Senior High School

DepED
DEPARTMENT OF EDUCATION

PRACTICAL RESEARCH 2

Quarter 1 - Module 1

Nature of Inquiry and Research

ALTERNATIVE DELIVERY MODE
ADM

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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

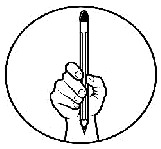
If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

At the end of this module, you should be able to:

1. Describe the characteristics, strengths, weaknesses, and kinds of quantitative research **(CS_RS12-Ia-c-1);**
2. Illustrate the importance of quantitative research across field **(CS_RS12-Ia-c-2);**
3. Differentiate the kinds of variables and their uses **(CS_RS12-Ia-c-3);**



What I Know

Directions: Read and analyze the statements below. Encircle the letter of the correct answer.

1. Which of the following statements is NOT a characteristic of quantitative research?
   A. Its results are taken from a sample can be generalized to the population.
   B. It delivers an in-depth understanding of the problem or study.
   C. It provides a more credible and reliable result.
   D. It involves statistical analysis of numerical data.

2. In an experiment, which group does not receive intervention?
   A. The treatment group
   B. The participant group
   C. The control group
   D. The experimental group

3. Which of the following research questions could be answered by using quantitative research methods?
   A. What is the most popular social media platform used by Senior High School students?
   B. How has the Covid-19 pandemic affected career choices among college students?
   C. What are the factors affecting depressive behavior?
   D. None of the above.

4. Which statement below illustrates a weakness of quantitative research?
   A. The responses of the participants are limited to what has been asked and the choices given.
   B. The researcher's perspective can influence interpretation of results.
   C. Data gathering takes too much time.
   D. There is low degree of subjectivity.

5. Which of the following is **NOT** a strength of quantitative research?
   A. Speedy data analysis
   B. Less expensive
   C. Replicable
   D. Objective

For items 6 and 7, identify whether the given research topic is:

A. Correlational
B. Quasi- experimental
C. Descriptive
D. Experimental

6. Determination of the degree of satisfaction of parents, teachers, and students on the online and modular blended learning

7. The effects of non-renewal of the ABS-CBN franchise to the average television viewing time of housewives

8. Which type of quantitative research seeks to determine relationship of one characteristic to the other?

A. Correlational
B. Experimental
C. Ex-post facto
D. Descriptive

9. Which of the following statements is NOT true about the importance of Quantitative Research?

A. It helps educators identify ways to improve learning
B. It helps improve crop production using safe organic fertilizers
C. It helps pharmaceutical companies explore safe and effective medicines
D. It helps understand victims of domestic violence perception of satisfaction

For items 10 to 12, determine if the statement is:

A. Always true
B. Sometimes true
C. Never true
D. Cannot be identified

10. A nominal variable is expressed in numbers.

11. The independent and dependent variables are applicable to ALL quantitative studies.

12. Dependent variables can be manipulated.

13. A group of students would like to know if spending time with a cat or dog decreases the amount of stress and allows students to perform better on tests. Which of the following is an extraneous variable?

A. Student's feeling towards the cat or dog
B. Amount of time spent with a cat or dog
C. Test scores of students
D. Amount of stress

14. A famous vlogger wanted to know if changing the content of his vlogs (food review, travel, study tips, etc.) will affect the number of views per uploaded video. The number of views per uploaded video is the:

A. Confounding variable
B. Independent variable
C. Dependent variable
D. Continuous variable

15. Which of the following is an example of a continuous variable?

A. Learning modality used
B. Student's test score
C. Student's height
D. Student's IQ

Lesson

1

INTRODUCTION TO QUANTITATIVE RESEARCH

What's In

Practical Research I introduced you to the two main classifications of research methods: **quantitative** and **qualitative**. You have learned that qualitative research is more of describing a phenomenon in a narrative; hence, the data collected can be in the form of words, images, or transcripts taken from a small sample, not generalizable to the population. Choosing a small sample size makes room for in-depth data collection and interpretation. In this lesson, you will learn about quantitative analysis, a more formal, objective, and systematic approach to obtaining answers to a question or problem of the study.

What I Need to Know

Vital to the conduct of a quantitative research project is a deep understanding of its characteristics. When you know its strengths and different classifications, you will be able to identify what kind of questions you should ask and what approach is most suited to find answers to these questions. The identification of its weaknesses, on the other hand, aids in recognizing the questions or topics that are inappropriate to this course. At the end of this lesson, you will have a good grasp of quantitative research that will prepare you in crafting a good research study and instrumental to building lifelong skills.

What's New

Activity 1: Finding clues

Directions**:** Group the following word clues if they are characteristics of Quantitative Research (Box A) or Qualitative Research (Box B).

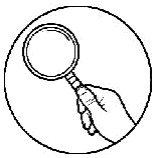
1. Measurable
2. Behavior
3. Statistical
4. Narrative
5. Objective
6. Text-based
7. Intervention
8. Experimental group
9. Unstructured observation
10. Inductive
11. Subjective
12. Small sample
13. Tables and charts
14. Deductive
15. Generalizable

A. Quantitative Research	B. Qualitative Research

Activity 2: Let's match

Directions: Match the following quantitative research title under column A to its classification (research design) in column B. Write the letter of the correct answer on the space provided.

