

Overview and Exemplar Components of the Research Methodology on the Research Writing Process for Senior High School Students

Almighty C. Tabuena¹, Yvon Mae C. Hilario², Mhelmafa P. Buenaflor³

¹Senior High School Faculty Member, High School Department,
Espiritu Santo Parochial School of Manila, Inc., Manila, Philippines

²Faculty Member, High School English Department, St. Stephen's High School, Manila, Philippines

³Undergraduate Student, Faculty of Education Sciences, Philippine Normal University, Manila, Philippines

ABSTRACT

The research methodology outlines how research has been performed, addresses an unusual technique as well a description of whether a researcher has introduced a new method or substantially modified one that already occurs. This article takes the initiative in research education to help students develop and retain research skills in planning, preparing, and writing research methods as one of the K-12 learning skills among senior high school research courses. The research methodology comprises basic components including the design, sampling, tools, collection procedures, analysis, and ethical considerations. There are three types of study designs: qualitative, quantitative, and mixed methods. One can explain the sampling procedure, size, subjects tested, and the location of the study in the sampling techniques. On the other hand, a researcher must mention the technical materials used in the study when writing the research instrument. The validity and reliability of the instruments should be tested before being used by the researcher. Since it involves gathering the information needed to resolve the research problem posed, data collection is considered to be the most important step of the research process. Data can be analyzed using a number of techniques, quantitative or qualitative. In addition, the study report should indicate whether and to what extent the studies comply with ethical standards. As a general rule, the research methods should be robust enough to reproduce the results. In this light, these overviews and exemplars help students demonstrate research writing skills and present research methodology throughout the research writing process.

KEYWORDS: components, exemplar, research, research methodology, research writing process, students

INTRODUCTION

Method section describes the participants (e.g., demographics, selection criteria, and group assignment), the materials (e.g., task[s], equipment, instruments, including a discussion of their validity and reliability, if appropriate), and the procedures employed in the study such as treatment(s) and data analysis (Philippine Normal University, 2019). The research paper includes a long list of methods and procedures used to investigate the topic. When it's used, the study report usually includes a summary of the participants/subjects, the research methods, the experimental materials, and the procedure. Each experiment can involve a separate methods portion. A rule of thumb is that the research methodology should be precise enough for any researcher to recreate the results (University of California San Diego, 2021).

In this case, this article aimed to provide an overview and exemplar components of the research methodology on the research writing process for senior high school students, and they should be able to specify and describe the research method they will use, whether experimental, descriptive, or

correlational, and discuss and/or explain the appropriateness of the research method to the study or why it is best to use to investigate the problem and/or address the research questions (Dacanay, 2020). In addition, this article takes initiative in research education to help the students in establishing and maintaining the research skills (Tabuena, 2021c; Tabuena, 2020b) in planning, preparing, and writing the research methodology as one of the K-12 learning competencies among senior high school research courses in the research writing process.

RESEARCH METHODOLOGY COMPONENTS

The research methodology includes the following basic components: research design, sample and sampling techniques, research instruments, data gathering procedures, data analysis, and ethical considerations. It describes how a researcher carried out the study. In writing it, include a source to literature that describes an unusual technique and provide a description if one has developed a new technique or extensively modified existing ones (Pagulayan, 2019; Zulueta & Costales Jr., 2003).

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RESEARCH DESIGN

Research designs are strategies and processes (plans and procedures) for research, ranging from assumptions to data collection strategies (detailed methods of collecting and

analyzing data); thus, we have three types of designs (Creswell, 2009): qualitative research, quantitative research, and mixed methods research.

