

BS English

Research Methodology

Course Code:9078

Study Guide

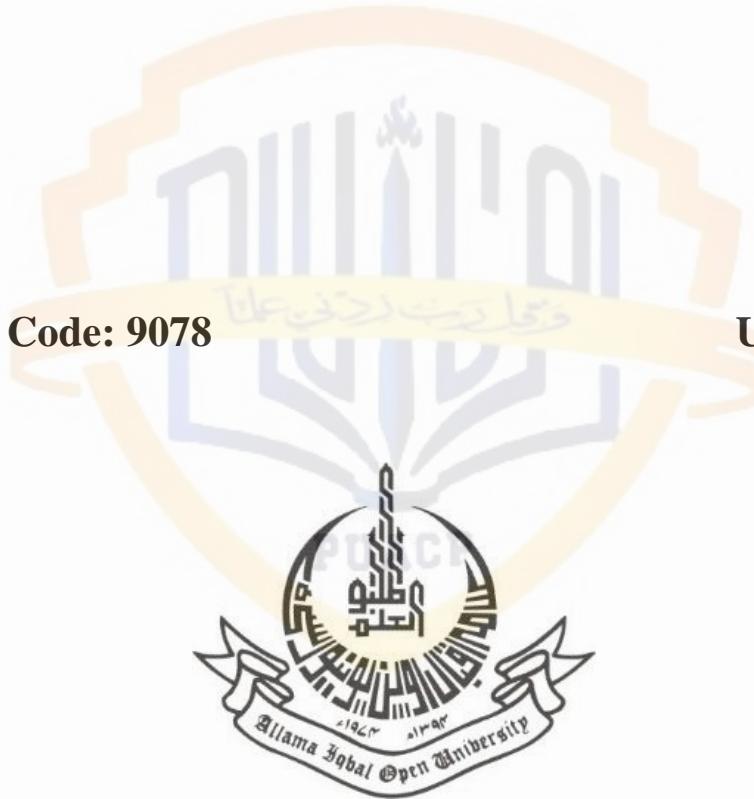


Department of English
Faculty of Social Sciences & Humanities
ALLAMA IQBAL OPEN UNIVERSITY

RESEARCH METHODOLOGY

Course Code: 9078

Units: 1–9



**Department of English
Faculty of Social Sciences and Humanities
ALLAMA IQBAL OPEN UNIVERSITY
ISLAMABAD**

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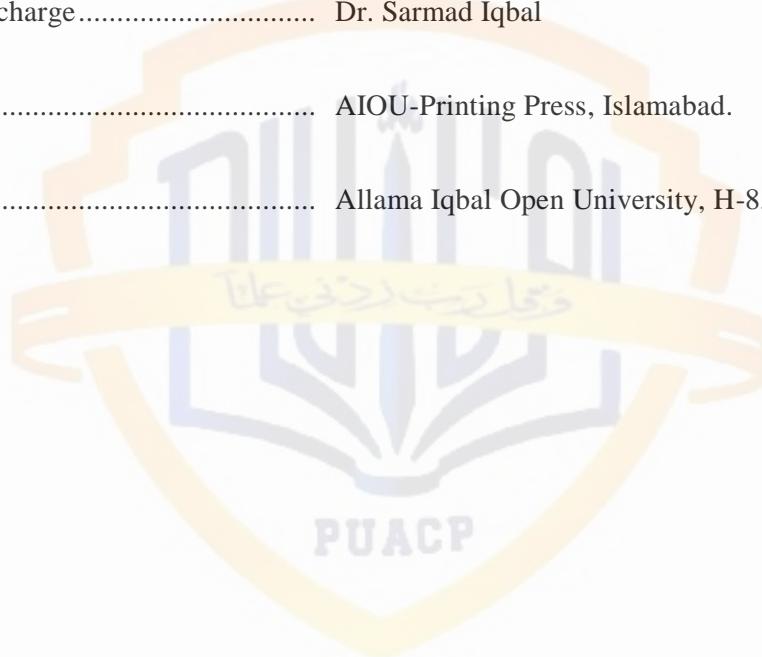
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FOREWORD

The BS English programme is being offered by the Department of English of Allama Iqbal Open University for the students who are interested in the fields of linguistics and literature. This programme is exclusive in the sense that it will provide study guides for all the courses written especially for the students of AIOU to introduce the concepts in an effective and simple manner. Furthermore, it will be effective from the viewpoint of students and researchers in implementing their knowledge in the classroom setting and/or research setting.

The BS English study guides aim to include all possible queries that students may have and gently stimulate their intellect to probe into further questions. The courses intend at professional development of the students in various disciplines of linguistics and literature using versatile methods adopted by course writers while writing the units. The topics and ideas presented in each unit are clear and relevant. Owing to the same reason, the text is comprehensive and accessible to students having no prior knowledge of linguistics and literature.

The BS English study guides are a powerful tool even for BS English tutors teaching in various regions, focusing upon a uniform scheme of studies for all the courses. Also, these courses will help tutors by providing adequate teaching material for independent teaching. All study guides strictly follow the standardized nine-unit sub-division of the course content for optimum understanding. The short introduction at the beginning provides an overview of the units followed by achievable learning objectives. The study guides also define difficult terms in the text and guide the students for accessible learning. The units are finally summed up in summary points and the assessment questions not only guide students but help to revise the content developed upon previously formed concepts. Moreover, they provide links and a list of the suggested readings for further inquiry.

In the end, I am happy to extend my gratitude to the course team chairman, course development coordinator, unit-writers, reviewers, and editors for the development of the course. Any suggestions for the improvement in the programme/courses will be fondly welcomed by the Department of English.

**Prof. Dr. Zia-ul-Qayyum
Vice-Chancellor**

INTRODUCTION TO THE COURSE

Basic Concepts of Research is to introduce you to the basic terms and concepts of Research as the main field of education and linguistics and literature area. It is significant enough to make you aware of these important basic concepts as it will make things easy for you being in position of a future researcher. Once these are clarified, you can practice them along with completing your suggested readings at the end of each unit. These suggested readings will equip you with practical skills in the field. These units cover the very basic concepts of nature of research to make you familiar with the very basic knowledge of it. All these basic concepts are like a strong foundation to construct the straight and resilient building of research work on it. To understand them well, go through the study guide thoroughly and attempt all the questions given at the end.

Literature review is all about theoretical backbone of research and is, in fact, a leading procedure toward comprehensive understanding of the research study at hand by providing background knowledge of most of the research works conducted in the field. As a matter of fact, there is a lot of literature on substantial research documents and, also, what to read and what not as well as how to write it systematically becomes a huge consideration and a massive task to be accomplished. That's why units are written to answer all these questions and to clarify all the confusions and misunderstandings by providing some basic conceptual knowledge about research mechanics, design, data collection, data analysis and writing about findings, conclusion and recommendations.

One unit is specifically written about significant parts of methodology of research designs, and here you will get to know the important principles of sampling and how to determine sample size. Therefore, this study guide will make your concept clear about the all the basic concepts of research and especially between quantitative and qualitative research approaches.

OBJECTIVES OF THE COURSE

By the end of going through all the units, you will be able to:

- define Research;
- differentiate between research methodology and methods;
- explain the concept of the nature of research regarding especially its components;
- identify the relationship of research paradigms and philosophies;
- pinpoint any two main research paradigms while explaining their characteristics;
- describe Ontology and Epistemology;
- recognize the research problem area and elucidate how it can be formulated as a statement of problem;
- discuss with illustrations the non- and researchable research questions;
- distinguish between aims and objectives of a research study; and
- write concise and practical smart objectives
- differentiate, with illustration, between pure and strategic types of researchers;
- describe the differences between descriptive and analytical research;
- recognize the quantitative and qualitative research tools and types
- acquire knowledge about writing of Chapters and Data Analysis and Conclusion;
- know how to arrange references or bibliography and appendices;
- discuss with illustrations the quantitative and qualitative researches;
- elaborate the characteristics of Mixed Research Type with practical examples of it; and
- explain with examples the Ethnography Research.

Unit-1



Written by: Dr. Malik Ajmal Gulzar

Reviewed by: Ms. Farah Saeed

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INTRODUCTION

Dear Students, Unit 1 on ‘Basic Concepts of Research’ is intended to introduce you with the basic terms and concepts of Research- the main field of educational area. It is significant enough to make you aware of these important basic concepts as it will make things easy for you being in position of a future researcher. Once they are clarified, you can practice them again and again along with completing your suggested readings at the end of the unit. This will equip you with practical skills in the field. This unit is covering the very basic concepts of nature and paradigms of research to make you familiar with the very basic knowledge of it. But the next concepts of identification and formulating statement of problem as well as differentiating between researchable and non-researchable questions to write clearly delineated research questions are added with the last section on objectives of the study. All these basic concepts are like a strong foundation to erect the straight and resilient building of research work on it. To understand them well, go through this unit thoroughly and attempt all the questions given at the end.

OBJECTIVES

By the end of this unit, dear students, you will be able to:

- i. define ‘Research’;
- ii. differentiate between research methodology and methods;
- iii. explain the concept of the nature of research regarding especially its components;
- iv. identify the relationship of research paradigms and philosophies;
- v. pinpoint any two main research paradigms while explaining their characteristics;
- vi. describe Ontology and Epistemology;
- vii. recognize the research problem area and elucidate how it can be formulated as a statement of problem;
- viii. discuss with illustrations the non- and researchable research questions;
- ix. elaborate the characteristics of a good research question with practical examples of it;
- x. define aim and objectives;
- xi. distinguish between aim and objectives of a research study; and
- xii. write concise and practical smart objectives.

1.1 AN OVERVIEW

Dear Students, today if you look around your own existence and that of national and international world, you will observe many problems and the various efforts to find out their solutions. You must be wondering how actually it happens and what processes are involved in it as you must be excited to know yourself all these steps for finding out solutions to varied problems in individual and social life. No worries. As a matter of fact, this involves ‘Research’. Now the question arises what research is. So let us see it step by step. First, just have a look at the term research itself. It comprises of prefix ‘re’ (meaning again and again) and the root word ‘search’ (finding out something meticulously). If now we look at our main term ‘Research’, it becomes obvious that it is a practical logical process based on some scientific inquiring and investigating procedure for working out solutions to different educational or social issues. This is done while repeatedly utilizing the existing body of information and real data. Research is, moreover, conducted in a wide range of fields from academic to the psychological ones to establish factual principles. To put it another way, ‘Research’ is an objectively approached systematic attempt for finding out the facts-based answers to the research questions and ultimately get solutions to the prevailed problem(s) in the field(s). For the said purpose, the whole research procedure is based on the principled steps of the research methodology. Here, it is important to note that Research Methodology is a whole procedural approach starting from identifying a problem and ending at finding out its solution as well as disseminating the results. Whereas, research methods are carefully selected strategies and techniques, consisting in research designs and tools, to carry out certain research work. This difference is well illustrated in the following:

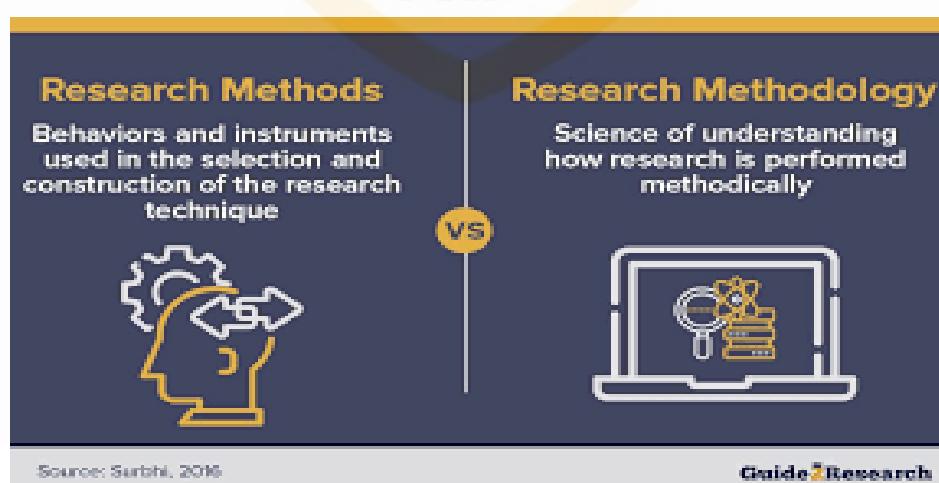


Figure 1.1: Research Methodology Vs Methods

In short, this is a brief description about the nature of research, the details of which are going to be shared, in the following 1.3 section of the unit:

1.2 NATURE OF RESEARCH

In order to understand nature of research, it is important to define research first of all. Hereby, it can be defined as a systematic or scientific procedure like experimental or survey type study for the sake of answering the research questions in an attempt to find out the solution to the prevailed unsettled conditions or problems. For this purpose, it manipulates the research variables, mostly having controlled settings, to contribute toward the development of a systematized frame of knowledge. Research can be either scientific (empirical), academic (psychological) or educational, descriptive (observational) or experimental, and qualitative or quantitative. In any case it utilizes scientific standards as well as statistical means to collect, organize, describe, and analyze the data. It may pave the path of developing theories, conceptual generalizations, and principles. Its usual process starts from identification and statement of the research problem, formulating research question(s) or hypothesis, describing objectives of the study, collecting the theoretical (literature review) as well as (practical) factual data, its analysis, and drawing out the data analysis-based findings and conclusion(s). These findings might lead towards a solution(s) of the research problem or toward some generalized principles as prerequisites of some theoretical origination. As defined by Klassen & et al. (2012), 'Research' is a cyclical procedure ... used to collect and analyze data for up surging our understanding about an issue on a certain topic [in any field]. According to them this is done in three key steps: firstly, to develop a research question, secondly, to collect data, and thirdly, to answer the question(s). All other steps are also important but not mentioned by them.

Therefore, criteria for a good research study are to plan precisely the research procedure, define clearly the purpose, describe smart objectives (measureable), elaborate operationally and carefully the research design and tools, examine data for reliability and validity, cautiously analyze the data adequately according to the research requirement (quantitatively, qualitatively or by a mixed method), and describe appropriately findings for the purpose of enabling the other researchers to conduct further research in the concerned field. All this procedure, if done diligently, reflect the characteristics of a reliable and valid research study for being organized according to a systematic rules set in a definite sequence. Such type of research work offers inspired and intensive thinking to avoid the intuitive use of guessing for jumping toward conclusion. So it is drawn out on the basis of staunch evidence, derived from the data analysis. Hence, led by the specific cognitive rules and rational processes of specific to general orientation, the

research study (historical/descriptive/experimental/case study) becomes more feasible and meaningful in the decision-making context. In this way a good research study overtakes the direct situations, objects or samples being scrutinized via framing some generalizations about the population or by developing a theory about the concerned factors. However, research designs, methods and results or findings should be made replicable and communicable in order to enable the other researchers for sake of evaluating their rationality and validity. In short, research is a journey from known to the undiscovered hidden truth. All this procedure can be understood well through this flow chart: Figure 1.2

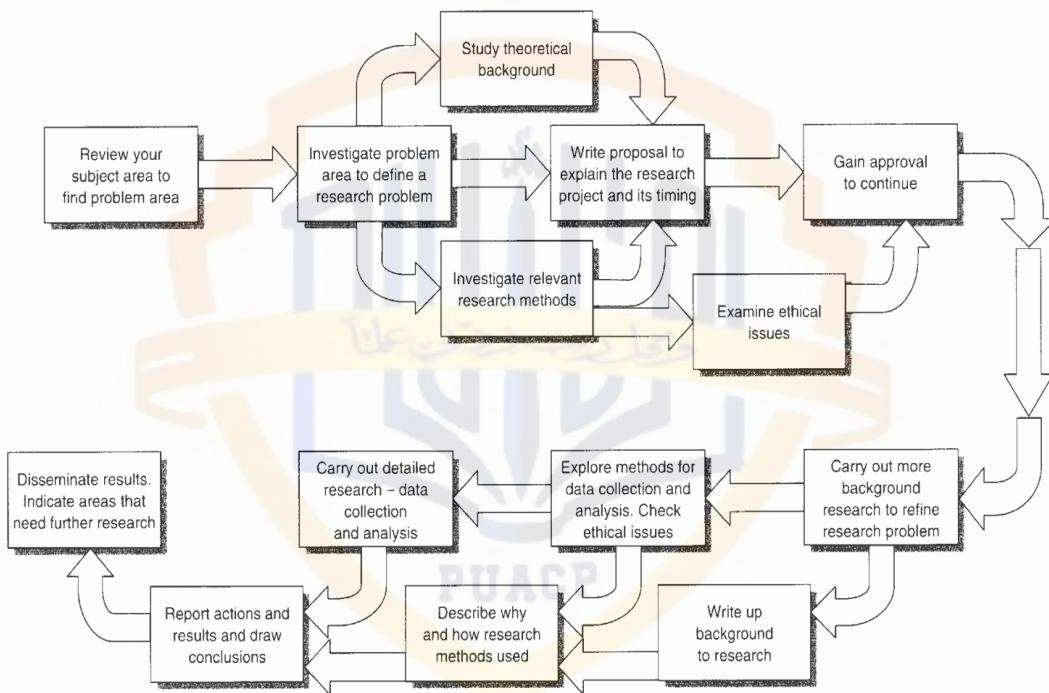


Figure 1.2: Research Procedure

1.3 PARADIGMS (PHILOSOPHIES) OF RESEARCH

The paradigms or philosophies of research are, in fact, an expedient way to locate and develop varied types of research theories. And the various sociological research paradigms revolve around the two major axes (Figure:1.3).