Column A	Column B
_____1. Investigating the effects of formalin treated eggplants on mice	**A.** Experimental
_____2. Factors affecting job satisfaction among Tech-Voc graduates	**B.** Descriptive
_____3. Prevalence of domestic violence in cities declared under Enhanced Community Quarantine during the Covid-19 pandemic	**C.** Ex post facto
_____4. The effects of age on social media platform choice	**D.** Quasi-experimental
_____5. The relationship between intelligence and sports choices among high school students	**E.** Correlational
	F. Case Study



What Is It

Quantitative Research

You have learned from Practical Research 1 that research method is classified into two main types: quantitative and qualitative. While both methods utilize a specific data gathering procedure, the former is generally concerned with understanding phenomenon relating to or involving quality or kind. The latter, on the other hand, is based on the measurement or quantity. In this module, we will focus on quantitative methods of research and its different kinds.

Quantitative research uses scientifically collected and statistically analyzed data to investigate observable phenomena. A phenomenon is any existing or observable fact or situation that we want to unearth further or understand. It is scientific for the fact that it uses a scientific method in designing and collecting numerical data. Once data is collected, it will undergo statistical analysis like Pearson's r, t-test and Analysis of Variance (ANOVA) for analysis. Since data is analyzed statistically, it is imperative that the data obtained must be numerical and quantifiable, hence its name quantitative research.

Numerical data are generally easier to collect than descriptions or phrases used in qualitative research. Information like student's grades in different subjects, number of hours

of engagement in social media platforms of teens, percentage of consumers who prefer the color blue for soap packaging, and average of daily Covid-19 patient recovery per region are just few examples of research data expressed in numbers. Some data, on the other hand, are not directly countable and thus require conversion from non-numerical information into numerical information. For instance, determining which brand of canned sardines is the best choice for consumers in terms of taste cannot be expressed in numbers unless we do a survey using a rating scale. Several forms of rating scales are available, e.g., the Likert scale that we can use to quantify data. Usually, they come in a selection of numbers with a corresponding meaning for each choice, for example: 1= tastes very good, 2 = satisfactory, or 3 = undesirable. Numerical choices convert texts into numbers so the researcher can perform mathematical operations for faster, more accurate, and more objective analysis.

Characteristics of Quantitative Research

Quantitative research is commonly used in natural sciences research problems because of the following characteristics:

1. **Large Sample Size**. To obtain more meaningful statistical result, the data must come from a large sample size.

2. **Objectivity**. Data gathering and analysis of results are done accurately, objectively, and are unaffected by the researcher's intuition and personal guesses.

3. **Concise Visual Presentation**. Data is numerical which makes presentation through graphs, charts, and tables possible and with better conveyance and interpretation.

4. **Faster Data Analysis**. The use of a statistical tools gives way for a less time-consuming data analysis.

5. **Generalized Data**. Data taken from a sample can be applied to the population if sampling is done accordingly, i.e., sufficient size and random samples were taken.

6. **Fast and Easy Data Collection**. Depending on the type of data needed, collection can be quick and easy. Quantitative research uses standardized research instruments that allow the researcher to collect data from a large sample size efficiently. For instance, a single survey form can be administered simultaneously to collect various measurable characteristics like age, gender, socio-economic status, etc.

7. **Reliable Data**. Data is taken and analyzed objectively from a sample as a representative of the population, making it more credible and reliable for policymaking and decision making.

8. **High Replicability**. The Quantitative method can be repeated to verify findings enhancing its validity, free from false or immature conclusions.

Advantages of Quantitative Research

The following are the advantages of quantitative research or its strengths:

1. Very objective
2. Numerical and quantifiable data can be used to predict outcomes.
3. Findings are generalizable to the population.
4. There is conclusive establishment of cause and effect
5. Fast and easy data analysis using statistical software.
6. Fast and easy data gathering
7. Quantitative research can be replicated or repeated.
8. Validity and reliability can be established

Disadvantages of Quantitative Research

The following are the disadvantages of quantitative research or its weaknesses:

1. It lacks the necessary data to explore a problem or concept in depth.
2. It does not provide comprehensive explanation of human experiences.
3. Some information cannot be described by numerical data such as feelings, and beliefs.
4. The research design is rigid and not very flexible.
5. The participants are limited to choose only from the given responses.
6. The respondents may tend to provide inaccurate responses.
7. A large sample size makes data collection more costly.

Kinds of Quantitative Research

Quantitative research is a broad spectrum that it can be classified into smaller and more specific kinds: descriptive, correlational, *ex post facto*, quasi-experimental, and experimental.

Descriptive design is used to describe a particular phenomenon by observing it as it occurs in nature. There is no experimental manipulation, and the researcher does not start with a hypothesis. The goal of descriptive research is only to describe the person or object of the study. An example of descriptive research design is "the determination of the different kinds of physical activities and how often high school students do it during the quarantine period."

The correlational design identifies the relationship between variables. Data is collected by observation since it does not consider the cause and effect, for example, the relationship between the amount of physical activity done and student academic achievement.