Table 1 Qualitative Research Designs

Qualitative Research Designs	Indicators			
	Purpose	Method	Analysis	Outcome
Case Study	To describe in-depth the experience	Direct observation and interaction with the subject	Synthesis of experience	An in-depth description of the experience
Ethnographic Research	To describe a culture's characteristics	Immerse self in culture	Describe characteristics of culture	Description of culture
Historical Research	To describe and examine events of the past to understand the present and anticipate potential future effects	Investigative process	Synthesis of all data (accept or reject); reconcile conflicting evidence	Biography, chronology, issue paper
Phenomenological Research	To describe experiences as they are lived and examine the uniqueness of an individual's lived situations	Triangulation (no specific steps to avoid limitations)	Classify and rank data, sense of wholeness, examine experiences beyond human awareness	Describe from the subject's point of view, identify themes, develop a structural explanation

A. Case Study

This study aims to identify why a creature acts, behaves, occurs, or exists in a particular manner. Case studies are detailed examinations of a program, case, procedure, or group of events. The information required for this study is captured via a variety of data collection techniques over an extended period of time. For example, "How do cancer survivors look at life? What are the characteristics of this single case?" Other examples of case study titles and topics are shown in Table 2.

Table 2 Case Study Titles and Topics Exemplars

Indicators	Exemplars
Case Study Titles and Topics	A Case Study of the Common Difficulties Experienced by High School Students in Chemistry Classroom in Gilgit-Baltistan (Pakistan) (Ali, 2012)
	Managing School Behavior: A Qualitative Case Study (Dodge, 2011)
	School Violence: A Qualitative Case Study (Altun & Baker, 2010)
	Bullying and School Attendance: A Case Study of Senior High School Students in Ghana (Dunne et al., 2010)

B. Ethnographic Research (Ethnography)

It literally means "writing about people groups". The researcher immerses with the people. Ethnography is a research technique, one of the inquiry strategies, focused on ethnically (minorities, intact cultural group) or socially distinct communities over a prolonged period of time using mostly observational and interview methods. For example, "What are the migratory adaptations of squatter families in Barangay Cutcut, Angeles City?" Other ethnographic research topics are shown in Table 3.

Table 3 Ethnographic Research Topics Exemplars

Indicators	Exemplars
Ethnographic Research Topics	A psychological case study with extensive notes based on observations of and interviews with OFWs
	A study of primate behavior in the wild measuring the amount of time an animal engaged in a specific behavior
	A multi-case study of children of drug addicts who excel despite early childhoods in a poor environment

C. Historical Research

The aim of this research is to discover, identify, locate, even quantify, and synthesize past data and events. Sources of data come from correspondence, publications, and everything delivered to be read, which are accepted (artifacts, documents, oral reports, or relics). For example, "What were the forms of Filipino-student activism from the Spanish Era to the Contemporary period?" Other historical research topics are shown in Table 4.

Table 4 Historical Research Topics Exemplars

Indicators	Exemplars
Historical Research Topics	A study of the factors leading to the historical development and growth of cooperative learning
	A study of the effects of the historical decisions of the Philippine Supreme Court on Philippine prisons
	A study of the evolution of print journalism in the Philippines through a study of collections of newspapers

D. Phenomenological Research (Phenomenology)

The focus of this kind of research is to determine and explain the components of [human] interactions and inner experiences and how the parts relate and built to the whole. This requires intensive research over an extended period of time to comprehend the meanings and relationships (patterns) of a limited number of subjects as shown in Table 5. For example, "What are the common experiences encountered by a person with a spouse who is undergoing rehabilitation?"

Table 5 Phenomenological Research Exemplar

Indicators	Exemplar
Phenomenological Research (Excerpts)	Daly (2005) examined the lived experiences of mothers of suicidal adolescents. She contended that, unfortunately, the mother's experience is often the hidden dimension in the family. Unstructured interviews were conveyed with 6 mothers living with suicidal adolescents. Six themes were identified: failure as a good mother, the ultimate rejection, feeling alone in the struggle, helplessness, and powerlessness in the struggle, cautious parenting, and keeping an emotional distance.

Quantitative Research Designs

There are two types of quantitative research: experimental and non-experimental research. For experimental research, we have true-experimental and quasi-experimental research.

A. True-Experimental Research

It adheres strictly to the procedures of the scientific method which involves the manipulation of variables and employment of treatment or interaction; to prove cause-effect relationship among a group of variables that make up a study. The independent variable is manipulated to determine its effect on the dependent variables. Subjects are randomly assigned to experimental treatments rather than identified in naturally occurring groups. Examples of true-experimental research topics are shown in Table 6.