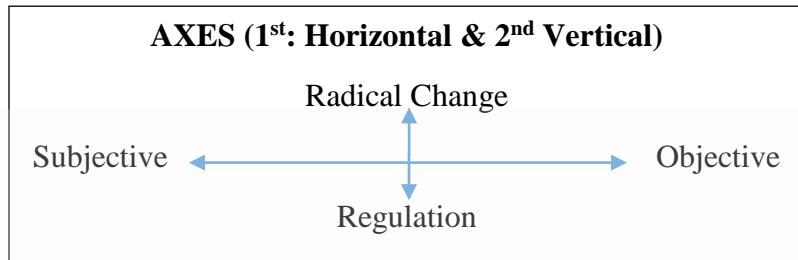


Figure 1.3: Axes for Research Paradigms

The two axis in the above-given figure 1.3 indicate the researcher's point of the view about the current state of affairs of the world. The first one is the horizontal axis having subjective and objective from left to right sides reflecting a researcher's objective realistic point of view to be acquired on the basis of the subjective perceptive experience. On the other hand, the second one, the vertical axis moves from regulation at the bottom toward a 'radical change' on the top side. It is indicative of the researcher's idea about the world as a firm basis to be studied for bringing about the positive radical changes in different worldly matters, and in our case in situation of teaching and learning English, to make it a better place to live in.

After having crossed these two horizontal and vertical axes, we develop different research quadrants or paradigms. According to Burrell and Morgan (2017), paradigm can be defined as a theoretical point of view that becomes a standard representative of an established set of interrelated ideas, either to read a research work or to conduct one by your own self. '...[A] set of [research] assumption(s) identifies a quite separate social scientific reality. To be located [with]in a particular paradigm is to view the world in a particular way' (P.24). Thus, they are very helpful, in this regard, '... to provide essentially rational explanations of social affairs' (P.26).

But before explaining the concept further, it is important to reflect on three underlining important research terminologies. They are Ontology, Epistemology and Methodology. Methodology is afore mentioned in section 1.2 Overview of this unit. So we shall here describe now only Ontology (having Greek origin ONTOS; meaning to be or being) and Epistemology (also having Greek origin EPISTEME; meaning knowledge). The first term 'Ontology' acclaims nature of social reality by answering to the questions about existence and its nature. Whereas Epistemology is concerned with gaining knowledge of social reality by developing the relationship between the researcher and social reality. Accordingly, Ontology focuses on what actually we want to know, and the later one guides us how we can know about social reality.

As it is mentioned in the very beginning of this section of Unit 1 that there are varied research paradigms like Positivism and Post- Positivism. Let us discuss them in detail. Introduced in 19th century by Auguste Comte (Father of Positivism), the traditional paradigm Positivism (Experimentalism/ Functionalism) is acquiring knowledge through scientific methods of analysis, synthesis, application, and classification. Thus, it is attributed to scientific truth and facts, experimentation, objectivity, and quantitative methodology. So, it supports philosophy of strict empiricism by exploring real situation in order to predict and formulate general laws. The second paradigm Post-Positivism (Interpretivism or Constructivism) is a philosophical perspective interested in finding the ways at both of individual and social levels, in which human beings interpret and construct the psychological and social realities within some specific social, linguistic and or historical contexts. Consequently, the second paradigm is based on critical reality. It combines empirical evidence with logical reasoning. The main attributes of it are, therefore, subjective qualitative, humanistic, and critical realism. Adding to it, the third paradigm is Pragmatism, which is concerned with practical issues, and not just with the rules. The researchers in this paradigm are known as Fallibilist as they see knowledge as something practical and useful. While keeping in view the research questions it combines both of positivism and interpretivism approaches. After having introduced the three research paradigms, now we are going to show their comparative characteristics in terms of ontology, epistemology, and methodology in the following table 1.1

Terms	Positivism	Post-Positivism	Pragmatism
Ontology	Tangible social reality to be proven by five senses.	Multiple context-bound realities.	Multi-dimensional and practical context-based reality.
Epistemology	Knowledge is gained through scientific methods, in which investigator and investigated are independent of each other and of instruments also.	Subjective: Knower and respondent co-create understanding.	Knowledge is gained in a practical way.
Methodology	Quantitative	Qualitative and Naturalistic	Mixed (Qualitative + Quantitative)

Table 1.1: Comparison of Research Paradigms

1.4 IDENTIFICATION AND FORMULATION OF RESEARCH PROBLEM

Dear Students, it is hoped that the basic concepts of research till its paradigms are clear to you. Now it's time to see how to begin a research study. As a matter of fact, it starts just at the onset of recognizing some problem or unsettled situation in the society, for which a solution is searched out. There are two steps for this commencing stage of a research study: First identification of research problem and second one is its formulation of statement. What is a research problem? It generally refers '... to some difficulty which a researcher experiences in the context of either a theoretical or practical situation and wants to obtain a solution for the same' (Kothari, 2004; P. 24). While selecting a research problem, it should be considered that topic to be studied should not be overdone or controversial in any sense. Rather it should be feasible in having measurable and SMART objectives and affordable economic status. After having selected the problem area for a research study, it must be well-defined as it would solve half of the problem and would facilitate all the research procedure in collecting data, by undertaking meticulously the following systematic process: '(i) Statement of the problem in a general way; (ii) understanding the nature of the problem; (iii) surveying the available literature (iv) developing the ideas through discussions; and (v) rephrasing the research problem into a working proposition' (Kothari, 2004; P. 27). These steps lead then to the molding of research problem into a straightforward form of a statement (not in a question form) having clearly mentioned all the variables, technical words and terms and basic postulates. The length of statement of the problem can vary from one statement of 3 to 4 sentences to one short or a long paragraph. One example of such statement of problem can be: The people's failure in taking all the three doses of CORONA vaccine is proving fatal, especially in Rawalpindi, Pakistan.

1.5 DIFFERENCE BETWEEN RESEARCHABLE AND NON-RESEARCHABLE QUESTIONS

Dear students! Now moving forward, this section of the unit is the one, understanding which can make easy for you to conduct a research study. After having gone through the basic stage of selecting research topic, based on some research problem, the main and very important stage in conducting a research work is to formulate a well-devised research question. And that is only possible, if you know well the difference between a researchable question and non-researchable question. It is important to mention here that this section is going to detail out not only difference between researchable and non-researchable question

but also how to formulate a good research question. Thus, let us start to describe the concept first of all with the examples of questions. For example, here are three questions given in the following:

‘Where is my laptop?’

‘Does the provision of motivation increase the language learning proficiency level?’

‘Can three doses of vaccine be helpful in curing Pakistani COVID 19 patients, especially in Pindi?’

Now look at the first Question (Q. 1). Do you think it is a researchable question? No, why? Yes, you are right. It is a non-researchable question as everyone, even in family knows about it that it is in his room. So there does not remain a need to conduct a research study as it is already a known fact and no more a social or educational problem to be worked upon for solution. But if you look at second question (Q. 2), it can be either a researchable or a non-researchable question. How? As far as it is concerned about the developed cities of Pakistan, its answer is known and that is affirmative because of many a research conducted on it. However, if it is a question about a far-flung area of Pakistan, there might be a need to conduct a research study to collect and analyse the data to get the factual knowledge about the current situation of the given topic in the special area. Coming to question no three (Q. 3), what is your opinion about it? Yes, surely it is a researchable question. Why? Answer is that it requires a survey research study to get answer to this question as it is not known to most of the population, even to the medical professionals. So, the need here is to collect data about the specific sample and analyse it for finding out the answer to the research question. Till here, it is simply described to make things easy for our learners. Now let us see what specific characteristics of a researchable question are, which differentiates it from a non-researchable one.

- A research question is formulated around the variables, two or more clearly labelled variables like in our Q. 3 there are variables: Three doses of vaccine and cure of Pakistani COVID 19 patients. The variables will be discussed in detail in Unit 7 of your study guide.
- The research question is stated clearly in an interrogative form, and not in a statement form.
- A research question takes care of ethical considerations like no one from the population should be offended by the research question in any moral or ethical aspect.

- It is testable and clearly identifies the problem to be solved by collecting the data easily.
- It's specific in its scope, not having the vast scope, for which collecting data becomes impossible for a researcher, e.g., a researcher cannot collect the data within a certain period (for example within a time period of two months) about three doses impact of Corona or COVID 19 vaccine not to speak of all over the world but even in Pakistan.
- Additionally, a researchable question noticeably pinpoints the population of the study, for instance, in our example of Q 3 population is there, 'Pakistani COVID 19 patients'.
- A very good characteristic of a research question is that it is written in a concise and precise way, having no ambiguity.
- Furthermore, it is well-aligned with the statement of problem, research design and ultimately with the research tools.

In short, a researchable question is testable, clear, concise, and precise, ethical and feasible to keep your research study focused and on track. In the beginning you might feel problem in formulating such research questions but with practice, exploring the issue and study of various research studies, you will be able to write a good research question. So, dear students, get ready to write your own research question on any of the practical social or educational problem to be solved.

1.6 OBJECTIVES OF THE RESEARCH STUDY

A vital step in conducting and writing a research study is describing its aim and main objectives. Without completing this crucial step, a research study may collapse into failure while wasting valuable time, resources, and energies of a researcher. The reason can be collecting inappropriate or purposeless data because of lacking the right direction in which study has to be processed.



Figure 1.4: An illustration of aim and objectives

In fact, aim is a pre-determined destination to be reached, and well planned-out and clearly depicted objectives are directing milestone to reach that destination. So aim is “What”, and objectives are “How” of a research study to complete its journey successfully. Before proceeding to the definitions of these very important concepts, let us have a look at the following figures, 1.5 and 1.6 to develop our understanding further.

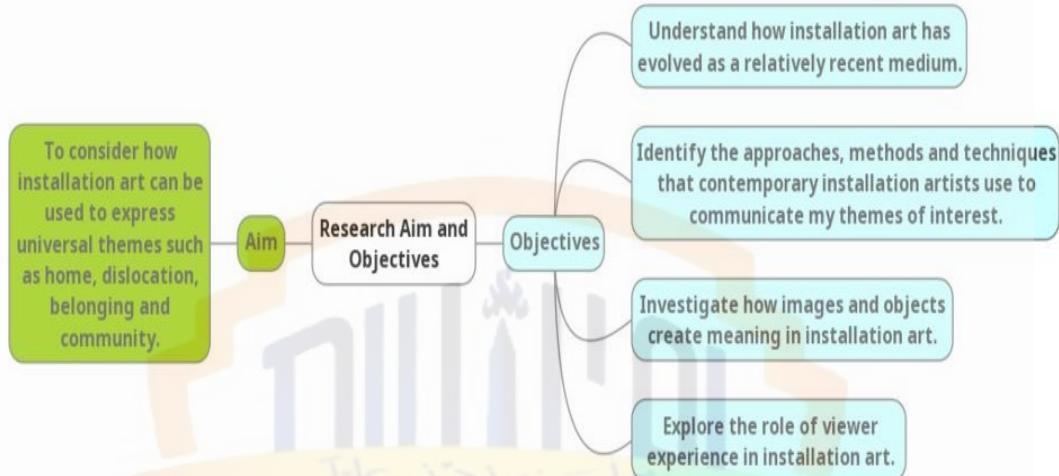


Figure 1.5: Aims and Objectives — Research Blog — Paper Joy Studio



Figure 1.6: Difference Between Aim and Objective | Definition, What and How/ Pediaa.Com

Therefore, we can say that aim is an anticipated outcome (What: Comprehensible knowledge), to obtain which more specific steps must be depicted and they are known as objectives (How: The research-specified actions or tasks). Thus, research objectives need to be practical, workable, functional, and accurately as well as specifically described. For our students this can be a hideous task, which can be converted into an easy and manageable task through the guidelines provided in the following 1.7 figure:



Figure 1.7: Which SMART Objectives Definition Should I Use? | Clear Review

Henceforth it is clear from figure 1.7 that statements to describe objectives of the research study should be specific and not the general ones. As objectives are, in fact, the results to be obtained so they must be achievable and measurable or assessable within the fixed timeframe. Moreover, the objectives should be planned and written as attainable and realistic outcomes especially in terms of information (accessible theoretical and practical data), money, skills, and time. A working illustration of such objectives is the objectives written in the start of each unit of your BS English study guides.

Some more practical guidelines for writing effective objectives are:

- Read the relevant research literature and review it to understand how the linguists and researchers plan and write their studies and especially how objectives are written in elucidated statement forms. This will lead you to write your own well-defined research objectives.
- After writing them up, take views of your teachers and other researchers; considering their guidelines you can revise, edit and refine your objective statements as they are once done according to the standard, the whole

research study is then well- aligned and designed to move ahead on real track of research study.

Once written clear, concise, and precise, feasible and practical objectives, they lead to choose the correct research sample, design, and tools to conduct the study. Please keep this in mind that at the end of your research study you must assess whether your research objectives have been achieved or not, if not, why so. In the latter case, you must simply explain the possible reasons behind it.

1.7 CONCLUSION

Dear students! This is to conclude the unit on the introduction of the ‘Research’ through its basic concepts. Though the unit is ended yet it is just the beginning of your journey as a researcher. To provide you with a good proficiency level in the field, the other detailed units on different theoretical and practical aspects of research are included. And for getting well versed in the knowledge and skills of research, it is hoped that you will go through all the units thoroughly as well as complete your suggested readings, included at the end of every unit. As far as this unit 1 is concerned, it dealt with the basic preparatory concepts of nature and paradigms of research, statement of problem, the non- and researchable questions, aim and objectives of the research study.

1.8 SUMMARY POINTS

Dear Students! Main points of the unit are summarized here in the following:

- i. ‘Research’ can be defined as a systematic, scientific, and logical cyclic process to answer the research questions to enhance our understanding and find out the solution to the prevalent unsettled conditions or problems.
- ii. Research methodology is different from methods as it is an entire practical approach to conduct a research study, beginning from identifying a problem and finishing at finding out its solution. However, research methods are selected research designs and tools to carry out a research work.
- iii. Nature of research is digging out the treasures of knowledge, found in various domains.
- iv. It can be either scientific, academic, or educational, descriptive or experimental, and qualitative or quantitative.
- v. Research studies are mostly conducted through manipulation of varied variables, collection, organization, description, and analysis of the theoretical and practical data.