***Ex post facto* design** is used to investigate a possible relationship between previous events and present conditions. The term "*Ex post facto*" which means after the fact, looks at the possible causes of an already occurring phenomenon. Just like the first two, there is no experimental manipulation in this design. An example of this is "How does the parent's academic achievement affect the children obesity?"

A quasi-experimental design is used to establish the cause-and-effect relationship of variables. Although it resembles the experimental design, the quasi-experimental has lesser validity due to the absence of random selection and assignment of subjects. Here, the independent variable is identified but not manipulated. The researcher does not modify pre-existing groups of subjects. The group exposed to treatment (experimental) is compared to the group unexposed to treatment (control): example, the effects of unemployment on attitude towards following safety protocol in ECQ declared areas.

Experimental design like quasi- experimental is used to establish the cause-and-effect relationship of two or more variables. This design provides a more conclusive result because it uses random assignment of subjects and experimental manipulations. For example, a comparison of the effects of various blended learning to the reading comprehension of elementary pupils.

What's More

Activity 3: True or False

Directions: On the space provided, write **TRUE** if the statement describes quantitative research and **FALSE** if it is incorrect.

_____1. Quantitative data can be presented using tables and graphs.
_____2. The results of quantitative research can be used to generalize and predict.
_____3. Quantitative research is flexible so at any stage, the study may change.
_____4. Quantitative data are more credible, reliable, and useful than qualitative data.
_____5. The research study cannot be replicated or repeated because it is unique in every case.
_____6. Data are in the form of numbers and analyzed statistically.
_____7. Data analysis is an on-going process. It can be done at any stage of the process.
_____8. The behavior of the participants is observed and is critical to the analysis of results.
_____9. Analysis of data is less time-consuming.
_____10. In quantitative research, the researcher participates and engages the participants in the study

Activity 4: Yes or No

Direction**:** Write **YES** on the blank if the question requires for quantitative approach and **NO** if it does not.

_____1. Are high grades in Mathematics a good indicator for employment after graduation?
_____2. Will taking brain enhancers increase examination scores?
_____3. Are there changes in consumer behavior before and after online selling was popularized?
_____4. Do online learning materials enhance the computer skills of students?
_____5. Are there changes in the study habits of public-school students before and after the Covid-19 pandemic?
_____6. What kind of pick-up lines are most appealing to both genders at the early adult stage?
_____7. Is there a difference in the academic performance of students using online, blended and modular learning modalities?
_____8. Will student's and parent's attitudes towards distance learning change over time?
_____9. Which of the four SHS tracks (Academic, Tech-Voc, Sports, Arts & Design) is greatly affected by the Covid-19 pandemic?
_____10. What are the factors affecting the delayed completion and submission of assignments/tasks given to students using modular learning modality?

What I Have Learned

Directions: Write your learning about the following:

1. What is quantitative research?
   _____
   _____
   _____

2. What are the characteristics of quantitative research?
   _____
   _____
   _____

3. Discuss the strengths of quantitative research.
   _____
   _____
   _____

4. Discuss the weaknesses of quantitative research.
   _____
   _____
   _____

5. Describe each type of quantitative design and give one (1) example for each kind.
   A. Descriptive design. _____
      _____
      _____
      _____

B. Correlational design. _____
_____
_____
_____

C. *Ex post facto design*. _____
_____
_____
_____

D. Quasi-experimental design. _____
_____
_____

E. Experimental design. _____
_____
_____
_____

What I Can Do

Directions: Read and identify ten (10) different quantitative research titles and classify them as to which quantitative design they belong.

RESEARCH TITLE	QUANTITATIVE RESEARCH DESIGN
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Lesson

2

FORMULATING RECOMMENDATIONS BASED ON CONCLUSIONS

What's In

You have learned from Lesson 1 that quantitative research is a formal, deductive, and systematic process that focuses mainly on obtaining and analyzing numerical data. The method of data collection is objective and replicable. At the same time, its analysis is statistical and generalizable to the population making the findings of quantitative research very credible and useful for administrators, law makers, scientists, decision-makers and business owners. It is for these reasons that quantitative analysis can be applied and very useful to various fields of study. In this lesson, you will uncover the role of quantitative research in the advancement of knowledge across disciplines.

Key Question: How is quantitative research applicable across fields?

What I Need to Know

People indulge in research to know more, to solve problems, or to improve existing conditions. More and more institutions promote research studies while younger individuals indulge in research projects not only because they are required to but also because they came to realize the value and benefits research has to offer. The quantitative research's systematic way of finding the answers forges its pertinence regardless of the area or sector. The more you perceive the value of quantitative research to different groups or field of study, the more you appreciate it, hence, igniting your interest from knowing that you may make use of it in your own chosen track.

What's New

Activity 1: Where do I belong?

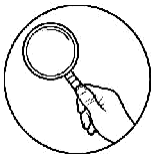
Direction. Listed in Column A are the important inventions, innovations or discoveries in history. Identify which field in Column B do these discoveries have great importance.