Table 6 True-Experimental Research Topics Exemplars

Indicators	Exemplars
True-Experimental Research Topics	The effect of counseling and medical treatment on alcoholism
	The effect of positive reinforcement on student's attitude to excel in school
	The effect of a terror Math teacher on students' attitude about attending Math classes

B. Quasi-Experimental Research

An independent variable is identified but not manipulated. The effects of the independent on the dependent variable are measured. The researcher does not randomly assign groups but rather uses those that are naturally formed or pre-existing ones. Examples of quasi-experimental research titles and topics are shown in Table 7.

Table 7 Quasi-Experimental Research Titles and Topics Exemplars

Indicators	Exemplars
Quasi-Experimental Research Titles	Classroom assessment techniques in music, arts, physical education, and health for junior high school students (Tabuena, 2017)
	A Pre-Experimental Research on the Implementation of Selected Classroom Assessment Techniques for Music, Arts, Physical Education, and Health (Tabuena, 2021a)
Quasi-Experimental Research Topics	The effect of studying in Catholic schools on the moral value system of those who graduate from those schools
	The effects of exercising regularly on body fitness
	The effects of good family upbringing to good performance in class

For non-experimental research, we have descriptive research and correlational research.

C. Descriptive Research or Survey Research

It describes the current status or existing condition of an identified variable. Designed to provide systematic information about a phenomenon. It answers the questions, "who, what, when, where, and how" and not the question "why". It does not seek to explain why certain things happen. Yet, in some cases, it also answers the questions "why" but more likely on a qualitative approach, methods such as the interview, observation, and qualitative survey, as shown in Tables 8 and 9.

Table 8 Descriptive Research Titles and Topics Exemplars

Indicators	Exemplars
Descriptive Research Titles	Demonstrative process on the use of research abstracts in writing the literature review for senior high school students (Tabuena, 2021b)
	Identifying and stating the problem through the use of a research outline proposal in the research writing process (Tabuena, 2020a)
Descriptive Research Topics	A description of the tobacco use habits of teenagers
	A description of the kinds of physical activities that typically occur in nursing homes and how frequently each occurs
	A description of how parents feel about the K-12 curriculum

Table 9 Descriptive Research Design Exemplars

Indicators	Exemplars	
Research Titles	Perception of the Students Between the School's Support in Academics and Sports Towards the Promotion and Sustainability of Sports Activities (Tabuena, 2020d)	Quality of Life of Post Myocardial Infarction Patients Admitted at Bulacan Medical Center (Santiago, 2018)
Descriptive-Survey Research Design (Excerpts)	This study used the descriptive-survey and action research design including both qualitative and quantitative methods using data collection procedures such as the questionnaire, structured interview protocols, and follow-up questions. The data are analyzed using the content analysis based on the structured interview and the use of weighted mean in determining the intensity of the response of the respondents for each behavioral indicator in the survey. Furthermore, the researchers' target is to compare the support that the school gives when it comes to activities whether it is academic or sports activities.	This study made use of a descriptive research design through a retrospective cohort study analytic method, which aimed to assess the quality of life of post-myocardial infarction patients who suffered from Acute Myocardial infarction admitted and subsequently discharged from the Bulacan Provincial Hospital year 2015. According to Doll (2001), a retrospective cohort study is a medical and psychological research study in which the records of groups of individuals who are alike in many ways but differ by a certain characteristic are compared for a particular outcome. In retrospective cohort studies, a risk ratio or odds ratio assesses relative risk (U.S. Department of Health and Human Services, National Institutes of Health).

D. Correlational Research

It defines the degree of relationship between two or more variables using statistical data. It seeks to interpret the relationships between and among several facts. It distinguishes patterns in some data, but it does not go so far in its analysis to prove causes for these observed patterns, as shown in Table 10. The variables are not manipulated.