- vi. For the above-mentioned purpose, it adopts the path of identification and statement of the research problem, formulating research questions or a hypothesis, describing objectives of the study, reviewing the literature as well as the collected data, its analysis, and drawing out findings and conclusion.
- vii. Research paradigms are the research philosophies that expedites locating and developing various types of research theories.
- viii. Different research paradigms include Positivism (Experimentalism/ Functionalism), Post-Positivism (Interpretivism / Constructivism) and Pragmatism (Practical approach).
- ix. Ontology applauds nature of social reality by answering to the questions about nature of existence.
- x. Epistemology is related with gaining knowledge of social reality by developing the relationship between the researcher and social reality.
- xi. Ontology, in fact, focuses upon what we want to know, and the Epistemology guides us how we can know about social reality.
- xii. To start any research, the very important initial step is to locate the current problematic area in any social or educational setting and then to formulate it as a brief statement of problem.
- xiii. A researchable question is testable, clear, concise and precise, ethical and feasible to keep a research study focused; whereas non-researchable is having opposite characteristics mentioned here.
- xiv. The characteristics of a good research question are:
- Formulated around two or more clearly labelled variables;
 - stated clearly in an interrogative form;
 - having ethical and moral considerations;
 - identifies clearly the problem to be solved;
 - testable by collecting the data easily;
 - specific in its scope;
 - pinpoints the population of the study;
 - written in a concise and precise way, having no ambiguity; and
 - having good alignment with the statement of problem, research design and also with the research tools.
- xv. Aim is an estimated result, to obtain which more specific steps have to be depicted and they are known as objectives.
- xvi. SMART objectives are:
- Specific;
 - achievable;
 - time-bound;
 - measurable; and
 - realistic.

1.9 SELF-ASSESSMENT QUESTIONS

- Q. 1** Define research and elaborate its nature with examples.
- Q. 2** How would you like to differentiate between research methodology and research methods? Support your answer with at least three examples.
- Q. 3** Now consider all of the research paradigms, mentioned in Unit 1; elaborate each of them and identify which one of these would you like to adopt and why?
- Q. 4** What have you understood by the terms? Ontology and Epistemology; explain them.
- Q. 5** Now select any topic of your interest for conducting a research study; for it write statement of the problem, research question and objectives.
- Q. 6** Illustrate the differences between researchable and non-researchable questions.
- Q. 7** Here is one example of a research question ‘what is the effectiveness of media-rich technology education on students?’ In your opinion, is it a researchable or a non-researchable question. In any of each case give arguments to prove your point of view.
- Q. 8** What is the difference between aim and objectives of the research study; elucidate it with examples.
- Q. 9** What are SMART objectives? Write a few SMART objectives for your research study on your own research topic.

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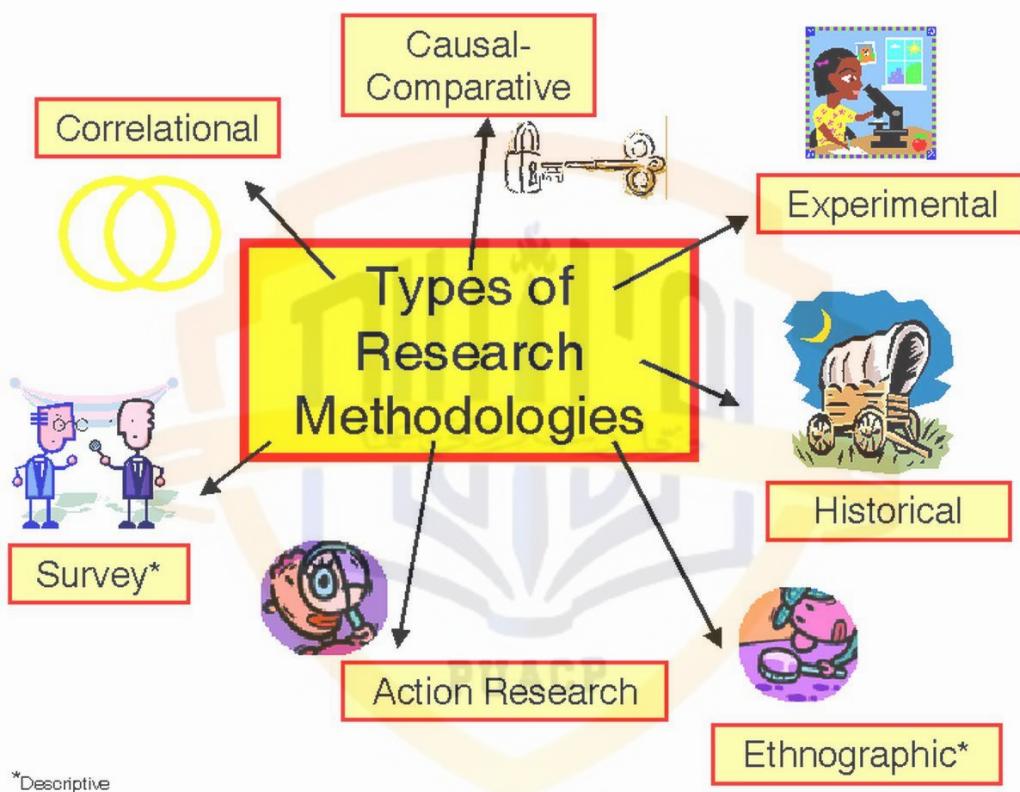
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Unit-2

TYPES OF RESEARCH



Types of Research by Method - We Educate, We Care/Educare

Written by: Dr. Malik Ajmal Gulzar

Reviewed by: Ms. Farah Saeed

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INTRODUCTION

Dear Students! The Unit 1 was on ‘The Basic Concepts of Research’, after going through which you have got an introduction about the basic terms and concepts of ‘Research’. Following that here is Unit 2, explaining different types of research to make you familiarize with the varieties of research and their relevant scope in the field. Basically, according to its nature and scope, research is of two types: Basic and Applied Research. These types are further divided into different sub-categories like descriptive, analytical, qualitative and quantitative etc. To understand them well, go through this unit thoroughly and attempt all the questions given at the end.

OBJECTIVES

By the end of this unit, dear students, you will be able to:

- i. identify different types of ‘Research’;
- ii. compare and contrast main research types;
- iii. explain the fundamental and applied researches;
- iv. differentiate, with illustration, between pure and strategic types of researches;
- v. elaborate the historical type of research;
- vi. describe the differences between descriptive and analytical research;
- vii. recognize the quantitative and qualitative research tools and types;
- viii. discuss with illustrations the quantitative and qualitative researches;
- ix. elaborate the characteristics of Mixed Research Type with practical examples of it; and
- x. explain with examples the Ethnography Research;

2.1 AN OVERVIEW

Research types are, as a matter of fact, the styles of conducting the research depending on the researcher's basic aim to conduct it. It may consider the data collection and analysis type or a researcher's own convenience or requirement to carry out a research study. If the research study is done just to seek, add knowledge or gain a full understanding of the current situation prevailed in the field, it is 'Basic (Fundamental) Research'. On the other hand, if the purpose is to take a step ahead of gaining or adding knowledge to its application, it is known as 'Applied Research'. The basic research aims at investigating the motives, causes and principles working at the back of a manifestation of a specific occurrence or an event. So, this type of research is also known as 'Theoretical Research' for being stimulated only by pure inquisitiveness to develop knowledge in a specific study area or a discipline. An example of such type of research is a case study to investigate the factors involved in triggering up depression of the middle-aged Pakistani people. Hence, it is the research to provide us with a logical and insightful understanding of a research problem, having a practical implication for both individual and the society.

The basic research is further distributed into two categories: 1. Pure and 2. strategic research types. The first one is, in fact, steered up without any pre-planned thought of explicit outcome except only the plan of knowledge expansion. Whereas strategic study is intentionally directed toward provision of a knowledge to work out a solution to a specific issue. Nevertheless, 'Applied Research' applies theories and principles to target the solutions to the current academic or societal problems through application or potential usage(s) of the fundamental research findings, e.g. An analysis of the impact of two doses of COVID 19 Vaccination on Islamabad inhabited Pakistani people between 40 and 50 years. Moving forward there is further division of both of basic and applied research into three research types, on the basis of data analysis procedures, and they are: Qualitative and Quantitative as well as Mixed Method Research.

In the following sections all the research would be explained. However, it is important to note here that though historical, descriptive and analytical fall under the same above-mentioned research types yet they would be described first separately and then main research types, qualitative and quantitative, would also be elaborated.

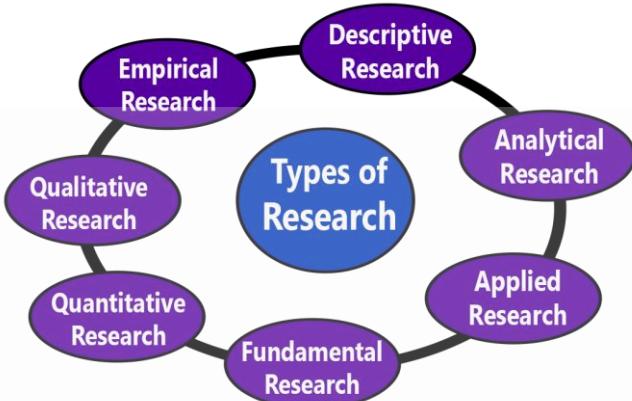


Figure 2.1: Types of Research/Library & Information Management

2.2 HISTORICAL RESEARCH

The term of history takes its origin in the Greek word ‘istoria’, meaning to explore, to enquire, and to learn. Henceforth, history is an analysis of past meaningful and chronological events and thus, it is learning of established facts. So it is not mere record of dates but an exclusive description of relativity of people with events, time-period and places (Murdick, 1969). In this way, history does have practical educational significance for developing an active and enquiring mind, promoting critical thinking skills in analyzing and evaluating numerous materials of primary and secondary sources. (Sandhiya, 2016). Primary sources are the ones created during the time of our historical investigation, for instance, law records, diaries, trial records and philosophical or scriptural trails whereas secondary sources are the documented chronicles, recorded by the historians on the related sequence of historical events, for example, historical books, journals, and history of gender analysis, etc.

Thereupon, historical research is explaining, re-examining, interpreting, revising the recorded facts to revalidate the acknowledged conclusions. The historical research problem is fundamentally having historical nature, and to find a solution to this, it mostly depends on sources rather than controlled laboratory environment. ‘Historical Research’ is, therefore, ‘... the systematic investigation, evaluation, synthesis of evidence with the objective to lay down the facts and derive conclusions regarding past events’ (Borng, 1967, P. 188). This type of research digs into the past events to re-enact it in its entirety for the sake of elaborating, analyzing, synthesizing, and philosophizing the significant meanings of the past. The historical research, thus, utilizes the ‘...reflective thinking to unsolved problems by means of discovery past trends of events, facts, or attitudes’ (Whitney, 1961, P.192).

Based on approach, nature and purpose, historical research is further divided into following four categories:

- i. ‘Historical Events Research’,
- ii. ‘Historical Process Research’,
- iii. ‘Cross sectional Comparative Research’ and
- iv. ‘Comparative Historical Research’. (Sandhiya, 2016)

Adding to it, there are following eight steps to conduct a historical research study:

- i. Developing and managing a paperwork system,
- ii. selection of a topic,
- iii. studying background historical context,
- iv. narrowing down your topic,
- v. gathering and recording information (literature review and data collection),
- vi. interpreting and analyzing sources and topic’s significance in historical context,
- vii. developing a thesis and finalizing research project, and
- viii. references or bibliography (or annotated bibliography)

Till here a brief introduction of historical research is given. Further details of it regarding data collection and analysis will be presented in our later section of the unit of qualitative research type as it falls under the same category, mentioned here.

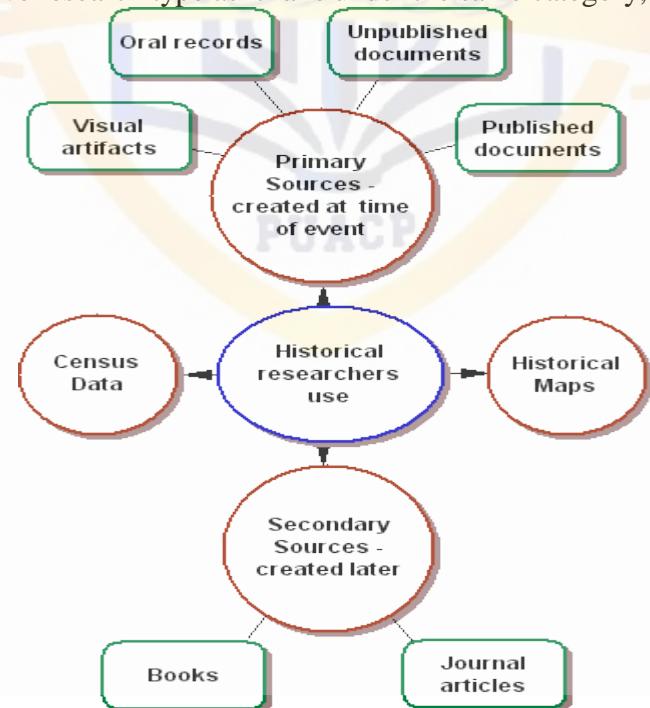


Figure 2.2: A Step by Step Guide to Doing Historical Research/
People/College of Humanities and Social Sciences

2.3 DESCRIPTIVE AND ANALYTICAL RESEARCH

'Descriptive Research' is conducted to describe prevalence of certain problematic issues, behaviors, or other characteristics of the population through classification, description, comparison, and measurement of data. But 'Analytical Research' focuses and analyses cause and effect relationship. Therefore, descriptive research generates hypotheses and is concerned with 'What, Who, When and Where' but analytical research tests hypotheses and deals with 'Why and How' (Omair, 2015). A hypothesis is an intelligent guess about variable association, which can be tested in a systematic research study. For example, interactive teaching will enhance oral skills of middle level Pakistani students in Islamabad. In this example, interactive teaching and oral skills are variables. The following table 2.1 is showing the differences between both of the research types, discussed here:

DESCRIPTIVE	ANALYTICAL
Describes	Explains
Is more exploratory	Is more explanatory
Profiles characteristics of the groups	Analyses because groups have certain characteristics
Focuses on 'What'	Focuses on 'Why'
Develops a hypothesis	Tests a hypothesis
Does not require comparisons (between groups or over time)	Requires comparisons between groups or overtime
Tries to minimize the precision of estimates.	Tries to maximize power to detect differences if they exist.

Table 2.1: Descriptive vs Analytical Research Types

At aggregate, descriptive study can be an Ecological study and on individual level there can be Case Report, Case Series and Cross-sectional research types. Cross-sectional research study is a research type which is conducted to know about the characteristic features of a population (a small definite group or a sample drawn from a large group) at one time like a photo snapshot with no comparison groups. On the other hand, cohort study is an example of analytical research type. In this type, participants are selected according to exposure or treatment status and followed up for certain period of time to determine outcomes. Thus, this research study makes it appropriate for unusual exposures or for definite cohorts, a distinct group of individuals sharing common characteristics and/or experiences, e.g. people born in the same year or month. Figure 2.3 is a good illustration of all these research designs, in form of a flow chart.

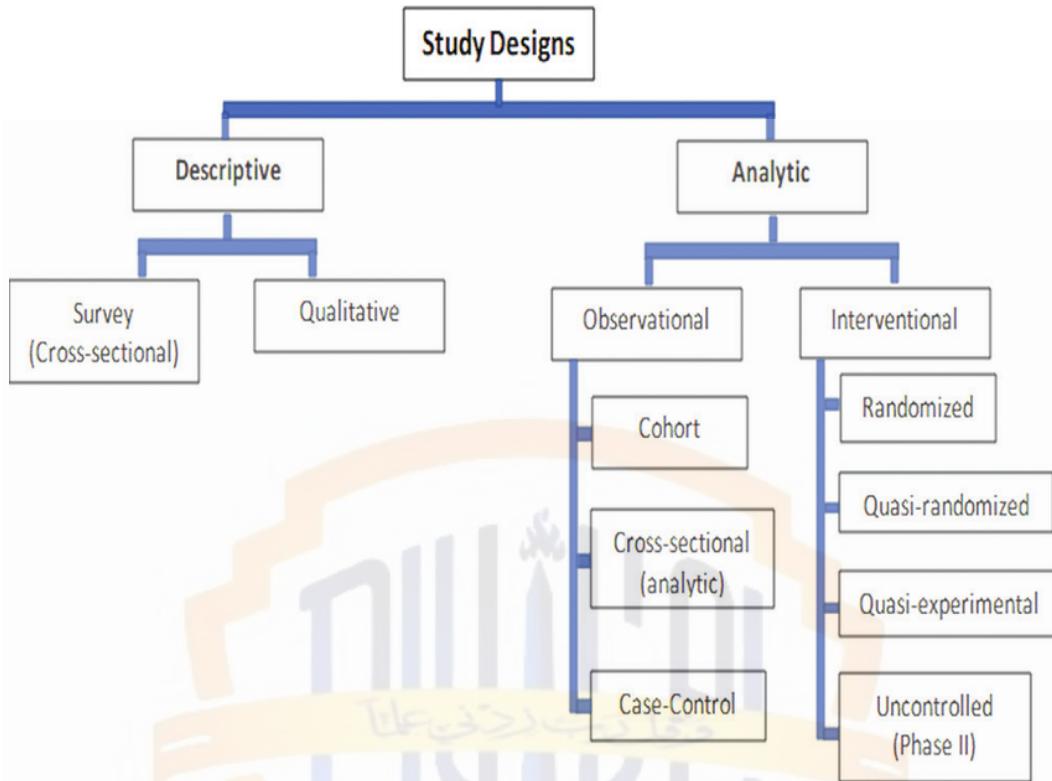


Figure 2.3: Descriptive and Analytic Research Designs

Source: Jifmi, M., & Tejpal, G., (2020). Critical appraisal of a clinical research paper: What one needs to know.