Column A	Column B
_____1. Vaccine	A. Agriculture and Fisheries
_____2. Refrigeration	B. Natural and Physical Science
_____3. Printing press	C. Business and Accounting
_____4. Computer	D. Information and Communications Technology
_____5. Airplane	E. Arts
_____6. Photo finishes	F. Education
_____7. Social media	G. Sports
_____8. Paint	H. Humanities and Social Science
	I. Mathematics

Activity 2: Expanding your vocabulary!

Directions: Read through the text of this lesson and look for an underlined word that has the same meaning as the word in the list below. Write the word on the space provided.

1. Intercession - _____
2. To find out – _____
3. Salable - _____
4. Quicken, expedite - _____
5. Relationship - _____
6. Create, produce - _____
7. Compatibility - _____
8. Toughest - _____
9. Changeable - _____
10. Global, widespread - _____



What Is It

Importance of Quantitative Research Across Fields

The value of quantitative research to man's quest to discover the unknown and improve underlying conditions is undeniable. Throughout history, quantitative research has paved the way to finding meaningful solutions to difficulties. For instance, the development of vaccines to strengthen our immunity against viruses causing highly communicable diseases like polio, influenza, chickenpox, and measles to name a few, underwent thorough experimental trials. You bet, scientists and medical experts all over the world today are working their best to fast track the development, testing and release of the vaccine for the Corona Virus Disease of 2019 (Covid-19) as the pandemic has critically affected the world economy, education, as well as physical and emotional well-being of people.

The findings of the quantitative study can influence leaders' and law-makers' decisions for crafting and implementing laws for the safety and welfare of the more significant majority. For example, a community with high cases of Covid-19 positive patients is mandated by law to be under Enhanced Community Quarantine where only the most essential businesses can operate. On the other hand, cities with less or zero case will be under General Community Quarantine where some businesses, public and private offices are already allowed to operate.

Using quantitative design helps us determine and better understand relationships between variables or phenomenon crucial to reducing the range of uncertainty because the mathematics (more of this in the last module) behind quantitative studies helps us make close estimates of the outcome (dependent variable) from a given condition/s (independent variable). Relationship between demand and supply, age and health, discipline and academic achievement, practice and winning at sports, depression and suicidal rates, algae population and Oxygen demand are just few examples of real-life applications of correlation studies in the past that we still apply today.

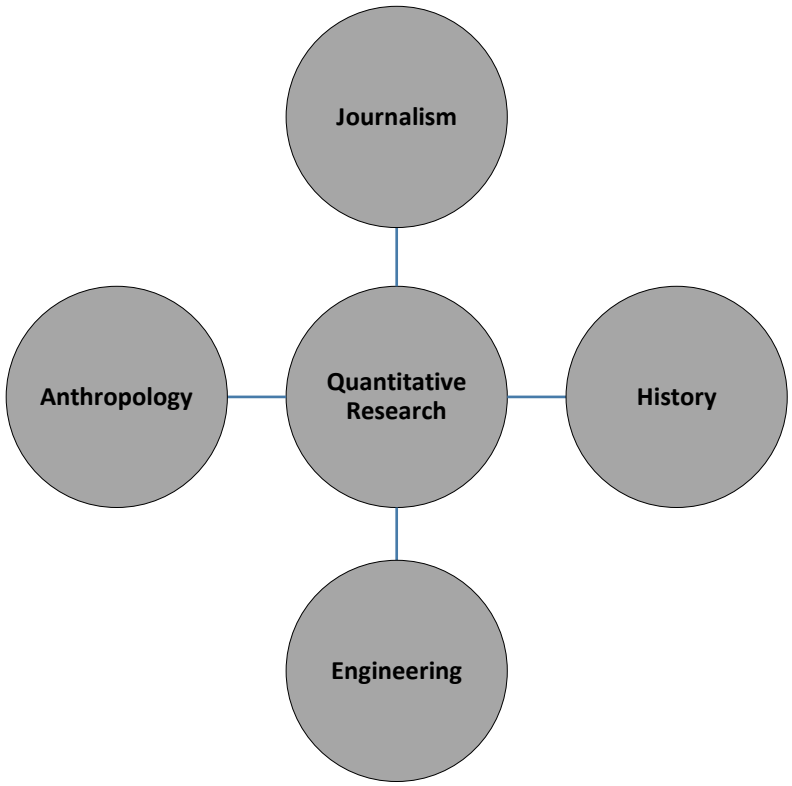
Most inventions and innovations are products of quantitative studies. Before you can enjoy the uses and features of a smart phone, it took years of research to establish compliance to standards for interoperability, to find the most cost-effective raw materials, and to identify the sleekest and sturdiest design, the fastest data saving and processing power, and most marketable add-ons according to consumer needs. Indeed, mankind will dwell in the darkness of ignorance if not for the people who conducted their research before reading about it from books or manuals.

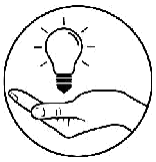
The table below shows some of the contributions of quantitative research to other fields and their example.