Table 10 Correlational Research Topics Exemplars

Indicators	Exemplars
Correlational Research Topics	The relationship between a successful career and educational attainment
	The relationship between high grades and having tutors
	The relationship between smoking and tuberculosis

Mixed Methods Research Designs

If your study will use both qualitative and quantitative approaches, this type of research design might suit your research study. There are three mixed methods research designs:

A. Sequential Mixed Method

When developing a sequential mixed methods study, the researcher would like to follow the work of another approach in the hopes of discovering more evidence that adds to what is already known. Beginning with a qualitative interview and conducting a quantitative survey in order to have broad population-level data. Alternatively, the research could begin with a theory or idea experiment followed by a more thorough exploration with a few samples, as shown in Table 11.

Table 11 Sequential Mixed Method Research Design Exemplars

Indicators	Exemplars	
Research Titles	Preferred Teaching Practices among Junior High School Teachers and Its Impact towards Readiness of Grade Seven Students in the Secondary School (Tabuena et al., 2020)	Students' perception in the implementation of the IMRaD structure approach and its implications on the research writing process (Tabuena, 2020b)
Sequential Mixed Method Research Design (Excerpts)	This study used the sequential mixed method design in identifying the preferred teaching practices among selected Grade 7 junior high school subject teachers conducted at Espiritu Santo Parochial School of Manila, Inc. and its impact and effectiveness towards the readiness of incoming Grade 7 students in the secondary school, for the school year 2019-2020; both quantitative and qualitative methods were implemented sequentially, through survey and interview, respectively.	This study used the sequential mixed method design in examining the implementation and appraisal of the IMRaD structure approach and its implications on the research writing process among Grade 12 senior high school students of the Humanities and Social Sciences (HumSS) academic strand, conducted at the Espiritu Santo Parochial School of Manila, Inc. in the school year 2019-2020. In terms of data gathering, both quantitative and qualitative methods were implemented in a sequential manner, through survey and interview, respectively.

B. Concurrent Mixed Method

In this type of mixed methods, researchers combine quantitative and qualitative methods to accomplish a detailed analysis of the research issue. The researcher obtains all types of data over the course of the research project and then incorporates all of the information into the analysis of the final results. It is possible to incorporate one type of data inside another to enquire various types of questions (the qualitative addresses the process while the quantitative, the outcomes).

C. Transformative Mixed Method

Transformative mixed methods procedures are those in which the researcher uses a theoretical theory or perspective, called a theoretical lens, as a data framework for a study design that includes both quantitative and qualitative data. This research provides a foundation on which the subjects of interest are built, an approach for gathering data, and the anticipated results/changes are shown. Using this lens, as a data collection methodology may go one of the following two ways: sequential or concurrent - shaping questions and providing ways for change or action.

SAMPLE AND SAMPLING TECHNIQUES

The population is composed of persons or objects that possess some common characteristics that are of interest to the researcher. From that population, you will only choose a particular sample. The sample is a subset of the entire population or a group of individuals that represents the population and serves as the respondents of the study. In getting the sample, you will use a particular sampling technique. There are two general kinds of sampling techniques (Jerusalem et al., 2017) as shown in Table 12:

Table 12 Probability and Non-probability Sampling Techniques

Sampling Techniques	Definition
Probability Sampling	Type of sampling in which all the members of the population are given an equal chance of being selected.
Non-probability Sampling	Type of sampling in which sampling group members are selected in a non-random manner; not each population member has a chance to participate in the study.

Types of Probability Sampling

The following are the different types of probability sampling: (a) Simple Random Sampling - gives the respondents an equal chance to be selected (e.g. fishbowl technique); (b) Systematic Random Sampling - selecting every *n*th element of the population (e.g. checking the 4th participant in the registered attendees); (c) Stratified Random Sampling - dividing the population into groups called strata according to some classification category (e.g. grade 11 level into different sections); and (d) Cluster Sampling - elements of the population are divided into groups called clusters. An example of probability sampling is shown in Table 13.

Table 13 Probability Sampling Exemplar

Indicators	Exemplar
Research Title	Development and Validation of a Philippine Music Achievement Test in Addressing the K to 12 Music Curriculum Learning Competencies (Tabuena, 2020; Tabuena, 2016)
Probability Sampling(Excerpts)	In some cases, the characteristic of the population is such that the proportions of the subgroups are grossly unequal. Therefore, the stratified proportional random sampling technique may be used. In this case, from District 1 to 6 in the Division of City Schools, Manila, proportional sample (for each district) is determined by dividing the sample distribution (total number of students per section) to the population (total number of students for specified districts), then multiply to the target sample size, which is 120 (students).