After having described Basic or Fundamental, Applied, Historical, Descriptive and Analytical research types, now will be explained Qualitative and Quantitative research types while also covering ethnographic research type, in the following session of the unit.

2.4 QUALITATIVE AND QUANTITATIVE RESEARCH TYPES

Qualitative and quantitative or mixed research type are, in fact, determined by the researchers as which type of data is required by them and how do they want to analyze it.

2.4.1 Quantitative Research

Quantitative research can be described as a methodical research study of evident occurrences through a computational and mathematical or especially statistical data analysis tool to obtain logical, reliable and impartial results. Accordingly, quantitative research is formal, objective and rigorous systematic process for generating information to describe concepts, events and new situations while examining relationships between or among dependent and independent variables (something measurable and controllable that variates and alters, while taking different values.). As a result, it determines the efficiency of treatments given to samples, participants of the study selected out of its population through some sampling technique. Now question arises; what is sampling? It is, as a matter of fact, a process of choosing representative subjects of the population (all elements having inclusion criteria). And for quantitative research there can be either random sampling technique (each member having an equal chance of being selected) or convenience sampling (whoever is accessible)

The purpose of Quantitative research, according to Farnsworth (2019), is to develop hypotheses and subsequently theories on mathematically quantifiable or numerical data while utilizing statistical tool for interpretation and analysis of the collected data. That is why data analysis is progressed in tabulated and graphical form. Quantitative research type is extensively used in the social sciences research like that of community health, economics, education, gender studies, psychology and sociology.

i. Quantitative Research Tools

Research tools are the data collection tools like interviews, questionnaires, observation a well as pre- and post- test/intervention tools. There are closed-ended and structured interviews and questionnaires as well as observations employed as quantitative research tools.

a. Interviews

Closed-ended and structured interview questions are developed as a research tool to get sample's limited responses about their perceptions and knowledge. Data, thus, collected for quantitative research is consisted in countable frequencies to be analyzed statistically.

b. Questionnaires

Closed-ended questions are used as a quantitative research tool to be administered to the sample respondents to be filled in at the spot or via internet sources like email or WhatsApp calls. Though having the risk of not getting maximum response of the sample yet even then it is very cost effective and impartial tool to be used. To make this tool effectual, a pilot study can be conducted prior to the main research study.

c. Observations

Another tool is an orderly and organized observation to guarantee a systematic record of sample's experience, as it occurs, and to examine the task performed by the sample. This tool is used to support or validate the data collected through questionnaires and interviews.

d. Pre- and Post-Tests/Interventions

Pre- and post- tests/interventions are also quantitative research tools, used mostly in experimental and quasi-experimental quantitative research designs. For this tool, tests are developed to assess the current situation of the sample or for needs analysis and impact of intervention on sample's condition before and after intervention respectively. Data collected through these tools are mostly unbiased and impartial objective data that are tabulated to be analyzed statistically. The data collected through these tools ensure reliability of the research study.

ii. Quantitative Research Types

Following is some of quantitative research types with their brief descriptions.

- a.** Descriptive Research (statistical research) - describes data and characteristics about the variables of a phenomenon.
- b.** Correlational Research - explores the statistical relationship between variables.
- c.** Experimental Research - explores the causal effective relationships between the variables in controlled environments.
- d.** Quasi- experimental Research - explores the causal effective relationships between the variables when environment is not under control. And
- e.** Survey Research - assess thoughts and opinions of the subjects (sample).

2.4.2 Qualitative Research

However, in educational research, Qualitative research type can also be used. It is the research type which does not need any advanced statistical tools rather it depends on exploratory, non-numerical, and descriptive phenomena like exploration or inquisitive studies of human experiences and behaviors for the purpose of developing an understanding about the prevailing issues via complete verbal portrayal and meaning exploration about the current situations. Therefore, qualitative research type has proved itself the best in studying about 'Why and how' broad questions regarding human experiences making it an all-inclusive approach to answer questions (not needed hypotheses) -- an acknowledgement that human realities are complex. Therefore, this research requires a high level of

researcher's involvement with subjects through strategies of participant observation and in-depth unstructured interviews. A solid example of such type of qualitative research is a case study about HSSC level teachers' experiences of teaching the subjects not allied with their specializations, in Pakistan. So, this qualitative research study would assess their complications and trials in order to conclude with some feasible and realistic solutions to the problem, faced by them. In this way, this research type mainly aims at knowing the meaningful nature as well as dynamics of a specific situation under study. Furthermore, decisions about sampling and sampling strategies depend on the unit of analysis which has been determined like individual people, program, group organization or community, genders, as well as older and younger ethnic groups. Purposeful or judgment sampling technique is used, in which you decide the purpose you want informants (or communities) to serve, and you go out to find some' (Bernard, 2000, P.176). Key informants are particularly knowledgeable about the inquiry setting and articulate about their knowledge. It is also important to mention here that in qualitative research; data analysis, via coding for recurring themes and categories, begins with data collection and its organization. Additionally, thick description is the foundation for qualitative analysis and reporting.

i. Qualitative Research Tools

There are open-ended interviews, questionnaires and observations utilized as qualitative research tools. Here, in the following, only two of them are described:

a. Interviews

Open-ended questions are developed as a research tool to yield in-depth responses about people's experiences, opinions, perceptions, feelings, and knowledge. Data, thus, consists of verbatim quotations with sufficient context to be interpretable.

b. Observations

Observation is another qualitative research tool to obtain fieldwork descriptions of activities, behaviors, actions, conversations, interpersonal interactions, organizational or community processes, or any other aspect of observable human experience. And data consists of field notes: rich detailed descriptions, including the context within which the observations were made.

ii. Qualitative Research Types

Following are qualitative traditions of inquiry with their brief descriptions. However, among all of the followings, Ethnography will be described separately according to the requirement of the unit.

- a. Biography—Life history, oral history – The writer, using an interpretive approach, needs to be able to bring himself or herself into the narrative and acknowledges his or her standpoint.
- b. Phenomenology – The lived experience - describes the meaning of the lived experience about a concept or a phenomenon for several individuals.
- c. Grounded theory – A Systematic approach based on Symbolic Interactionism which posits that humans act and interact on the basis of symbols, which have meaning and value for the actors.
- d. Ethnography – A description and interpretation of a researcher’s own cultural or social group or system.
- e. Case Study – An exploration of a “bounded system” or a case (or multiple cases) over time through detailed, in-depth data collection involving multiple sources of information rich in contextual setting, which may be physical, social, historical and/or economic.

2.4.3 Mixed Research Type

Then there is another research type and that is the ‘Mixed research’ type. The term itself indicates that it works on an organized amalgamation and combination of both of quantitative and qualitative research types to investigate a particular problematic event or situation, just to get more comprehensive meaningful interpretation of data. How it happens; actually, most of the time in such studies, the qualitative descriptive findings support the quantitative conclusion drawn from data analysis, and vice versa also. Mostly this type of research study is conducted in the fields of community, medical and associated health sciences, social sciences as well as mental health sciences and pharmacy because of its being more helpful in analyzing both of numerical and non-numerical data, presented in tabular, graphical and narrative form. Hence this research type is both exploratory as well as conclusive one simultaneously.

2.5 ETHNOGRAPHIC RESEARCH

One of the qualitative research types is Ethnography, having a narrative or story telling approach, in which a researcher examines his own field group’s observable and learned patterns of human behavior, customs, and ways of life. So, it involves a researcher’s prolonged observation of the group, typically through participant observation. Moreover, it requires a prolonged time-period to collect data. Though qualitative in its nature yet Ethnography Research may incorporate quantitative data and archival documents.

The stages involved in such type of research are:

- Field work;
- Key informants;
- Thick description of the sample of the study;
- Emic (insider group perspective) and Etic (researcher's interpretation of social life).
- Context is important and needs holistic view; and
- Needs grounding in anthropology, a scientific study of humanity as a whole.



Figure: What Does an Ethnographer Do? /Interaction Design Foundation/ Jonathan Cook

2.6 CONCLUSION

In nutshell, it can be said that there are different research types depending on researchers' aim and purposes, their convenience and requirement to explore, describe, analyze various problematic social or educational situations for finding out their solutions in order to add, expand and develop knowledge and understanding of the concerned situations. Some of the research types are fundamental (pure and strategic), applied, historical, descriptive, analytical, ethnographic, qualitative, quantitative, and mixed research types. All of them are described briefly in this unit 2 to give a basic idea to our learners about main research types, which can be further explored through suggested readings. All of them are significant ones to be chosen for conducting any research work.

2.7 SUMMARY POINTS

Dear Students! Main points of the unit are summarized here in the following:

- i. Research types are the styles of conducting the research according to the researcher's basic aim or purpose, the type of data collection and analysis or a researcher's own convenience or requirement to carry out a research study.
- ii. If the research study is done just to seek, add knowledge or gain a full understanding of the current situation, it is 'Basic (Fundamental) Research'.
- iii. But if the purpose is to apply and implement the obtained or already existing, it is known as 'Applied Research'.
- iv. The basic research is further divided into two types: 1. Pure and 2. strategic research types.
- v. Pure research is only conducted for expanding and developing knowledge and it does not have any pre-planned idea about its outcome.
- vi. The strategic study is intentionally directed toward provision of a knowledge to work out a solution to a specific issue.
- vii. Historical type of research digs into the past events to re-enact it in its entirety for the purpose of highlighting the significant meanings of the past.
- viii. Historical research is further divided into four categories of events, process, cross-sectional comparative, and comparative historical research.
- ix. There are eight steps to conduct a historical research study
- x. 'Descriptive Research' is conducted to describe prevalence of certain problematic issues, behaviors, or other characteristics of the population.
- xi. 'Analytical Research' focuses and analyses any cause-and-effect relationship.
- xii. Descriptive research generates hypotheses and is concerned with 'What, Who, When and Where'.
- xiii. Analytical research tests hypotheses and deals with 'Why and How'.
- xiv. Quantitative research can be described as a systematic study of evident occurrences through a computational and mathematical or especially statistical data analysis tool to obtain logical, reliable, and impartial results.
- xv. Quantitative Research has further types like: Descriptive Research (statistical research), Correlational Research, Experimental Research, Quasi- experimental Research and Survey Research.
- xvi. The research tools used in quantitative research type are closed-ended and structured interviews and questionnaires, observation and pre- as well as post-tests.
- xvii. Qualitative research is exploratory, non-numerical, and descriptive phenomena of human experiences and behaviors in order to develop an understanding about the prevailing issues.
- xviii. It describes through verbal portrayal and meaning exploration of the current situations.

- xix. Qualitative Research types are Biography, Phenomenology, Grounded theory, Ethnography and Case Study.
- xx. The qualitative research tools are open-ended interviews, questionnaires, and observations.
- xxi. Mixed Research Type works on an organized mixing up of both of quantitative and qualitative research types to investigate a particular problematic event or situation, just to get more comprehensive meaningful interpretation of data.
- xxii. Ethnography researcher examines and narrates his own field group's observable and learned patterns of human behavior, customs, and ways of life.

2.8 SELF-ASSESSMENT QUESTIONS

- Q. 1 How many are there research types according to purpose and nature of research? Explain them with examples.
- Q. 2 How would you distinguish between pure and strategic research types? Support your answer with at least three examples.
- Q. 3 What have you understood about historical research? Which one of historical research types would you like to adopt and why?
- Q. 4 Compare and contrast descriptive and analytical research types.
- Q. 5 Point out similarities and dissimilarities of qualitative and quantitative research types.
- Q. 6 Illustrate the differences between qualitative and quantitative research tools.
- Q. 7 Write down one example of Ethnography research; while explaining all of its characteristics.
- Q. 8 Which type of research do you like? Explain its reasons.
- Q. 9 Select any one of research types, mentioned in Unit 2, and develop a plan for your own research study according to that.

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Unit-3

**REVIEW OF LITERATURE
(THEORETICAL BACKBONE OF
RESEARCH)**

**Written by: Dr. Malik Ajmal Gulzar
Reviewed by: Ms. Farah Saeed**

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INTRODUCTION

Dear Students! The Unit 2 is all about theoretical backbone of research, also known as review of literature. Reviewing literature is, in fact, a leading procedure toward comprehensive understanding of the research study at hand by providing background knowledge of most of the research conducted in the field. Well, Literature review is something that gives a sense of uncomfortable experience for not having awareness what is it actually and how to conduct it theoretically and practically. As a matter of fact, there is a lot of literature on substantial research documents; and what to read and what not as well as how to write it systematically becomes a huge consideration and a mammoth task to be accomplished. That's why this unit is written to answer all these questions and to clarify all the confusions by providing some basic conceptual knowledge and certain common rules to be followed for the said purpose. The question, first arises, 'What is Literature Review'. To answer it simply, it is reviewing the major works, on the topic chosen for the research study, for gaining solid theoretical base, authority, authentication, and sophistication of a proficient researcher. Hence, review of literature means to utilize conceptual perspectives, theoretical debates, and previous research insights to create your own conceptual and theoretical framework. So, in the following sections of the unit, the procedure to carry out all this will be discussed.

OBJECTIVES

By the end of this unit, dear students, you will be able to:

- i. recognize What is a literature review;
- ii. describe its significance in conducting a research work;
- iii. explain it within context of six points of Bloom taxonomy;
- iv. elaborate the different purposes working behind literature review;
- v. describe the five points for a well-organized literature review;
- vi. interpret and analyze the reviewed literature in light of Bloom Taxonomy;
- vii. acquire knowledge about citation and referencing styles of MLA and APA; and
- viii. utilize the knowledge of the above-mentioned styles in reviewing a literature.

3.1 AN OVERVIEW

Review of literature, a difficult stage in research process and write up, becomes quite interesting after acquiring the skills to do it. Before proceeding further, let us see what literature is. It is essentially an assemblage of theoretical writings on a given topic or a subject. Actually, reviewing the literature of previous studies reflect a researchers' scholarly power as how well they have gone through all the existing knowledge to find out a gap between it and the proposed research study. It is the competence of a researcher to bring together crux of different previous research findings, conducted at assorted time periods in varied parts of a country or the world. This can be done just, when a researcher is being able to see broader debates in the field, while making connections between different or similar theoretical points of views in order to gain awareness of the field and understanding of gaps in research studies. Hence, it is justified in representing a researcher's knowledge of the topic and providing a basis for theoretical and/or conceptual framework as well as that of research methodology. To put it simply, reviewing literature is an iterative process that comprises of reading, writing, re-reading, and discovering new dimensions in the field. A researcher, in which, starts his journey as a novice reader but then gradually he or she starts developing the familiarity with the literature.

3.2 WHAT IS A LITERATURE REVIEW?

'What is a literature review' a question about what is it for, meaning what is the purpose of a literature review? As a matter of fact, a literature review is critically analysing the existing knowledge of the field to find out both positive and negative aspects of the research studies. Also, it helps in gaining insight into the comparative patterns, developments and also variances of the research studies, which leads a researcher to identify what still has to be done in the field. This is known as the gap in the current and the proposed research studies. According to Bloom Taxonomy, literature review is a process of six factors. Among which is the ultimate one creation or synthesis of new ideas or concepts after going through five factors, starting from gaining knowledge toward its comprehension, application, analysis, and application. In the revised version of Bloom Taxonomy, knowledge is replaced by the term 'remembering' (Schultz; 2005). This is also a two-way process, well-illustrated in the following figure 3.1, followed up by graphical presentation of old and new versions in Figure 3.2.