Field	Contribution/Application	Example
Social Science	• Show effects of intervention to group behavior • Understand cultural or racial conflicts • Human satisfaction and stressors	The effects of pandemic on social behavior and economic stability
Natural and Physical Sciences	• Investigate the effectiveness of a product or treatment to illnesses • Finding or enhancing alternative energy sources • Advancement in material science	Antidiabetic properties of common Philippine herbs
Agriculture and Fisheries	• Increase the yield of crops • Prevent and cure crops and livestock diseases	The effectiveness of organic and inorganic fertilizer to vegetable production
Sports	• Enhance athletic performance	Diet and exercise techniques for different kinds of sports
Business	• Offer device marketing strategies • Improve marketability	Effectiveness of Facebook ads on sales.
Arts and Design	• Show relationship between color and architectural space • Maximize use of Multimedia and adaptation for recreation, business marketing and lifestyle changes.	The effects of music on learning and behavior.
Environmental Science	• Determine Cause and effects of climate change	The environmental factors affecting natural calamities

What's More

Directions: In a separate sheet, make a concept map (example below) of all other fields/disciplines where you think quantitative research can be applied. Explain why quantitative research is important to these fields.





What I Have Learned

Directions: Answer the following questions clearly and briefly.

A. How is quantitative research relevant to different discipline?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

B. Briefly explain the importance or contribution of quantitative research to each of the following fields of study.

Field	Importance / Contribution
Natural and Physical Science	
Education	
Sports	
Arts and Design	
Agriculture and Fisheries	
Information and Communication Technology	
Social Science	
Business and Accounting	

What I Can Do

Directions: Search online or from a book or publication one particular quantitative study for every field below and indicate its contribution to the development of knowledge to that field.

Field	Title, Author/s, Year published	Contribution
Education	The Better You Feel the Better You Learn: Do Warm Colours and Rounded Shapes Enhance Learning Outcome in Multimedia Learning? Munchow, H, Mengelkamp, C, Bannert, M. (2017)	Finds a way to improve learning through colors and shapes.
Medicine		
Sports		
Food Industry		
Agriculture		
Arts		
Social Science		
Environmental Science		
ICT		
Energy		

Lesson

3

SOURCES OF RELATED LITERATURE AND STUDIES

What's In

You have learned from the previous lessons that quantitative research is concerned about numerical or measurable values that we can analyze statistically. How do we measure such values? Is it measurable at all times? Do these values change? Are these values applicable for descriptive, correlational, *ex post facto*, quasi-experimental and experimental research? In this lesson, you will learn about the different classifications of data used in quantitative research and their examples.

What I Need to Know

Variables play a significant role in quantitative research. When you intend to accomplish something through research, the boundaries of your goal must be defined first to direct your focus into a specific characteristic or condition through identifying the variables of your research study. Doing such eliminates complexities and elaborate work especially for a senior high school student like you. Knowing the different kinds of research variables also aids in smooth data collection and analysis.

What's New

Activity 1: Let's review!

Directions: Read and analyze the following questions. Choose the letter of the correct answer.

1. Which variable is manipulated by the researcher?
   A. Extraneous variable
   B. Independent variable
   C. Dependent variable
   D. Confounding variable

2. Which of the following is an example of a quantitative variable?
   A. Plant variety
   B. IQ
   C. Hair color
   D. Race

3. Which of the following is an example qualitative variable?
   A. Monthly sales
   B. Basketball player number
   C. gender
   D. IQ

4. The variable is the presumed effect of the manipulation on the object/subject of the experiment.
   A. Extraneous variable
   B. Independent variable
   C. Dependent variable
   D. Confounding variable

5. A type of variable that represent categories and can be ordered.
   A. Nominal
   B. Discrete
   C. Ordinal
   D. Ratio

6. What type of variable is characterized by evenly dispersed range of numbers?
   A. Nominal
   B. Interval
   C. Dichotomous
   D. Ratio

7. The variable that has potential effect on the dependent variables that are not part of the study.
   A. Extraneous variable
   B. Independent variable
   C. Dependent variable
   D. Confounding variable

8. A variable that is used to name, categorize, or label the attributes being measured.
   A. Nominal
   B. Interval
   C. Ordinal
   D. Ratio

9. What type of variable is gender?
   A. Nominal
   B. Interval
   C. Dichotomous
   D. Continuous

10. What type of variable is height of students before and after taking growth enhancers for 2 months?
   A. Nominal
   B. Interval
   C. Dichotomous
   D. Continuous