Types of Non-Probability Sampling

The following are the different types of non-probability sampling: (a) Convenience Sampling - accidental or incidental sampling (e.g. interviewing students who entered the school); (b) Quota Sampling - the population is divided into homogenous strata and then sample elements are selected from each stratum; (c) Purposive Sampling - involves the handpicking of subjects. It is also called judgemental sampling. An example of non-probability sampling is shown in Table 14.

Table 14 Non-Probability Sampling Exemplar

Indicators	Exemplar
Research Title	Effectiveness of Classroom Assessment Techniques in Improving Performance of Students in Music and Piano (Tabuena, 2019b)
Non-probability Sampling(Excerpts)	This study used purposive sampling of thirty (30) Grade 10 students from the eight (8) sections (from St. Albert the Great to St. Rose of Lima) of Espiritu Santo Parochial School of Manila, Inc. for the school year 2018-2019 to determine the effectiveness of classroom assessment techniques that might provide and help teachers through assessment and evaluation processes in teaching World Music and Basic Piano Music.

Sample Size

In sample and sampling techniques, you will also indicate the research subjects and the research locale. In the research subjects, you will identify among the sample who the subjects will be. In the research locale, you will specify where the study will be conducted; and an explanation of the appropriateness of the research subject and the research locale in your research study. Observe the previous two examples on sample and sampling techniques (Table 13 and Table 14); there is a sample (number of subjects), sampling technique, research subject, and research locale. The question now is, "how to determine the sample size?"

Computing the Sample Size - Slovin's Formula is used to compute for sample size (Sevilla, 1984; Calmorin, 2010) when you have limited information about the characteristics of the population and are using a non-probability sampling procedure (Subong, Jr., 2005). The formula (sometimes written as Sloven's formula) was formulated by Slovin in 1960. The error tolerance, *e*, can be given to you. Formula: $n = N / (1 + Ne^2)$; where: *n* = sample size; *N* = population size; and *e* = desired margin of error (0.05). The following are the steps: (a) determine the population and decide the margin error of not be higher than 5%

(0.05); (b) compute using the formula; (c) use the sample to determine the distribution per strata, the sample proportion is equal to the sample divided by population size; and (d) multiply the sample proportion to the sample size to determine the individual sample (Calderon & Gonzales, 1993).

In other researches, especially in descriptive or survey research, the researcher will just get the 30% of the population. For example, there are 260 grade 12 students, the sample will be 78. The researcher will administer the questionnaire for [not less than] 78 grade 12 students.

RESEARCH INSTRUMENTS

In writing the research instrument, list the technical materials used in the study. For standard materials like relevant technical specifications, sources, methods of preparation, and other relevant information refer the reader to the relevant literature for specifications. If you have used new materials, described them in sufficient detail to allow another expert to prepare the same materials. What instruments were used? Are these standard instruments? If not, you should cite the relevant literature so that others could, if they were so inclined, repeat your study.

In this research methodology component, the researcher should be able to: (a) describe how your variables will be measured or observed (e.g. in experimental research, the measurement of the dependent variable should be described in this section); (b) describe the instrument/s and other data gathering materials you will use; and (c) include information about the types of items and responses, the scoring procedure, pieces of evidence of reliability and validity of the instrument. If you constructed your instrument, discuss the steps of how you developed and validated your instrument (i.e. showing evidence/s of validity and estimates of reliability). An example of a detailed description of a research instrument is shown in Table 15.