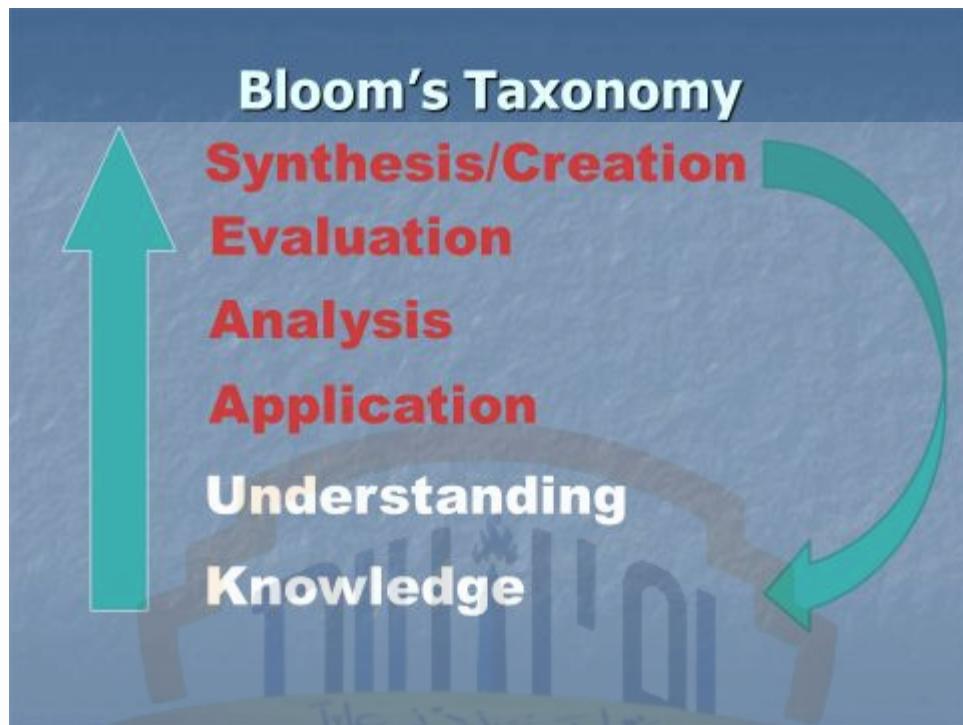
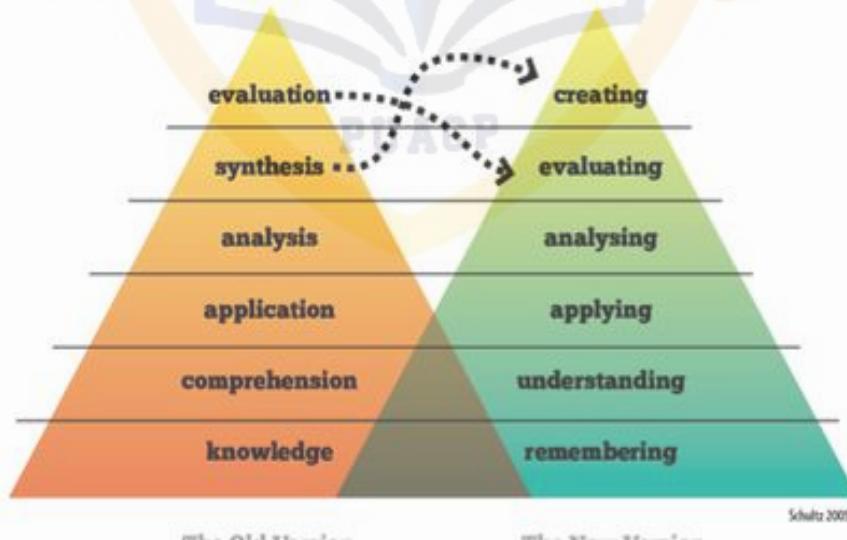


Figure 3.1: Bloom's Taxonomy



Original and Revised version of Bloom's Taxonomy (Schultz, 2005)

Figure 3.2: Old and New Versions of Bloom's Taxonomy

3.3 PURPOSE OF LITERATURE REVIEW

There are following seven purposes of reviewing a literature:

- i. Establishing the terms as well as a framework.
- ii. Presenting an analytical appraisal of previous literature on the selected topic.
- iii. Exploring the ways in which the other researchers have resolved and explained similar problems or issues.
- iv. Outlining and developing the relationship among these finding of the research works.
- v. Evaluating quality of the literature after analysing and application and significance of the literature.
- vi. Establishing the lacks or gaps- a justification for conducting the proposed research study. And last but not the least one
- vii. Demonstrating one's scholarly accuracy and verification.

Relevant to the above- mentioned seven points, there are six following points articulated by Ridley (2012). Review of a literature:

- i. Offers a historical context for a research study. It is important because of two factors: Firstly, knowing the existing or current research studies to be able to contribute even a small proportion by adding understanding of the field. Secondly, demonstration of scholarly proof of reading theoretical conceptions and transforming them into your own conceptual framework.
- ii. Provides an outline of the contemporary context, in which the researcher's work is positioned. It is needed as research field is constantly expanded and updated with the emergence of each new research study.
- iii. Contains a discussion of applicable concepts and theories underpinning the particular research work. For example, for conducting a research regarding impacts of English Language teachers' behaviors on middle-level students in Pakistan, it is required to clarify how linguists have approached this research problem and how the current study fits in them.
- iv. Introduces appropriate terminology with its proper definition to for providing guidelines to the researchers to develop their own.
- v. Describes associated research works of the area to guide the new researchers for extending or challenging the current ones, and addressing as well as filling a gap.

- vi. Affords reassuring evidence to a practical issue addressed in a particular research work.

All the purposes, mentioned above, are significant enough to be considered and carried out appropriately for the purpose of gaining a comprehensive understanding of the field which, in turn, becomes a source of confidence for a researcher to articulate well about his or her own study.

3.4 ORGANIZING WELL THE THEORETICAL DATA

Reviewing a literature is a task more than just collecting various research conceptual perspectives and findings. It is, in reality, interpreting and analyzing the theoretical data, which is impossible without organizing it well before. For which, there are following five ways:

- i. ‘Topical Order’: Organizing theoretical data via chief topics or concerns while emphasizing the relationship between or among variables.
- ii. ‘Chronological Order’: Organizing the literature according to the publishing dates of the research studies.
- iii. ‘Problem-Cause-Solution Order’: Organizing the review in such a way as leads toward the solutions while staring from the problems.
- iv. ‘General-to-Specific Order’: (The Funnel Approach) Examining broad based research firstly to focus upon the relevant specific studies.
- v. ‘Specific-to-General Order’: Discussing the specific research studies firstly to draw out conclusions.

Now, it depends on a researcher to select any one of the above-mentioned organizing ways of the theoretical data for smooth and systematic analysis to obtain a valid theoretical base and direction for proper and rightly directed research methodology, data collection and its analysis.

3.5 INTERPRETATION AND ANALYSIS OF THE REVIEWED LITERATURE

Reviewing a literature is a very intricate process, which involves higher-order thinking skills to move from just description or mere quoting the various researchers to theoretical data analysis, synthesis, and evaluation. Let us refer here to Bloom’s Taxonomy as illustrated in Figures 3.1 and 3.2, under section 3.3 of the unit. It helps us in finding out a way as how to think and then how to transform it into writing. According to Bloom, knowledge, comprehension, and its

application are the minimum of the complex thinking skills, leading toward more complex ones: Analysis, synthesis, and evaluation. Each one of this depends on the successful completion of the skill one level below to it. For example, one cannot get comprehension without acquiring knowledge first. Now let us apply it to our literature review.

As far as knowledge is concerned, it refers to provision of the factual (having terminology, definitions and general information), conceptual (consisting of sequential relationships between conceptual perspectives and theories), process (based on processes of doing something step-wise while utilizing skills and techniques), and meta-cognitive knowledge (containing in understanding of thought processes) in a literature review. The basic purpose is to equip readers with the comprehension, which is impossible without provision of knowledge in various ways like definitions, description, diagrams, summaries, and tables. Next to knowledge is comprehension, for which knowledge contained within literature is needed to be explained, negotiated, interpreted, extrapolated for establishing the relevance and significance of a textual source. This can be done through paraphrasing, descriptive summaries and through interpretations in order to develop readers' comprehension of the textual or theoretical data. Then comes its application, to utilize the knowledge obtained, in its demonstration to construct something new like developing conceptual framework. Henceforth, literature review is a systematic procedure to process information for all the Bloom categories, mentioned till here.

Now let us move toward the higher-order thinking skills, in which comes first of all analysis, that can be carried out through detailed examination of conceptual data by classifying it into sub-categories and by contrasting and comparing them to establish relationship between or among them. This leads to synthesis based on extracting findings from the data analysis. Thus, synthesis becomes a whole, bigger than sum of the parts pulled apart in analysis. At this stage of Synthesis, we again pull things of data together by combining, integrating, and developing connections between various findings and between variables as well as by generalizing conclusions also. This stage is followed up by evaluation via making judgments. For this, we must assess our own arguments and defend them against any potential objections for putting forward any recommendations or a critique through usage of either a theoretical framework or logical reasoning contained within purpose of the research study. One important point to note is that evaluation can be done at various stages of a literature review like it is done to judge even a single source for in-text citations. But at the end it should also be done to evaluate the overall reviewing process. In short, Bloom's Taxonomy is a guiding principle in reviewing a literature in a comprehensive, organized, and

systematic way of providing readers with knowledge, its interpretation, comprehension, application, analysis, synthesis, evaluation and creation (the new highest thinking skill).

3.6 CITATION AND REFERENCING STYLES (MLA &APA)

Reviewing of literature is, as mentioned before in the preceding section, not only quoting the existing knowledge but also its interpretation, comparison, and analysis. For all this surely there are in-text citation and then referencing of it. And acknowledging sources is called citing or referencing (A citation or reference, in the text, is where you refer to an author). But the question is why it is required and how to proceed with it. It is, actually, having double-facet dimensions to benefit not only the researcher but also the reader in reflecting the former's scholarly knowledge, adding authority and credibility to his or her information as well as in latter's understanding the context of the work and its tracking down respectively. Adding to it, it has ethical consideration also in ensuring intellectual integrity to distinguish between the researcher's own and someone's else ideas. Now it is also equally important to know that we need to refer to the sources for all the ideas, information, opinions, results, that have been directly quoted, paraphrased and/or summarised. Also, definitions of terms, illustrations, figures, tables, taken from the other sources are referenced. So, we need a proper standard way for citation and referencing, for which there are many formats followed by different universities and institutions of research. We must select the one recommended by our university or the concerned one related to us. Most of the time APA and MLA are used in referencing within educational research studies.

One thing more to be noted down is that we refer as closely as possibly to the sources, while citing them within text as well as at the end of our research work, for which we make a list of quoted works. For this there are also two terms used mostly: 1. Reference and 2. Bibliography. From between these two, one can be selected by the researcher according to his or her own requirement. The list is named 'References', when only the quoted or cited sources are enlisted as references. However, we use 'Bibliography', when all quoted or non-quoted works are enlisted at the end of a research study. Coming back to quoting the sources, there are two types of them. First one is short and the second one is large or block quotations. There are different styles of using each of them in our work, depending on the edition of referencing styles of MLA (Modern Language Association) or APA (American Psychological Association). Short quotes of one to two lines are given in quoted marks or inverted commas, and it is referred to the source before using period. Whereas, for more than four lines of text, cited

content is separated from the main text by one or two lines. It is included after a colon, without quotation marks usually, and single-spaced as well as indented from left margin or from both of the margins. At end of the quote, again one space is left, and reference is contained within brackets, used after a period or full stop. Here are examples for both types in the following:

Short quotation example:

Brown (2008) points out about students, who are “open to new ideas are more likely to succeed at tertiary studies” (P.23). This is likely...

Block quotation example:

There are a number of definitions of health in use, however, the World Health Organisation (WHO) defines it as:

the state of being in which an individual or group of individuals are able to function without feeling unwell either physically or mentally.
(World Health Organisation, p. 32, 2008).

Moreover, while citing, author and date are mentioned along with the page no in case of using exact words of the source. Additionally, while compiling reference or bibliography, following points must be considered:

- i. Names of authors (family names and at least initials), alphabetically arranged
- ii. Name of journal article, chapter or conference paper
- iii. Name of journal, book, conference, etc.
- iv. Date of publication
- v. Volume number (for journals)
- vi. Editor of book (if applicable)
- vii. Publisher (for books)
- viii. Place of publication (for books)
- ix. Page numbers (of article or book chapters)

As an example, one illustration is given here:

Barry, M. and Molyneux, M. (1992), “Ethical dilemmas in malaria drug and vaccine trials: A bioethical perspective”, *J Med Ethics*, vol. 18, pp.189-192.

Furthermore, to be on safe side from plagiarism, dear students, avoid using direct quotes most of the time rather use notes. For which you have to consider research questions, key issues and topic words in the topic. Then read the whole article and draw out the main points to be used for citation within texts. In short, be careful of only a few following points, mentioned in this section of the unit, for citations and referencing. Be informed which referencing system is required by you. While

reading the various literatures, always keep in your record all of the bibliographic details and page numbers of the read literature. Be consistent and careful to keep distinguished your own ideas from the ones by the others. And at the last but not the least, do not forget to give references of any sources used by you in your research work.

3.7 CONCLUSION

As a conclusion, it is to point out that a valid research study depends on a solid and appropriate reviewing of literature, which can be mentioned otherwise as a theoretical data backbone, without which the physical structure of any research study cannot be erected straight. Literature review, in fact, provides not only a sound basis of theoretical knowledge, but also it suggests the right direction of research methodology to lead a researcher on the straight pathway of conducting a research study without getting distracted from any point of data collection and its analysis. Just a researcher must be aware of all the conventions of conducting a literature review, detailed out in this unit, especially that of in-text citation and referencing styles. Though a tiresome and hectic task yet it proves to be an interesting one, when a researcher tries to acquire the skills to carry it out under the consideration of its being very helpful, practical, and feasible.

3.8 SUMMARY POINTS

Dear Students! Main points of the unit are summarized here in the following:

- i. Reviewing the literature of previous studies is an iterative process of reading, writing and re-reading to reflect a researchers' scholarly power to find out a gap between it and the proposed research study.
- ii. A good literature review is conducted on basis of Bloom Taxonomy six points: Knowledge (remembering in new version), comprehension, application, analysis, evaluation, and creation.
- iii. There are seven purposes of reviewing a literature: Establishing the terms as well as a framework, presenting an analytical appraisal, exploring the ways in which the other researchers have resolved similar problems, outlining and developing the relationship among these finding, evaluating quality of the literature after analysing and application and significance of the literature, establishing the lacks or gaps, and demonstrating one's scholarly accuracy.

- iv. There are following five orders to organize a literature review in a systematic order: ‘Topical’, ‘Chronological’, ‘Problem-Cause-Solution’, ‘General-to-Specific’ and ‘Specific-to-General Order’.
- v. Bloom’s Taxonomy is a guiding principle in reviewing a literature in a comprehensive, organized and systematic way of providing readers with knowledge, its interpretation, comprehension, application, analysis, synthesis, evaluation and creation.
- vi. Acknowledging sources is called citing or referencing.
- vii. It benefits not only the researcher but also the readers in reflecting the former’s scholarly knowledge, adding authority and credibility to his or her information as well as in latter’s understanding the context of the work and its tracking down respectively.
- viii. Citation and referencing has ethical consideration also in ensuring intellectual integrity to distinguish between the researcher’s own and someone’s else ideas.
- ix. The sources for all of the ideas, information, opinions, results, definitions of terms, illustrations, figures, and tables, taken from the other sources are referenced.
- x. Mostly, APA and MLA are used in referencing within educational research studies.
- xi. The list is named ‘References’, when only the quoted or cited sources are enlisted as references.
- xii. However, we use ‘Bibliography’, when all quoted or non-quoted works are enlisted at the end of a research study.