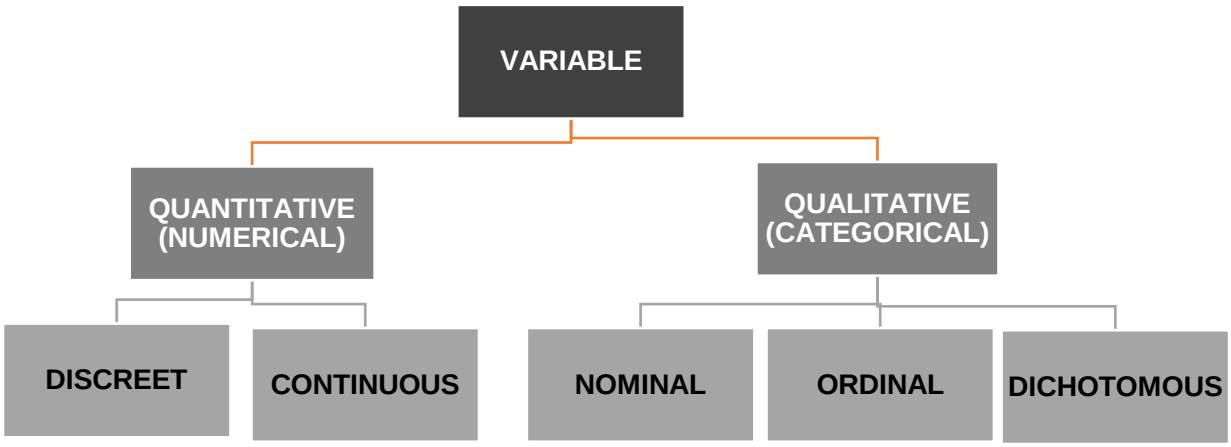
What Is It

To get an answer to an inquiry that they are investigating, researchers will observe and measure the quality or quantity of the object of the study. It is therefore imperative for the researcher to identify the variables significant in explaining observed effects or behavior.

A **Variable** is anything that has a quantity or quality that varies. For instance, during the quarantine period, your mother planted tomato seedlings in pots. Now common understanding from science tells you that several factors are affecting the growth of tomatoes: sunlight, water, kind of soil, and nutrients in soil. How fast the tomato seedlings will grow and bear fruits will depend on these factors. The growth of tomatoes and the number of fruits produced are examples of the **Dependent Variables**. The amount of sunlight, water, and nutrients in the soil are the **Independent Variables**. If there is an existing relationship between the independent and dependent variables, then the value of the dependent variable varies in response to the manipulation done on the independent variable. The independent variable is also identified as the presumed cause while the dependent variable is the presumed effect. In an experimental quantitative design, the independent variable is pre-defined and manipulated by the researcher while the dependent variable is observed and measured. For descriptive, correlational, and *ex post facto* quantitative research designs, independent and dependent variables simply do not apply.

It is important to note other factors that may influence the outcome (dependent variable) not manipulated or pre-defined by the researcher. These factors are called **Extraneous Variables**. In our example above, the presence of pests and environmental stressors (e.g. pets, extreme weather) are the extraneous variables. Since extraneous variables may affect the result of the experiment, it is crucial for the researcher to identify them prior to conducting the experiment and control them in such a way that they do not threaten the **internal validity** (i.e. accurate conclusion) of the result. Controlling the extraneous variable can be done by holding it constant or distribute its effect across the treatment. When the researcher fails to control the extraneous variable that it caused considerable effect to the outcome, the extraneous variable becomes a **Confounding Variable**. For example, if the tomato had been infested by pests (confounding variable) then you cannot conclude that manipulations in sunlight, water, and soil nutrients (independent variable) are the only contributing factors for the stunted growth and poor yield (dependent variable) of the plant or is it the result of both the independent variables and the confounding variable.

The variables can also be classified according to their nature. The diagram below shows the different classifications:



I. Quantitative Variables, also called numerical variables, are the type of variables used in quantitative research because they are numeric and can be measured. Under this category are discrete and continuous variables.

A. **Discrete variables** are countable whole numbers. It does not take negative values or values between fixed points. For example: number of students in a class, group size and frequency.
B. **Continuous variables** take fractional (non-whole number) values that can either be a positive or a negative. Example: height, temperature.

Numerical data have two levels of measurement, namely:

A. Intervals are quantitative variables where the interval or differences between consecutive values are equal and meaningful, but the numbers are arbitrary. For example, the difference between 36 degrees and 37 degrees is the same as between 100 degrees and 101 degrees. The zero point does not suggest the absence of a property being measured. Temperature at 0 degree Celsius is assigned as the melting point of ice. Other examples of interval data would be year and IQ score.

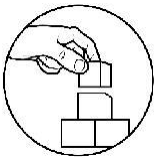
B. Ratio type of data is similar to interval. The only difference is the presence of a true zero value. The zero point in this scale indicates the absence of the quantity being measured. Examples are age, height, weight, and distance.

II. **Qualitative Variables** also referred to as Categorical Variables are not expressed in numbers but are descriptions or categories. It can be further divided into dichotomous, nominal or ordinal.

A. Dichotomous variable consists of only two distinct categories or values, for example, a response to a question either be a yes or no.

B. Nominal variable simply defines groups of subjects. In here, you may have more than 2 categories of equivalent magnitude. For example, a basketball player's number is used to distinguish him from other players. It certainly does not follow that player 10 is better than player 8. Other examples are blood type, hair color and mode of transportation.

C. Ordinal variable, from the name itself, denotes that a variable is ranked in a certain order. This variable can have a qualitative or quantitative attribute. For example, a survey questionnaire may have a numerical rating as choices like 1, 2, 3, 4, 5ranked accordingly (5=highest, 1=lowest) or categorical rating like strongly agree, agree, neutral, disagree and strongly disagree. Other examples or ordinal variable: cancer stage (Stage I, Stage II, Stage III), Spotify Top 20 hits, academic honors (with highest, with high, with honors).



