hypothesis D. systematic

3. What is the process of gathering data or information to solve a particular or specific problem in a scientific manner?
   A. Inquiry B. Hypothesis C. Research D. Scientific

4. What type of hypothesis is being tested and represents what the experiment doubts to be true?
   A. alternative B. directional C. hypothesis D. null

5. Which of the following is **NOT** a characteristic of a good research title?
   A. The title must be brief and concise as possible.
   B. The title must be written like an inverted pyramid.
   C. The title is formulated before the start of the research work.
   D. Use the terms "A study of…, An Analysis of…, and the like.

6. Marlon wants to conduct a survey on the effect of COVID-19 in their barangay whose population is 500, find the sample size and the margin of error is 5%
   A. 200 B. 220 C. 222 D. 223

7. Which of the following research title is complete?
   A. High-School Dropouts of Luna National High School
   B. Factors Affecting Motor Performance in Kinder Pupils
   C. Achievement and Teaching Techniques in Mathematics 10
   D. Relationship Between Divergent Thinking Scores and Selected Characteristics of Special Science Class Students

8. Which of the following contains the sample research instruments and other supplementary materials related to the study?
   A. appendix B. problem C. objectives D. studies

9. What part of the research proposal that provides the background of the study?
A. introduction B. problem C. objectives D. title

10. A teacher wants to find out the effect of diet and regular soda on blood sugar levels. What is the independent variable in the statement?
A. amount of soda B. blood sugar levels
C. effect of diet D. type of soda

11. What kind of variable that is affected by the independent variable?
A. control B. dependent C. independent D. moderator

12. What part of the research proposal contains the alphabetize list of books, researchers, articles, interviews and other reference materials used by the researcher?
A. appendix B. bibliography C. methodology D. objectives

13. A researcher wants to study the effects of computer-assisted instruction on the reading comprehension of Grade 10 students. What would be the accessible population?
A. All Grade 10 students of La Union
B. All Grade 10 teachers of La Union
C. All Grade 10 students in public schools of Region I
D. All Grade 10 students in public schools of Luna I district

14. Which of the following is/are consider in formulating research hypothesis?
I. Define the variables.
II. State the problem that you are trying to solve.
III. State for the statistical analysis to be used
IV. Try to write the hypothesis as an if-then statement.

A. I and II B. I, II and III C. I, II and IV D. I, II, III and IV

15. Which of the following is **NOT** a question that should be ask to help you formulate a good research hypothesis?
A. Is your hypothesis testable?
B. Is the language clear and focused?
C. How to write the problem statement?
D. Can you manipulate your variables without hampering the ethical standards?

References

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Methods of Research Module. Don Mariano Marcos Memorial State University-Open University. La Union, Philippines. 2008

Links:

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