3.9 SELF-ASSESSMENT QUESTIONS

- Q. 1 Explain what a literature review is as well as its significance in conducting a research work?
- Q. 2 How would you conduct literature review considering six stages of Bloom Taxonomy? Support your answer with examples.
- Q. 3 What have you understood about the seven purposes of literature review? Elucidate them with examples.
- Q. 4 Describe in detail how a literature review can be organized well and give reasons for its requirement by a researcher.
- Q. 5 ‘Bloom’s Taxonomy is a guiding principle in reviewing a literature in a comprehensive, organized and systematic way of providing readers with knowledge, its interpretation, comprehension, application, analysis, synthesis, evaluation and creation’; discuss it.
- Q. 6 Mention the reasons for using citation and referencing styles in reviewing a literature.
- Q. 7 What do you know about MLA and APA referencing styles? Elaborate and also explain why will you select any one of them.

SUGGESTED READINGS

Flick, U. (2015). *Introducing Research Methodology: A Beginner's Guide to Doing a Research Project*. Sage.

Kumar, R. (2018). *Research methodology: A Step-by-Step Guide for Beginners*. Sage.

Ridley, D. (2012). *The literature review: A Step-by-Step Guide for Students*.



Unit-4



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INTRODUCTION

Dear Students, here is unit 4 on Research Design, the main axis of any research study to be conducted. After selecting research topic, identification of research problem, its statement, formulating research study objectives and research questions, the most important stage is selecting appropriate research design to carry out any research work. It is just like a backbone of any research study. So, choosing the right research design and tools ensures the right direction of research procedural process. For this purpose, it is important to be familiar with the said concept of research design in all its aspects; to make assure which this unit is written about research design. So please go thoroughly it and attempt all self-assessment questions along with completion of suggested reading to get the full grasp of the concept.

OBJECTIVES

After completion of this unit, the students will be able to:

- i. define 'Research Design';
- ii. understand importance and need of a research design;
- iii. find out the various benefits and drawbacks of different types of research design;
- iv. analyse the various techniques and approaches of a research design;
- v. explain the case study research design especially its research tools and characteristics;
- vi. pinpoint Case Study Models;
- vii. elaborate survey research design and its tools of collecting data;
- viii. differentiate between two types of experimental research designs: True and quasi- experimental designs;
- ix. describe advantages and disadvantages of both of the experimental designs; and
- x. implement appropriate type of research design for different studies.

4.1 WHAT IS THE DEFINITION OF RESEARCH DESIGN?

A research design is a plan for the techniques and approaches the researcher will use, for conducting a research study. Researchers can focus on study methodologies that are appropriate for the subject material and, thanks to the design, replicate successful studies. The foregoing are the necessary components:

1. A truthful statement of intent
2. Techniques to be employed in data collection and analysis
3. The method to be utilized in assessing the information gathered
4. The study methodology adopted
5. Potential stumbling hurdles in research
6. The context in which the research was conducted
7. Timeline

4.2 IMPORTANCE OF RESEARCH DESIGN

Design is concerned with the goal, reasons, motives, including plans that must be implemented within practical limitations such as geography, time, money, and staff availability. The odds of success are substantially boosted, when the "starting" of a research endeavor is sufficiently described as a specific statement of goals and reasons.

4.2.1 The Need of Research Design

The dependability of the obtained results of a research study is influenced by the study design. As a result, it serves as a firm foundation for something like the remaining chapters of a research dissertation. It is vital since it ensures the seamless operation of various research methodologies. This improves the study's effectiveness by delivering much of the information with the least amount of work, money, and time.

For example, for the building of a car, a suitable plan developed with such an expert architect is essential. Similarly, we need a good plan or approach before we start collecting data for the study. Even a slight misstep might damage the project's ultimate purpose, thus style is characterized must always be done with prudence. The design helps the investigator organize his ideas, making it easier for him to notice and remedy any problems.

A good design of a research study has all its components working together in such a logical order. The research objectives and goals should be matched with the theoretical and conceptual framework. Similarly, the data gathering strategy must

be in line with the study's goals, theoretical and conceptual framework, and appropriate data analysis procedure.

The importance of research design in research work is influenced by the following factors:

- It might lead to the type of study that you want, with a useful conclusion.
- It decreases inaccuracy.
- It enables you to achieve maximum efficiency and dependability.
- It reduces the amount of wasted time.
- It reduces any research problem's ambiguity, perplexity, and practical haphazardness.
- It is quite helpful in gathering research materials and testing hypotheses.
- It is a road map for getting research on the proper track.
- Bias and marginal mistakes are eliminated.
- It gives an estimate of the resources needed to be employed in monetary terms, effort, time, and labor.
- Smooth and efficient sailing (defines limits and aids in avoiding blind searches) maximizes the consistency of outcomes.
- It provides a solid basis for the project.
- It helps avoiding erroneous assumptions and pointless practices.
- It allows for the detection of defects and shortcomings (anticipates problems).
- It makes us learn from other people's critical remarks and evaluations to incorporate.

Effective research begins with thoughtful declarations of goal and objectives, as well as related research questions. These crucial first stages lead to key decisions on research kind, analysis strategies, as well as competent implementation within set timelines and budgets.

The research project takes shape by selecting acceptable study types based on well-defined research objectives, collecting relevant data, and reaching conclusions based on well-planned analyses. All this is done through meticulously chosen research design for a study. In the following, are described various research designs.

4.3 CASE STUDY

A case study research design is a qualitative research type. It is popular inside the social sciences since it entails watching individuals or cases in their natural environment with minimal researcher's intervention.

Researchers are using the case study approach to assess certain theories or hypotheses by asking a particular inquiry about a person or group. This can be accomplished by compiling information from key informant interviews. Case research study is a great strategy for grasping the complexities of a topic that quantitative research techniques may overlook.

A case study varies from other qualitative researches in the following ways:

- It is concerned in how a collection of circumstances impacts a person or group of individuals.
- It always refers to a single question centered on one or more examples; and it focuses on personal stories and experiences.

The following are the main characteristics of case study research design:

- To test one hypothesis, case study research techniques often entail the researcher's addressing a few inquiries of one individual or a small group of persons (known as respondents).
- In a case study for research methodology, the researcher may utilize triangulation to acquire data, which involves using many sources, such as documents as well as field data. This is then examined and interpreted to generate a theory that can be tested or confirmed by other researchers through more research.
- To guide its approaches, the case study approach requires precise concepts and theories. When carrying out a case study, having a very well research question is critical because the study's findings are dependent on it. Challenging existing ideas, hypotheses, or assumptions is the greatest way to address a research question.
- Categories are discussed using objective language that excludes any prior beliefs that people may have about them. The investigator sets out to learn by asking precise questions about how people think about or interpret reality in their situation.

Throughout industry, administration, psychology, sociology, political science, and other relevant subjects, the case study research is extensively used.

4.3.1 Main Case Study Approaches to Data Collection

The recording of experiences that provides a knowledge of reality is a fundamental component of qualitative research. When it relates toward the case study design, there are two main methods for gathering data: document examination and fieldwork.

Literature review, the procedure through which the researcher gathers all material available through historical sources, is also included in a case study in research

technique. Books, newspapers, journals, movies, photographs, and other textual materials are examples. Video cameras can also be used by the researcher to catch events as they happen. The researcher might also examine materials created by participants within case study to learn more about their experiences and feelings.

Field research entails taking part in firsthand interviews and observations. Telephone interviews, events as well as public gatherings, trips to homes or workplaces, or shadowing somebody for a period are all observational instances. The research can do yet another interviews or group interviews with several people at once.

The case study design is, in short, broken down into three stages: goal setting, data collecting, then analysis and interpretation. Based on their understanding, the researcher initially decides regarding what should be examined. They then collect information through research tools of data collection, interviews, questionnaires and observation.

4.3.2 Case Study Research Tools

The case study is among the most basic research procedures. Respondents must fill out a questionnaire that includes both open-ended and preset questions. It is even possible to do it using an online survey.

Semi – Structured Interview

The semi structured interview is a more difficult method for a case study research. This entails the researcher becoming more knowledgeable about the subject through listening what someone has to say. One-on-one conversations with the sample are frequently used to do this. Semi-structured interviews provide more flexibility and can get data that structured questionnaires cannot.

Focus Group Interview

Another technique is indeed the group discussion interview, in which the researcher invites a small group of people to participate in an open-ended debate about a specific theme or issue. A normal group size ranges from 5 to 15 people. Researchers can use this tool to dive deeper into people's thoughts, feelings, and experiences.

Participant Observation

Another strategy is participant observation, which entails the researcher participating in and observing normal activities to get insight into the experience. The people being examined are not often aware that they are being watched, but the researcher keeps track of everything with field notes. Depending on the

situation, a case study research design could use one or more of these research tools to collect the data.

4.3.3 How Case Studies Are Used

In the social sciences, case studies are frequently employed. Sometimes there is no other way to grasp the impact of socioeconomic pressures, interpersonal dynamics, and other human variables except to analyze one instance at a time and seek for patterns and statistics later. Case studies are also employed in business for the same reasons. Here are several examples:

1. Case studies could be used to teach and provide instances of potential scenarios and difficulties, as well as how they get resolved. They could also be used to establish and implement strategies. Case studies can be used to assess a program's or project's success. They can assist teams in improving their cooperation by identifying areas where improvements are needed, such as group dynamics, communications, roles and responsibilities, and leadership styles.
2. Case studies can be used to investigate how people's experiences influence the workplace. They can feed concepts about how a person or group interacts from their surroundings because the study entails watching and evaluating concrete facts of life.
3. Case studies can be used to assess a company's long-term viability. Because they examine all areas of a firm or organization, they are excellent for social, environmental, and economic impact studies. This provides academics with a comprehensive view of an organization's dynamics.
4. Case studies can be used to discover issues in organizations or businesses. They can assist in identifying issues that are not obvious to customers, investors, management, or staff.
5. Case studies have been used in teaching to show pupils how to solve real-world problems or situations. Students will be able to recognize and cope with comparable situations in their life because of this

4.3.4 Case Study Models

Human beings are complicated creatures, who connect with one another in a variety of ways in their daily lives. The researchers, in a case study, look at a case as well as try to figure out how behavioral patterns are formed, as well as their causal relationships. Case studies aid in the comprehension of one or more distinct events. Here are a few common approaches:

1. Illustrative Case Study

When a researcher sees a group of individuals doing something, this is called observation. This method of investigating an event as well as phenomenon might reveal cause-and-effect linkages between numerous variables, and known as illustrative case study.

2. Cumulative Case Study

A cumulative case research report is one, where the same collection of phenomena is observed throughout time. Cumulative research studies can be extremely useful in gaining a better knowledge of processes, which are events that occur over time. For example, if people's conduct changes, when they move from one location to the other, the researcher may be curious as to why these adjustments occurred.

3. Exploratory Case Study

An exploratory study gathers data to answer a question. It can assist scholars in gaining a better understanding of social, economic, political, and other social issues.

To be brief, Case studies can be classified in a variety of ways. They could be historical case studies, in which a researcher follows events as they unfold themselves across time. A researcher compares two or even more groups of individuals, places, even things to derive conclusions about them in a comparative case study. Inside an interventions case study, a researcher intervenes to influence the subjects' behavior. The research approach is determined by the requirements of the research group.

4.4 SURVEY RESEARCH DESIGN

Simply put, survey research refers to the use of surveys as a method of collecting large amounts of data.

The numbers of people to be contacted, who might conduct these interview, and what questions are being asked are the most crucial factors to consider while doing survey research. The survey approach can be arranged in several different ways. The most common types of survey research inquiries or tools are as follows:

4.4.1 Open Ended Questions

These questions do not have predetermined responses, which is a frequent strategy in survey research. They give respondents the option of responding on their own terms.

4.4.2 Likert Scale

This is a measure on which respondents rate themselves. It is normally a scale of one to five, with one denoting 'strongly disagree' and five denoting 'strongly agree.'

4.4.3 Mathematical Questions

These questions require numerical information. "How long had you lived in the region?", for example.

4.4.4 Comparative Questions

These questions make a comparison between two individuals or products. "Which soap is more effective?", for example. or "What makes you think this book is better than the other one?"

4.4.5 Descriptive Questions

Respondents in the sample are asked to describe, explain, or exemplify something in this kind of survey research questions.

4.4.6 Multiple Choice Questions

Respondents select one answer from a list of multiple options.

4.4.7 Examples of Survey Research

Sociologists employ survey research as well. Their goal is to learn more about human behaviour and use what they have discovered to improve society. They could want to examine if people's sentiments regarding certain political or social issues have changed over time, for example. Survey research is used in a number of situations, including government agencies, educational institutions, hospitals, including non-profit organizations.

Since they enable researchers to analyze comparatively large samples in a short period of time, surveys are an efficient approach to collect data about human behavior. Even though surveys are much more efficient than qualitative research, they are less accurate than qualitative data. The following are some of the reasons for this:

- Obtaining a random sample of the chosen population is tough.
- Participants may interpret questions in a variety of ways.
- People may feel compelled to satisfy the researcher by providing the response they believe they desire.
- It is difficult for people to provide correct information on areas about which they have limited knowledge.

4.5 EXPERIMENTAL RESEARCH

A properly conducted study with two or more variables is known as experimental research. The differences between the first and second sets are measured against the first set's differences. For example, quantitative research methodologies, exploratory in nature, are utilized.

4.5.1 Types of Experimental Research Design

These are methods used to collect data in experimental investigations. According to the notion of fundamental experimental design, following are types of Experimental Research Design:

- There are two sorts of basic research designs: qualitative and quantitative research designs.
- Quasi-experiments and true experimental; the goal of both is to figure out what is truly causing behavior.
- Genuine or true experiments, in which all critical aspects that can impact the phenomena are completely controlled, and are the ideal design. However, controlling all important factors is usually difficult or impracticable, requiring the need for a quasi-experimental research design.

There are several similarities between actual and pseudo-experiments:

- Study participants are given therapy and condition.
- A specific outcome of interest may be assessed; and
- The researchers want to investigate if there is a link between the treatment and the outcome. Now these types are further explained in the following:

a. Pre-Experimental Study

Following application of cause-and-effect elements, a group, or a series of groups, is maintained under surveillance. This investigation is used to see if more study is needed for these groups or not. Three types of pre-experimental study can be found:

- A Single-Case Study Research Design
- One-group the research design was a pre- and post-test
- Static-group comparison.

b. True Experimental Study

It depends on data techniques to validate or deny a hypothesis, a true experiment is by far the most accurate sort of investigation. Only true designs, out of all the other sorts of study setups, can show a cause-and-effect relationship inside a group. In a real experiment, three requirements must be met:

- There will be two groups: a) Control Group which will not be impacted by the changes and an b) Experimental Group which will be influenced by environmental intervention.
- The researcher maintains control over the variables, and the distribution seems random.
- In the physical sciences, this form of experimentation is prevalent.

c. Quasi Experimental Research

A research strategy, like an experiment itself, is referred to as "quasi-experimental" research. An experimental design is like, but not identical to, a quasi-experimental component. The difference between the two is the dispersion of a comparative group.

A design of experiments is one in which the researcher alters the amount of one or even more independent variables before assessing the results. Experiments are an effective way to figure out cause-and-effect correlations. True experimental designs differ from quasi-experiments in the following ways:

- In a quasi-experiment, all these treatment and control groups distinguish not only in terms of something like the experimental services they receive, as well as in ways that really are normally unknown and perhaps even unknowable.
- In an experiment, subjects are randomly assigned to procedure comparison group, whereas they would not be randomly assigned in a quasi-experiment.
- As a result, the researcher must try to account with as many of these discrepancies as feasible statistically. Because there is no supervision in quasi-experiments, several "rival hypotheses" may contend with both the experiments and the observed outcomes as alternative explanations.

4.5.2 Experimental Research has Several Advantages

Putting new theories or notions to the test is crucial. Why put time, effort, as well as money into something that could, or could not work. Following are the advantages of it:

- To attain desired outcomes, researchers must have a firm grip on factors involved in research study.
- The subject or sector has no bearing on the effectiveness of experimental research. It may be utilized for research purposes in any other sector.
- The outcomes are quite precise.
- After the results have been obtained, they may be applied to comparable ideas or circumstances.
- Experimentation is a terrific place to begin. The data collected will act as a base for generating new ideas and doing further research.