What's More

Activity 2: Identifying variables

Directions: Identify the Independent, Dependent and Extraneous variable/s in each of the following situations.

1. Three groups of students were placed in a classroom with controlled room temperatures of 18°C, 20°C, 25°C. The math exam scores of the students were then taken and compared to the other groups.
   Independent variable: _____
   Dependent variable: _____
   Extraneous variable: _____

2. An online seller would like to know whether the indication of price on Facebook posts will attract consumers more. He posted 50 products for sale on Facebook market, 25 of which he indicated the price while the remaining 25 products, did not have prices. Buyers were just instructed to send him a personal message (pm) if they want to know the price. He then identified which products have greater sales.
   Independent variable: _____
   Dependent variable: _____
   Extraneous variable: _____

3. A housewife wanted to know which soil is best for her pechay plants: the soil purchased from an online seller, soil from her backyard compost or the soil underneath the nearby bamboo tree. She planted 30 pechay seeds into each soil source and then compared the growth of pechay after a month.
   Independent variable: _____
   Dependent variable: _____
   Extraneous variable: _____

4. Jenny is only borrowing the cellphone chargers of her brother, sister and mother because she lost her phone charger. All chargers are of the same specifications as hers even though they have different phone brands. However, she would like to know which charger and charging cable combination would fill her phone battery the fastest. She used the following codes as her reference and charged her phone uninterrupted using the following combination. The charging time of the phone was then compared.

Brother's Charger: BB	Sister's Charger: SS	Mother's Charger: MM
Brother's Cable: bb	Sister's Cable: ss	Mother's Cable: mm

Combination	Charging time	Combination	Charging time	Combination	Charging time
BBbb		SSss		MMmm	
BBss		SSbb		MMbb	
BBmm		SSmm		MMss	

   Independent variable: _____
   Dependent variable: _____
   Extraneous variable: _____

5. A teacher wanted to know which learning delivery modes (pure online, pure modular, combination of online and modular) is most effective and has the fastest turnaround time in the submission of accomplished activities among her Grade 12 students. She divided the students into 3 groups, gave them the same activity sheets and asked them to submit as soon as it is completed. She then compared the scores and completion time of the 3 groups.
   Independent variable: _____
   Dependent variable: _____
   Extraneous variable: _____

Activity 3: Classifying variables

Directions: Identify the following variable as either qualitative or quantitative. Then, classify which specific category they belong.

Data	Type of variable (Qualitative/Quantitative)	Classification (Discrete, continuous, interval, ratio, nominal, dichotomous, ordinal)
Ex. Number of eggs laid by chickens	Quantitative	Discrete, interval
1. Amount of fertilizer given to plants		
2. Weight of Pechay harvested (in grams)		
3. Speed of car		
4. Tomato plant variety		
5. Color of alcohol packaging (blue, orange, white, pink)		

6. Educational level of parents (high school grad, college grad, MS, PhD)		
7. Online seller satisfaction rating (1-5 stars)		
8. Cellphone brand		
9. Number of Covid-19 positive cases		
10. Type of music		
11. Number of passengers in a PUJ		
12. Socio-economic status		
13. Gender		
14. Temperature in Fahrenheit		
15. Civil Status		

Activity 4: Let's Go Online

Go to the link below and practice what you've learned from this lesson:
https://bit.ly/2TEw2o4
https://bit.ly/2X3TdtL

What I Have Learned

Directions: Explain briefly what is being asked for.

1. Compare and contrast qualitative variables and quantitative variables.

2. Why are dependent and independent variables not applicable in a descriptive type of research?

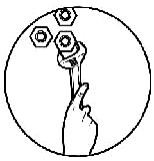
3. How important is it for the researcher to identify the type of variables used in the study?

4. How does confounding variable affect the validity of the study?

_____
_____
_____
_____
_____
_____
_____

5. When do we use discrete, continuous, nominal, ordinal?

_____
_____
_____
_____
_____
_____
_____



What I Can Do

Make a quick survey to your friends, family members and professors who have previously conducted a quantitative research study. Evaluate the title of their papers and identify the independent, dependent, and other variables.

Summary

- **Quantitative research** uses scientifically collected and statistically analyzed data to investigate observable phenomena.
- **Characteristics of quantitative research** are (1) Large sample size, (2) Objective, (3) Visual result presentation, (4) Faster data analysis, (5) Generalized data, (6) Fast data collection, (7) Reliable data, and (8) Replication.
- Kinds of quantitative research are (1) Descriptive, (2) Correlational, (3) Ex post facto design, (4) quasi-experimental, and (5) experimental.
- Types of Variables: (1) **Independent**, (2) **Dependent**, (3) **Extraneous**, (4) **Continuous,** (5) **Discrete**, (6) **Dichotomous**, (7) **Nominal variable** and (8) **Ordinal variable.**

Assessment: (Post-Test)

Directions: Read and analyze the statements below. Encircle the letter of the correct answer.