Table 15 Research Instrument Exemplar

Indicators	Exemplar
Research Title	Quality of Life of Post Myocardial Infarction Patients Admitted at Bulacan Medical Center (Santiago, 2018)
Research Instrument(Excerpts)	The study made use of the RAND 36-Item Short-Form Health Survey (SF-36). SF-36 is a set of generic, coherent, and easily administered quality-of-life measures. These measures rely upon patient self-reporting and are now widely utilized by managed care organizations and by Medicare for routine monitoring and assessment of care outcomes in adult patients. The RAND 36-Item Health Survey (Version 1.0) taps eight health concepts: physical functioning, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, emotional well-being, social functioning, energy/fatigue, and general health perceptions. It also includes a single item that indicates the perceived change in health. Accordingly, this study assessed the physical, social functioning, vitality, as well as general health of patients discharged from Bulacan Provincial Hospital one month after an acute myocardial infarction, using the Rand 36 survey questionnaire. A 36-item short-form (SF-36) was given to survey the health status and an abbreviated variant of it; the SF-36 was designed for use in clinical practice and research, health policy evaluations, and general population surveys by the study (RAND Corporation, 2018).

In some cases, some researchers followed a process of developing a research instrument; one will explain to the reader the process of developing the research instrument from the kind of instrument, format, types of questions to its purpose by the research problem.

DATA GATHERING PROCEDURES

Before the researcher administers the research instrument/s (e.g. questionnaires), he should ensure its validity and reliability. Then, that is the time to gather your data. Collecting data is regarded as the most important step in the research process because it involves obtaining the necessary information to answer the posed research question. Data collection techniques include (but not limited to) conducting surveys, interviews and/or observations, demographics, documents, and related literature and, test and experiments. An example of the data gathering procedure in the research writing process is shown in Table 16.

Table 16 Data Gathering Procedure Exemplar

Indicators	Exemplar
Research Title	Preferred Teaching Practices among Junior High School Teachers and Its Impact towards Readiness of Grade Seven Students in the Secondary School (Tabuena et al., 2020)
Data Gathering Procedure(Excerpts)	In the first phase of the sequential mixed method (quantitative method), the research instrument (survey questionnaire) was evaluated and validated by three experts (teachers and coordinators) at Espiritu Santo Parochial School of Manila, Inc., and distributed for the survey process among 12 teachers; consisting of three parts in terms of pedagogy, practices, and assessment and evaluation. In addition, the researchers asked permission of the participants to give necessary (existing) data, the class mean or average score of respective handled section/s both in the first and second grading periods. The data was used to assess whether the preferred teaching practices are effective and suitable for the students, particularly in Grade 7. The researchers initiated the strictest confidentiality and anonymity of the data gathered. In the second phase (qualitative method), an interview protocol was conducted to expound the data, involving a detailed exploration with a few individuals (Creswell, 2009).

DATA ANALYSIS

A variety of methods may be used to analyze data (Tabuena & Hilario, 2021). The method of data research differs according to the approach to be taken – quantitative or qualitative. Quantitative information is provided in tables and maps, although this information provides both qualitative and quantitative perspectives. Any technique can be used manually or by using an automated program. There are several statistical packages available, such as Microsoft Excel, which can be used for succinct and streamlined analyses.

In this component, the researcher should be able to discuss the procedures as to how he will score, record/encode and analyze the data to answer the research problem/s. If the researcher will use a special form for recording or accumulating data, place an example in the appendix section. If one will conduct a phenomenological study, he should describe the sophisticated ways how the data would be processed and analyzed. Further, if one will apply statistical tests to analyze the data, identify the specific descriptive statistics and/or inferential statistics that will use in the research study (Dacanay, 2020).

On the other hand, statistical techniques are used to give meaning to the data gathered from the subjects. In this sense, you will be dealing with the general analysis of data according to your research design to the data gathering procedure. There are three different types of data analysis: univariate, bivariate, and multivariate. There are three general types of data analysis, you might be using qualitative or quantitative data analysis if you used mixed methods research designs. For qualitative data analysis, we have ethnographic data analysis, grounded theory data analysis, phenomenological data analysis, constant comparative method analysis, or language-based data analysis (content analysis, discourse analysis, narrative analysis). You may use other data analysis based on the nature of your research study: normative analysis (arithmetic mean and standard deviation), descriptive analysis, status analysis, classification of analysis, evaluate analysis, comparative analysis, and/or cost-effective analysis.