4.5.3 Predictors of Experimental Design's Most Important Elements

a. Variable Manipulation

The researcher's job is to find the factor that is considered to influence the results of an experiment. The component that is being modified is referred to as "therapy" or "intervention". The researcher has the option of providing care to study participants.

Assume a group of scholars was looking at the factors that contribute to maternal employment. They could believe that subsidizing is a good idea; daycare expenses will encourage this type of activity. They may then conduct an experiment in which some participants receive government-funded early childcare subsidies while others do not. The researchers also may experiment with different subsidy values to determine whether different incentive values lead to different outcomes or not.

b. Random Assignment

- Treatment groups are assigned to study participants at random.
- Everyone has the same possibility of participation in each situation.
- Participants are divided into two groups: individuals who get therapy and those who do not get therapy (also known as "experimental" and "control group" respectively).
- Because random assignment neutralizes all other impacts save the variables, causation and effect may be readily determined.

c. Sampling at Random

Convenience sampling has long been employed by experimental researchers to choose participants in the study. However, research has shown that procedures developed and the limitations of extrapolating results from such a sample consisting to a larger population became clearer; experimental researchers began to use random sampling.

d. Validity

Internal and external validity are the two categories of experiment validity. Within social sciences research experiments, it is generally difficult to achieve.

Internal Validity

- Whenever an experiment is having knowledge, we know that perhaps the independent variable (for example, childcare subsidies) produces the study's outcome (e.g., maternal employment)
- As a result, we may conclude that the independent variable generated the observed effect, when participants, because of two organizations, should

- not have differed merely at the start of the study, they were randomly allocated to treatment control groups.
- Dropouts or refusals to participate in research might endanger the study's internal consistency. Differential attrition happens, when certain types of people leave out or refuse to participate in activities at a higher rate than others.

External Validity

- In social science experiments, external validity is also a major concern.
- It is tough to extrapolate experimental outcomes to groups that were not part of the study.
- External validity is more likely in studies that randomly pick volunteers from one of the most diverse as well as representative communities.
- Any use of random sample procedures makes things simpler to extrapolate study findings to other populations.
- A recent study in Iowa found that a revised curriculum increased third-grade students' reading comprehension. To determine the original study external validity, consider if the new curriculum would be beneficial with New York third graders or children in those other elementary grades.

4.5.4 The Benefits and Drawbacks of a Quasi-Experimental Design

Some of the benefits of a Quasi-Experimental design are as follows:

- Quasi-experiments can become a useful tool for determining what is best for the general population. External validity is another term for this.
- Other experimental methodologies can be utilized in conjunction with the quasi-experiment methodology, giving the researchers more power by allowing them to control the variables.
- It has a higher degree of transferability.
- It is a natural process that the researchers have sculpted well.
- Real-world problems and answers are used, not made-up ones.
- It provides improved control so over third variable, referred to as the confounding variable, which alters the cause-and-effect relationship.

The following are some of the drawbacks:

- It has a lower level of internal validity than true experiments.
- Because there is no randomization, the researcher cannot be confident that the confounding and third variables are no longer present.
- Human mistake is a possibility.
- It is probable that the researcher's personal bias will play a role.

- There is a chance the data is falsified because people's reactions are tough to quantify.
- Using old or backdated data might result in mistakes and inadequate study findings.

4.6 CONCLUSION

The research system is essentially a systemized as well as structural framework that includes the researcher's many study approaches and procedures. The study design aids the researchers on their journey, in the unknown but having a systemized approach by their side. The research design is a helpful tool for researchers which is starting and ending point for them whenever they need to do research in their area of specification. Research design includes all the necessary steps and guidelines to complete any kind of research. This unit is important for a learner to understand well whenever one is about to start research, they need to understand the basic crust of research design and then begin their work so that in their future research they do not have to face any problem regarding their work.

4.7 SUMMARY POINTS

The unit can be summarized as following points:

- i. A research design is a plan for the techniques and approaches the researcher will use, for conducting a research study.
- ii. The dependability of the obtained results of a research study is influenced by the study design.
- iii. Research design importance lies in its ensuring the seamless operation of various research methodologies.
- iv. Characteristics of Case Study are: Addressing a few inquiries of one individual or a small group of persons, utilizing triangulation of data, formulating a very well-defined research question, and concise and precise questionnaires or interviews.
- v. The research tools used to collect case study data are: Semi-structured interviews, focused group interview and participant observations.
- vi. Various models of case study ae: Illustrative, cumulative, and exploratory.
- vii. Survey research refers to the use of surveys as a method of collecting large amounts of data.

- viii. The research tools for a survey design are open-ended, mathematical, comparative, descriptive and multiple-choice questions either for an interview or a for a questionnaire.
- ix. There are two types of experimental research designs: True and Quasi-experimental designs.
- x. Genuine or true experiments, in which all critical aspects are completely controlled, however, controlling all important factors is usually difficult or impracticable, requiring the need for a quasi-experimental research design.
- xi. Predictors of Experimental Design's most important elements are: Variable manipulation, randomization, and internal and external validity.
- xii. Despite having a few advantages, quasi-experimental design has also some disadvantages.

4.8 SELF-ASSESSMENT QUESTIONS

- Q. 1 Define research design. How many are there research designs? Explain them with examples.
- Q. 2 Detail out the characteristics of Case Study research design.
- Q. 3 What have you understood about case study research tools? Which one of them would you like to adopt and why?
- Q. 4 Compare and contrast case study and survey research designs.
- Q. 5 Point out similarities and dissimilarities of case study and survey research tools
- Q. 6 How would you distinguish between pure- and quasi-experimental research designs? Support your answer with at least a few examples.
- Q. 7 Write down the benefits and drawbacks of both of true- and quasi-experimental research designs.

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Unit-5



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INTRODUCTION

Dear Students, here is unit 5 on Research Tools, the main sources of collecting practical data for the research study to be conducted. The right selection of research tools is much important according to research design taken up to answer the research questions by collecting and analyzing data. Failing this step, the full research study would collapse. In order to avoid this disappointing situation, our young researchers must try to get knowledge about different types of research tools suited for various research designs. And to fulfill this desired purpose Unit 5 is written on Research Tools. So please go through it completely along with suggested readings to equip yourselves with the required knowledge of the field as well as to get the full grasp on the concept.

OBJECTIVES

After completion of this unit, you will be able to:

- i. analyze the various primary and secondary data collection sources.
- ii. evaluate the various observational research sources.
- iii. elaborate observational research study and its various characteristics as well as steps of collecting data;
- iv. describe different steps of conducting interviews and their types;
- v. explain with illustrations the data collecting tool, questionnaire with its types along with their advantages and disadvantages.
- vi. mention in detail secondary data sources; and
- vii. find out the adoption of suitable research sources for different studies.

5.1 PRIMARY DATA COLLECTION SOURCES

A primary source is an object, a person, as well as a work of art that provides direct yet rather personal evidence about an incident, object, individual, or a work of art. Primary records serve as the foundation for further research, allowing students and researchers to come as quickly as feasible towards what happened during a specific event or experience. Primary sources are the ones from the time in question and were written or created by someone who observed the event firsthand. Primary materials typically reflect a team's or organization's distinct perspective. Primary materials, both written and unwritten, are also permitted. In a scientific investigation, primary sources include original ideas and commentary. Here are some instances of primary sources:

- Memoirs and autobiographies
- Personal letters, diaries, and correspondence
- Interviews, questionnaires, as well as fieldwork are used to acquire data.
- Email, blogs, listservs, as well as newsgroups are all examples of Internet communication.
- Photographs, drawings, and even posters are on display.
- Literary and artistic works.
- At the time, books, newspaper and magazine articles, and advertisements were published.
- Polls of the public opinion.
- Oral histories and speeches.
- Authentic papers (birth certificates, property deeds, trial transcripts).
- Census statistics are examples of research data.
- Organizational and government agency records, both official and unofficial ones.
- Tools, currency, clothing, furniture, and other artefacts of various types.
- Voice tapes, DVDs, even video recordings are all available.
- Official government documents.
- Patents.
- Technical Issues Reports. And
- Scientific journal articles detailing the results of experimental research.

5.1.1 Types of Data

i. *Information that is Quantitative*

Quantitative data refers to the information that can be measured and is usually used to make comparisons. Individuals, actions, settings, and other separate occurrences are all counted. Using statistics, the quantitative technique is utilized to examine what, who, when, as well as where wellness events occur.

Quantitative data includes things like age, weight, temperature, as well as the number of patients with diabetes.

ii. *Qualitative Data*

The characteristics of qualitative data are as following:

- Qualitative data is a vast category of non-numerical data that can contain almost anything.
- Words are used to define and explain a particular occurrence like that of health-related issues in qualitative data.
- While this data may be accessed, it cannot be measured.
- It entails observing and listening to people in certain situations to learn how they feel and why they feel that way.
- Qualitative data includes male/female, e.g., smoker/non-smoker, as well as questionnaire response (agree, disagree, neutral).
- Here are some instances of qualitative data from the health-care setting:
- It is tough to assess organizational transformation.
- Clinical leadership is evaluated in the implementation program guidelines.
- Patient opinions on the quality of care.

5.1.2 Sources of Information

i. *Primary Data Sources*

Whenever an individual researcher or even a team of researchers arranges, gathers, or analyzes the data to address the research questions, this is known as primary data analysis.

The advantages of just using Primary Data include the following:

- You simply collect the information you need to respond to your study question.
- You have complete control over the data collection process, allowing you to ensure data quality, decrease the missing value, and analyze the instrument's reliability.
- You can assess an interference in its truest form (the double randomized trial), along with a new procedure or perhaps an educational program.

5.2 SOURCES OF SECONDARY DATA

Existing that you use to address your research topic that was obtained for a different purpose (**Romano**). Thus, using Secondary data has its own benefits like:

- 1 It may provide population estimates: for example, state data can be blended across states to obtain population estimates.
- 2 It is less expensive to obtain secondary data than original data (**Romano**).

- 3 Collecting secondary data requires less time.
- 4 You may not need to be concerned about informed consent or the use of human subjects.

However, problems with Secondary Data are also there like:

- 1 Design and data collecting for the study have already been finished.
- 2 Data might well be insufficient to address a particular research question. or Methodological approach and data gathering techniques may be lacking in information.
- 3 The data may be deficient in specifics.
- 4 Secondary data analysis may be less important in some fields or departments (for example, in experimental programs).
- 5 The statistical analysis of data frequently necessitates the use of approaches.

5.3 OBSERVATIONAL RESEARCH

What is observational research, and how does it differ from other types of study?

Being part of observational study, individuals and events are observed in natural settings. This allows the researchers to observe their participants making decisions and responding to difficulties in their natural environments rather than in controlled environments such as study rooms or focus groups.

5.3.1 Types of Observational Studies

i. *Observation of Nature*

Observation method takes place within the context of the phenomena being seen. The observations were done in the least intrusive possible way, only with researcher avoiding direct contact with the subjects.

ii. *Observation by Participants*

Researchers that employ participant observation take an active role in the study. In addition to observing behavior, an investigator may conduct interviews, take notes, check materials, and take pictures.

iii. *Observation with a Purpose*

Structured observation is done in a lab or even a synthetic setting instead of in the wild by researchers. An ordered observation is one in which a limited handful of behaviors are seen. This technique is much less conventional, but still, it allows for the inclusion of a fewer number of variables.

5.3.2 When is it Appropriate to Undertake Observational Research?

When you want to do the following, you should perform observation behavior:

- Look at how people act in a natural context.
- Investigate how real-world factors affect behavior.
- Explain a phenomenon.

5.3.3 Some Examples of Observational Research

Many qualitative research procedures, including content analysis and grounded theory, rely on observational methods. Both methods might include stages of data collection in natural environments using observational methods.

5.3.4 Benefits and Drawbacks of Observational Research

Consider the benefits and drawbacks of using observation in research before proceeding:

a. Benefits

You could note what occurs in a natural environment, when conducting observational study. This enables you to gain insights that would otherwise be impossible to access through standard research approaches like as focus groups and surveys. If you observe actions in a controlled environment, they are much more accurate, reliable, and natural.

b. Drawbacks

Because you would not have control over the environment, it may be difficult to control factors in observational research. Observational research can be time-consuming and costly at times.

5.3.5 Observational Steps

1. Determine the Purpose of Your Research

Recognize the goals and objectives of your research. Decide what questions you want to answer, as well as who you want to investigate or why. In this piece, you will learn how to progress with your research goal.

2. Generate a Checklist of Questions as well as a Research Strategy

Create a research plan based upon your research topic that outlines how you will gather information.

3. Decide on Your Data Collection Methods or Tools

Choose between a naturalistic observation approach and an engaged participant method for your research. Decide about how you will record audio and video, capture images, or take notes.

4. Observe

Go out into the field and make a note of what you find! Before you begin, double-check that you have all the necessary permissions.

5. Prepare your Information

After the observation, arrange collected data for analysis. After you have transcribed your audio and video recordings, start arranging your notes and papers.

6. Examine the patterns in your data.

By getting into the data, you can make a sense of it. Codify and arrange your information in a methodical manner to find themes and trends. Explore articles on qualitative coding to learn more about this approach.

5.4 INTERVIEWS

After all, an interview is a dialogue, through which information about sample is gathered. A responder and an interviewer are both involved in a research interview. The interviewer leads the discussion and asks questions, while the interviewee responds. Interviews might take place in person or over the phone. Furthermore, the web is becoming more popular as a platform for conducting interviews.

5.4.1 Different Types of Interviews

Depending on the criteria being addressed as well as the information produced, interviews can be conducted in a variety of ways. They may be classified into three categories:

a. Interviews that Follow a Pattern

During an interview, the researcher asks questions in a predefined order about various topics. For their replies, respondents must choose from a list of possibilities. On some subjects, the interviewer may well be able to provide clarity. Structured interviews are widely used in surveys.

b. Semi-structured Interviews

The interviewers ask questions, as well as in a semi-structured interview, respondents react in their own terms. Some interviewers utilize a topic guide that also serves as a checklist to guarantee that all respondents submit information on the same topics. Certain subjects might be explored further by the interviewer, depending on the respondents' replies or seeking for more clarity with follow-up questions. For obtaining in-depth information

from many respondents as well as from interviewees in a systematic manner, semi-structured interviews are effective.

c. **Unstructured Interviews**

The interviewer has no precise boundaries, constraints, prepared questions, or options in an unstructured interview. The interviewer poses a few broad questions to the responder to elicit an honest, informal, and spontaneous response. To gain a deeper understanding of the issue, the interviewer asks more questions and/or analyses disparities. When there is a little information on the subject, unstructured interviews are very useful to better understand the story underlying respondents' experiences.

5.4.2 Conducting an Interview

In the following sections are given the steps to be taken before, during and after the interviews:

i. ***Steps to Take Before the Interview:***

1. Define your objectives to identify your aims and indeed the data you will have to get there. Make certain that an interview is the ideal technique for achieving your objectives.
2. Decide on the type of interview you will going to take. Determine if organized, semi-structured, or unstructured interviews are required based on your desired information, money, time, and potential respondents.
3. Choose the most appropriate replies. Due to the nature of the interview, choose the qualities of interviewers and the number of interviews necessary.
4. Plan out how you will conduct the interviews. Consider having them conducted so over phone and in person. For big surveys, consider employing computer-assisted interviewing and recording.
5. Figure out how you will get your respondents. Because some people may not respond, gather contact details for a larger number of persons than that of a lot of interviews you require. By phone, e-mail, or regular letter, introduce yourself, your organization, and your concept to them.
6. Make an appointment as well as explain the interview's purpose as well as the importance of their participation.

ii. ***During the Interview***

1. Introduce yourself and maintain a friendly yet professional conversation during the interview.
2. Describe the purpose of your study, the importance of their involvement, and the expected length of the interview.

3. Be prepared to reschedule an interview if a responder has a scheduling difficulty.
4. Describe the format of the interview.
5. Explain how the talk will be documented and how the data gathered will be used, and, if possible, get individual written authorization to participate.
6. Ask if the respondents have any questions.
7. When asking inquiries or looking into problems, use a neutral tone of voice and language as much as feasible.
8. Keep your focus on the topic of discussion and conclude the talk within the time limit.
9. Double-check your notes and recording device on a frequent basis to guarantee proper recording without bothering the responder.
10. Conclude the meeting with the double check that all of the questions were asked, clarifying how you will use the information again, thanking the responder, and inquiring if they have any more questions.

iii. *After the Interview*

1. Twice check that number of times, the interview was properly recorded and take additional notes, if required.
2. Prepare your interview replies in advance. Your unstructured and semi-structured interview replies must be transcribed. A data analysis software must contain structured interview replies.
3. Gather resources for qualitative analysis in preparation for data analysis.