1. Which of the following statements is NOT true about the importance of Quantitative Research?
   A. helps educators identify ways to improve learning
   B. helps improve crop production using safe organic fertilizers
   C. helps pharmaceutical companies explore safe and effective medicines
   D. helps understand victims of domestic violence perception of satisfaction

2. Which of the following statements is NOT a characteristic of quantitative research?
   A. The results taken from a sample can be generalized to the population.
   B. It provides an in-depth understanding of the problem or study.
   C. It provides a more credible and reliable result.
   D. Statistical analysis of numerical data.

3. In an experiment, which group does not receive intervention?

A. The treatment group
B. The participant group
C. The control group
D. The experimental group

4. Which of the following research questions could be answered by using quantitative research methods?

A. What is the most popular social media platform used by Senior High School students?
B. How has the Covid-19 pandemic affects career choices among college students?
C. What are the factors affecting depressive behavior?
D. None of the above.

5. Which of the following is **NOT** a strength of quantitative research?

A. Speedy data analysis
B. Less expensive
C. Replicable
D. Objective

6. Which statement below illustrates a weakness of quantitative research?

A. The responses of the participants are limited to what has been asked and the choices given.
B. The researcher's perspective can influence interpretation of results.
C. Data gathering takes too much time.
D. There is low degree of subjectivity.

For items 7 and 8, identify whether the given research topic is:

A. Correlational
B. Quasi- experimental
C. Descriptive
D. Experimental

7. Determination of the degree of satisfaction of parents, teachers, and students on the online and modular blended learning.

8. The effects of non-renewal of the ABS-CBN franchise to the average daily time watching television of housewives.

9. Which type of quantitative research seeks to determine relationship of one characteristic to the other characteristic?

A. Correlational
B. Experimental
C. Ex-post facto
D. Descriptive

For items 10 to 12, determine if the statement is:

A. Always true
B. Sometimes true
C. Never true
D. Cannot be identified

10 Dependent variables can be manipulated.

11. The independent and dependent variables are applicable to ALL quantitative studies.

12. A nominal variable is expressed in numbers.

13. A group of students would like to know if spending time with a cat or dog decreases the amount of stress and allows students to perform better on tests. Which of the following is an extraneous variable?
    A. Student's feeling towards the cat or dog
    B. Amount of time spent with a cat or dog
    C. Test scores of students
    D. Amount of stress

14. Which of the following is an example of a continuous variable?
    A. Learning modality used
    B. Student's test score
    C. Student's height
    D. Student's IQ

15. A famous vlogger wanted to know if changing the content of his vlogs (food review, travel, study tips, etc.) will affect the number of views per uploaded video. The number of views per uploaded video is the:
    A. Confounding variable
    B. Independent variable
    C. Dependent variable
    D. Continuous variable

Key to Answers

MODULE 1, LESSON 1

What's New Activity 1

Quantitative	Qualitative
Measurable	Behavior
Statistical	Narrative
Objective	Text-based
Intervention	Unstructured
Experimental	observation
Group	Inductive
Table and Charts	Subjective
	Small Sample
Deductive	
Generalizable	

What's New Activity 2

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

What's More Activity 3

1. TRUE
2. TRUE
3. FALSE
4. TRUE
5. FALSE
6. TRUE
7. FALSE
8. TRUE
9. TRUE
10. FALSE

What's More Activity 4

1. YES
2. YES
3. NO
4. YES
5. NO
6. NO
7. YES
8. NO
9. YES
10. NO

MODULE 1, LESSON 2

What's New Activity 1

1. B
2. A/C
3. F
4. D
5. C
6. G
7. H
8. E

What's New Activity 2

1. Intervention
2. Discover
3. Marketable
4. Fast track
6. Crafting
7. Interoperability
8. Sturdiest
9. Variable

MODULE 1, LESSON 3

What's New Activity 1

1. B
2. B
3. C
4. C
5. C
6. B
7. A
8. A
9. C
10. D

What's More Activity 2

1. IV: Room Temperature
   DV: Math Exam Scores
   EV: Student's IQ/Abilities
2. IV: FB Posts
   DV: Sales
   EV: Product quality/current economic status
3. IV: source of soil
   DV: growth of pechay
   EV: weather or environmental conditions/pests
4. IV: charger and charging cable combination
   DV: charging time/how fast
   EV: charger quality/compatibility
5. IV: learning modality
   DV: exam scores
   EV: student learning styles/availability of resources

What's More Activity 3

1. Quantitative – Continuous
2. Quantitative – Continuous
3. Quantitative – Continuous
4. Qualitative – Nominal
5. Qualitative – Nominal
6. Qualitative – Ordinal
7. Qualitative – Ordinal
8. Qualitative – Nominal
9. Quantitative – Discrete
10. Qualitative – Nominal
11. Quantitative – Discrete
12. Qualitative – Ordinal
13. Qualitative – Dichotomous
14. Quantitative – Interval
15. Qualitative – Nominal

Posttest

1. D
2. B
3. C
4. A
5. B
6. A
7. C
8. A
9. A
10. C
11. C
12. B
13. A
14. C
15. C

Pretest

1. B
2. C
3. A
4. A
5. B
6. C
7. A
8. A
9. D
10. B
11. C
12. B
13. A
14. C
15. C

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