Qualitative Data Analysis

Qualitative data analysis is focused on quantifiable meanings expressed through words, qualitative data analysis is based on meaning expressed through language (conceptualization). Qualitative data analysis includes arranging, accounting for, and describing data; in short, making sense of data in terms of participants' meanings of the case, noting trends and themes (patterns), categories, and regularities. Having a database (a compilation of information such that it can be conveniently accessed, maintained, and updated) is not sufficient to perform a qualitative analysis. In order to achieve results that will turn raw data into new information, a qualitative researcher must effectively participate in all stages of the research process. The understanding of these processes is an important part of reading, understanding, and interpreting qualitative research.

Qualitative data is obtained in a number of ways. In most qualitative studies, a database consists of a series of interview transcripts generated through the process of open-ended, oriented, and exploratory interviews. However, there is no limit of what could constitute a qualitative archive, and increasingly we are making more inventive use of such sources as documented findings (both video and participatory), focus groups [discussion], texts and papers, multi-media or public domain sources, policy manuals, photos, and lay autobiographical accounts.

Quantitative Data Analysis

Quantitative data analysis, a prolific method of study, as it stems from positivism. It can be used for analysis with long- and short-term studies, as well as case studies, action research, correlational research, and experiments. Quantitative data analysis is based on numeric values while data collection generates numerical values on a scale. The study would use charts and statistics and could be facilitated by the identification of variables. There are three fundamentally different types of quantitative data analysis: univariate, bivariate, and multivariate analysis.

A. Univariate Analysis

It is a test of a single variable to determine whether the sample is similar to the population from which it has been drawn, as shown in Table 17.

Table 17 Univariate Analysis Exemplar

Indicators	Exemplar
Variable/s	Different Levels of Colleges
Problem	How adequate are the instructional materials at the different levels of colleges in certain regions as perceived by the Mathematics professors?
Statistical Tool	Weighted Arithmetic Mean
Sample Results	Level 1 college, the weighted mean is 3.6 (very adequate); level 2, 3.4 (adequate); level 3, 2.9 (adequate); and level 4, 2.8 (adequate)
Data Analysis (Analysis and Interpretation)	Table 1 shows the adequacy of instructional materials at the level of colleges. Level 1 college obtained a weighted mean of 3.6 interpreted as very adequate; level 2, obtained a weighted mean of 3.4 interpreted as adequate; level 3 obtained a weighted mean of 2.9 interpreted as adequate; and level 4 obtained a weighted mean of 2.8 interpreted as adequate. Based on the foregoing results as shown in the table, the instructional materials of the different levels of colleges in certain regions as perceived by the Mathematics professors ranged from adequate to very adequate; thus the null hypothesis is rejected.

B. Bivariate Analysis

It is a test of two variables on how they differ from each other (statistical tools i.e., correlation coefficient, z-test, and t-test), as shown in Table 18.

Table 18 Bivariate Analysis Exemplar

Indicators	Exemplar
Variable/s	English and Mathematics scores
Problem	What is the relationship between English and Mathematics as perceived by 10 BSE students in a certain university?
Statistical Tool	Pearson Product-Moment Correlation Coefficient (r)
Sample Results	English scores: 27, 48, 45, 34, 20, 38, 23, 40, 28, 37; Mathematics scores: 25, 35, 45, 21, 14, 27, 14, 38, 20, 23; respectively (N=10).
Data Analysis (Analysis and Interpretation)	The obtained Pearson r value is 0.87 which denotes a high relationship. This means that students who got high scores in English also got high scores in Mathematics and those who got low scores in Mathematics also got low scores in English. Thus, the null hypothesis is rejected.

C. Multivariate Analysis

It is a test of three or more independent variables at a time on the degree of relationship with the dependent variable, as shown in Table 19.

Table 19 Multivariate Analysis Exemplar

Indicators	Exemplar
Variable/s	Independent - crude vinegar from coconut tuba, coconut water, nipa, camias, and buri tuba; Dependent - pH coconut of crude vinegar
Problem	Is there a significant difference in the pH content of crude vinegar from coconut tuba, coconut water, nipa, camias, and buri tuba?
Statistical Tool	ANOVA (Analysis of Variance)
Data Analysis (Analysis and Interpretation)	The number of degrees of freedom of 4.24 at a 1% level of probability requires an F-value of 4.22 to be significant and degrees of freedom of 6.24 (period of storage) requires 3.67 to be significant. The computed F-value obtained for samples is 15.47 and for the period of storage is 15.19 which are significant at 0.01 level of probability. This means that the pH content of crude vinegar from different samples stored for seven weeks differs from each other. Thus, the null hypothesis is rejected.

Data Analysis Exemplar

Examples of data analysis on the research writing process are shown in Table 20.

Table 20 Data Analysis Exemplar

Indicators	Exemplars	
Research Titles	Preferred Teaching Practices among Junior High School Teachers and Its Impact towards Readiness of Grade Seven Students in the Secondary School (Tabuena et al., 2020)	Students' perception in the implementation of the IMRaD structure approach and its implications on the research writing process (Tabuena, 2020b)
Data Analyses (Excerpts)	The data were analyzed using the content analysis based on the interview and the use of frequency distribution, percentage, rank, and average/mean in determining the intensity of the response of the participants for each indicator in the survey questionnaire. On the other hand, to measure the existing data of the students taken from the teachers (class mean or average score of respective handled section/s both in first and second grading period), the researchers used the Hake factor analysis wherein the researchers obtained the value of normalized gain to interpret and analyze the gain in the scores of the students from first quarter (pre-evaluation) to second quarter (post-evaluation).	The data were analyzed by applying descriptive and inferential statistics; different tests were utilized such as the frequency distribution, weighted mean, mean (average), standard deviation, and independent-sample t-test.

ETHICAL CONSIDERATIONS

The research paper should contain information about whether, and the extent to which, the studies complied with ethical requirements. Have you explained how you complied with all relevant ethical requirements, including those governing experiments on humans and animals? Have you explained how the identity of research subjects was protected and that informed consent was obtained from all those who participated?

The following are the ethical codes and policies for research: honesty, objectivity, openness, respect for intellectual property, confidentiality, and human subject protection. On the other hand, the following are the rights of research participants: (a) voluntary participation, (b) informed consent, (c) risk of harm (principle of non-maleficence), (d) confidentiality, and (e) anonymity. An example of ethical considerations on the research writing process is shown in Table 21.

Table 21 Ethical Considerations Exemplar

Indicators	Exemplar
Research Title	Constructing Appropriate Music Listening Response Assessment Tool for Grade 7 Philippine Music Listening Competency (Tabuena, 2019a)
Potential Ethical Issues and Considerations(Excerpts)	The researcher will be responsible for the protection, of any risk and harm, of the students involved through following proper procedures of test administration, with supporting documents and letters from the Division of City Schools. In addition, it will guarantee the confidentiality and anonymity of the individual participants. In terms of data analysis, potential miscalculations will be prevented through statistical data management and software. Further, there is no future intimate information being disclosed during the data collection process.

CONCLUSION

The research methodology explains how a study was conducted. Have a reference to literature that discusses an uncommon technique in your writing, as well as a definition if you've created a new technique or significantly changed one that already exists. It includes the following basic components: research design, sample and sampling techniques, research instruments, data gathering procedures, data analysis, and ethical considerations. There are three types of study designs: qualitative research, quantitative research, and mixed methods research. You will describe the process of deciding the sampling and sample size, as well as the test subjects and the research location, in sample and sampling techniques.

A researcher, on the other hand, must list the technical materials used in the analysis while writing the test instrument. Refer the reader to the relevant literature for requirements for standard materials such as relevant technical specifications, sources, methods of preparation, and other relevant details. The validity and reliability of the research instrument(s) (e.g., questionnaires) should be checked before the researcher uses them. Then it's time to start collecting information. Since it entails collecting the requisite information to address the raised research question, data collection is considered the most crucial phase in the research process.

Data can be analyzed using a number of techniques. The approach to be taken – quantitative or qualitative – determines the data research technique to be used. In addition, the study report should state whether and to what degree the experiments met ethical standards. A different methods section can be used for each experiment. The research methodology, as a general rule, should be accurate enough for any researcher to replicate the findings. In this light, these overviews, approaches, exemplars, and processes aid students in demonstrating research writing skills and presenting research methodology during the research writing process.

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