5.5 QUESTIONNAIRE

The questionnaire is the primary research tool, and it consists of a series of questions meant to elicit data from respondents. Questionnaires are used to collect information in the same manner that written interviews are used. They can be filled out in person, over the phone, on a computer, or by mail.

Questionnaire surveys are a low-cost, rapid, and efficient method of collecting significant amounts of data from a big group of people.

The investigator does not need to be present, when the surveys are being completed, and the data may be accessed promptly. If interview process with large groups of people is impossible, this technique can help. One issue with survey is that people may lie to safeguard their social standing.

Most people desire to project a favorable picture of themselves; as a result, people may lie or bend the truth in terms of improving their image, such as when students

exaggerate their review time. In that case, Questionnaires are a low-cost, quick way to study easily many people's behaviors, attitudes, preferences, perspectives, and intentions.

To collect data, most questionnaires utilize a mix of open and closed questions, depending on qualitative and quantitative type of research. This is advantageous since it permits the gathering of both qualitative and quantitative information.

5.5.1 Close Ended Questions

Only responses that fall into predetermined categories are allowed in responses to closed questions.

Nominal data is data that can be classified into a single category. The categorization might be simple (e.g., "yes" either "no," "male" as well as "female") or complex (e.g., "yes" either "no," "male" or "female")

Closed-ended questions might also yield ordinal information. A continual rating scale is commonly used to gauge the intensity of attitudes and emotions.

i. ***Strengths***

- They have had the potential to reduce costs. As a result, they are able to provide vast amounts of research results at a reasonable cost. As a result, a larger, more representative sample of the population might be produced, from which research could be extrapolated.
- The respondent offers quantifiable data (for example, a collection of "yes" and "no" responses), which enables scientific analysis of the results.
- Every inquiry is the same. The same questions are asked to all respondents in the same order. This means that a questionnaire may be readily replicated to ensure consistency. Therefore, a researcher can use the questionnaire to double-check the results.

ii. ***Limitations***

- They are not particularly informative. Participants have less flexibility to offer remarks that represent their actual thoughts about an issue since their replies are predefined.

5.5.2 Questions with no Answers

When people are asked open-ended questions, they are free to respond in their own terms. With open-ended questions, respondents can respond in their own words and in as much detail as they desire.

Open questions are good, if you truly want to get the most out of your responders' comments. There are no pre-determined replies in these, so responders can express precisely what they want in their own words.

Open inquiries are frequently used, when dealing with complex subjects that demand more explanation and discussion than a few simple categories to be supplied.

i. ***Strengths***

- In open questions, respondents can expound on their views, providing significant qualitative data. This implies that study can determine why someone holds a particular viewpoint.

ii. ***Limitations***

- Data collection takes a lengthy time. Respondents take longer to complete open-ended questions. This is problematic since it may result in a reduced sample size.
- Data analysis is time-consuming. Qualitative approach takes longer since the researcher must read the responses and attempt to categorize information using coding, which can be subjective and challenging.
- Because open questions need better writing abilities and a stronger capacity to explain oneself verbally, they are not appropriate for people with less knowledge.

5.6 SOURCES FOR SECONDARY DATA COLLECTION

Secondary data is information derived from original data and made accessible to researchers for use in their own research studies. It is a research source which has already been compiled. A researcher may well have obtained information for a given study before sharing it with other researchers. Instead of being gathered for specialized research purposes, just like in the case of something like a national census, the data might be obtained for general use. Data that is classed as secondary in one study may be considered primary in another. This occurs, when data is duplicated, resulting in real statistics for the very first study and as a secondary information for the second one.

5.6.1 Secondary Data Sources

Secondary data sources include journals, personal contacts, publications, newspaper, websites, and government records, etc. Secondary data is also known to be more easily available, when compared to the earlier data. Using these sources, only a tiny bit of research is necessary, as well as a modest quantity of effort.

With the introduction of computer news and social media, secondary data sources have become more accessible. The following is a list of some of these resources:

1. Books

One of the first methods of data collection was the use of books. Books are now accessible on almost any subject you could think of. When conducting research, all you must do is to look for a particular book on the issue at hand, then choose from the available range of books in that subject area.

If you choose your books carefully, they may be a reliable source of information and can aid in the preparation of a literature review.

2. Printed Sources

For diverse study topics, there are a range of published materials available. The writer, as well as the publishing company, are primarily responsible for the accuracy of the data derived from these sources. Published sources might be printed or electronic, depending on the situation. They may be compensated or unpaid, depending on the discretion of the writer and the publishing firm.

3. Unpublished Personal Sources

In comparison to published sources, something may not even be publicly available or easily accessible. They might only be available, if the investigator shares material with a colleague, which is not allowed to see otherwise.

For example, a firm's product management team may want customer feedback to assess what customers think of their product and make improvement recommendations. They will have to get information, from the customer service team, which was gathered specifically to help customers.

4. Journals

When it comes to gathering knowledge, journals are quickly becoming more significant than books. It is because new publications are added to papers on a regular basis, guaranteeing that public has greater access material.

In addition, whenever it comes to research, journals are generally more specialized. A magazine can be called "Secondary quantitative data and information collecting", whereas a book might simply be called "Secondary data collecting".

5. Newspapers

In most circumstances, information obtained from such a paper may be trusted. As a result, it is one of the most trustworthy secondary data sources.

Newspapers tend to focus on social, economic, including educational issues rather than scientific ones. As a result, publications may not be the most trustworthy source of scientific information.

6. Websites

Because the internet is frequently uncontrolled, information obtained through it may not be as accurate as that obtained from traditional sources. Certain closely maintained websites, on the other hand, just provide information and may be detected by researchers. The majority of these websites are either government and commercial enterprises that collect data for a fee.

7. Blogs

Even though blogs are among the most popular online data sources, they may not be quite as reliable as webpages. Everyone nowadays has a blog, and many people use them to attract traffic to websites or profit from sponsored advertisements.

They could always be relied upon for a reason. If a blogger is paid to post good reviews of a product, for example, he or she could do even if the reviews are false.

8. Diaries

Although diaries are personal records, researchers seldom use them to gather data. Except these days, when people post public diaries chronicling specific occasions in their life, diaries are usually personal.

Anne Frank's diary, which offered a detailed account of Nazi warfare, is a good example of this.

9. Documents from the Government

Government documents, which are a substantial and reputable source of secondary information, can be found nowadays easily. They produce data that may be used in advertising, business, humanities, and other forms of social science study.

These records include, among other things, census data, health data, and educational institute records. They are gathered on a regular basis to help with project prioritization, budgeting, and planning.

10. Podcasts

Podcasts have become increasingly popular, and many people prefer to listen to them over the radio. They function similarly to online radio channels and are becoming increasingly popular.

During podcasts, information is frequently transferred, and listeners can utilize it to construct statistics.

Furthermore, Information can also be gathered from the following sources: Data from of the public sector includes letters, radio stations, and public sector documents.

5.7 CONCLUSION

In research tools unit, basically the important tools and techniques are described to let you understand them. In this unit it is explained how we will collect our data to lead to its analysis, which type of data collection method will be used in the study and which data collection method will be preferable. So here every method is explained to understand the type of data collection so that it will be easy for researchers to pick up the convenient and feasible type of data collection method to collect data easily and timely. This unit also helps us comprehend which type of questionnaires in accordance of the study be chosen in such a way as it becomes beneficial for researchers in the future.

5.8 SUMMARY POINTS

Here are main points of the unit summarized as below:

- i. A primary source is an object, a person, as well as a work of art that come directly in personal contact.
- ii. There are two types of primary source data: Quantitative and Qualitative.
- iii. Primary data collection benefits a researcher in simply collecting the needed information, having complete control over the data collection process, and in assessing an interference in its truest form.
- iv. The primary data collection tools include: Structured and unstructured interviews, Observation and Questionnaires.
- v. In an observational study, individuals and events are observed in natural settings.
- vi. There are three types of observations: Natural, participants and that of purpose.
- vii. Observation studies are performed to look at people's action in a natural context, to investigate how real-world factors affect behavior and explain a phenomenon.

- viii. Content analysis and grounded theory are a few examples of observational studies.
- ix. There are many advantages of observational studies like observing actions in a controlled environment are much more accurate, reliable, and natural.
- x. There are also some drawbacks of observational research studies like they can be time-consuming and costly at times.
- xi. An interview is a dialogue between interviewer and responder, through which information about sample is gathered.
- xii. Following are types of interviews: Interview having a pattern, semi-structured and unstructured interviews.
- xiii. Another tool, like interviews, for collecting primary data is the questionnaire comprising of a series of questions for eliciting data from respondents.
- xiv. They can be filled out in person, over the phone, on a computer, or by mail.
- xv. Questionnaire surveys are a low-cost, rapid, and efficient method of collecting significant amount of data from a big group of people.
- xvi. Moreover, the investigator does not need to be present during the surveys.
- xvii. There are closed-ended and open-ended questionnaires having their own advantages and disadvantages.
- xviii. Secondary data is a compiled information derived from original data and made accessible to researchers for use in their own research studies.
- xix. The secondary sources of collecting data are: Books, Printed Material, Journals, Blogs, Newspapers, Diaries, Websites, Documents of Government and Podcasts.

5.9 SELF-ASSESSMENT QUESTIONS

- Q. 1 Analyze and compare, with examples, primary and secondary sources of data collection.
- Q. 2 Differentiate between Qualitative and Quantitative types of data, while supporting your answer with your own choice of any one of them and the reason for it.

- Q. 3 What have you understood about observational research study? Explain its advantages and disadvantages, while describing its characteristics, data collection tool and various steps to conduct it.
- Q. 4 Elaborate the data collection tool of interview, its types and steps taken before, during and after conducting interviews.
- Q. 5 Describe in detail what are questionnaires, their types, benefits and drawbacks of closed- and open-ended questionnaires.
- Q. 6 Detail out the secondary sources of data collection with their examples

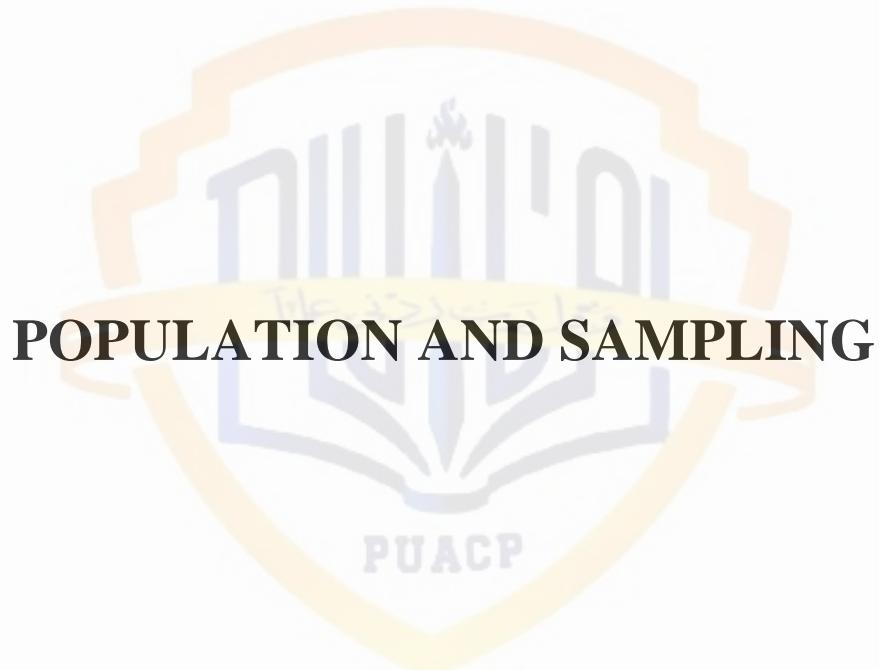
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SUGGESTED READINGS

- “Methodology of Educational Research” by Lokesh Koel, and
- “Research Methodology for Business Research” by Uma Sekaran.
- Research Methodology” by C.R. Kothar.

Unit-6



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INTRODUCTION

This unit, dear students, is about one of the most significant parts of methodology of your research study, which is **sampling** and **population**. Here, you will learn about the basic concepts of population and sampling, their definitions and certain important terminologies which are employed in the research. Moreover, you will get to know the important principles of sampling and how to determine sample size. Therefore, this unit will make your concept clear about the sampling difference between quantitative and qualitative research approaches. Hence, it will introduce all the important techniques and strategies about the collection of samples in both qualitative and quantitative research.

OBJECTIVES

This unit will help students to:

- i. understand the basic concepts of sampling and population;
- ii. recognize the major principles of sampling;
- iii. differentiate between qualitative and quantitative sampling strategies;
- iv. determine sample size in their research studies; and
- v. select representative sample by using appropriate sampling strategy.

6.1 WHAT IS POPULATION AND SAMPLE?

The group of participants that is examined by the researcher in an experiential research is called **Sample**. On the other side, the group of people about whom the study is conducted is called **Population**. One thing you need to keep in your mind is that the sample is selected from the population since the whole population cannot be studied. Therefore, in order to study the whole population, the sample is selected from the population. For instance, your target population in a particular study can be ELF students in Pakistani higher secondary girls' schools, and the sample can be three to four higher secondary girls' schools' classes. Hence, we can say that the population of a research can be all the people for whom the research is being conducted, and upon them the findings are generalized or applied.

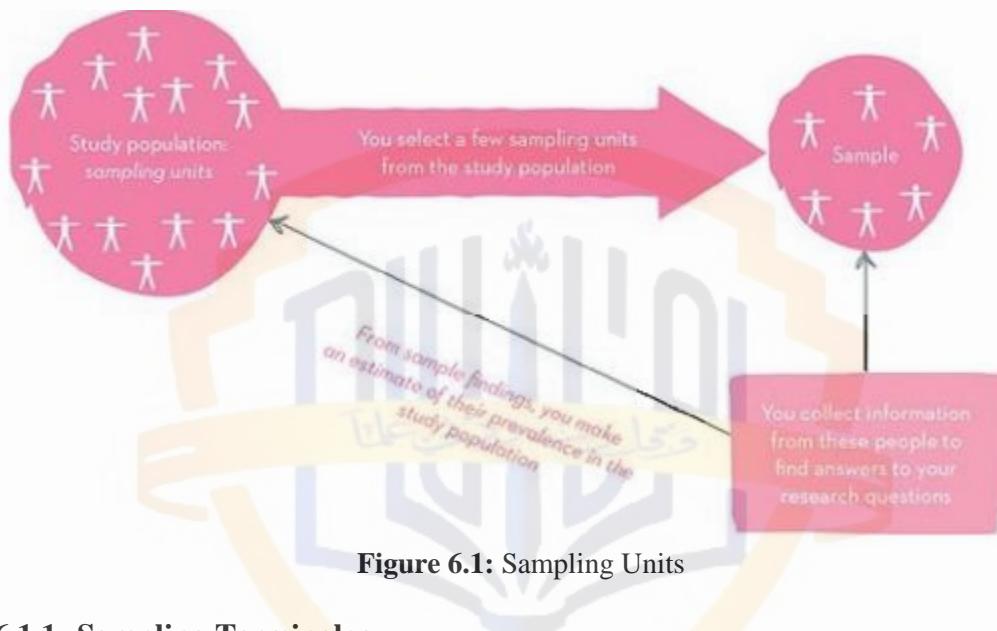
A good sample must be true representative of the target population because you are going to select few participants from the target population, and you will apply findings upon the whole population that is why your sample must be like the target population in its main features. For instance: ethnicity, gender, age, academic capability, educational level, socioeconomic status, and social class (Dornyei, 2007).

A sample is a subclass of the selected target population and is always representative of the entire population. Therefore, the matter of representativeness is very important as Milroy and Gordon (2003) and other intellectuals and authors greatly emphasized this point that the accuracy of findings largely depends on how true sample is representative of the population, and accurately the sample has been selected from the target population.

Here a question arises that "why don't we study every member of the population?" This is a very important question. The answer is that the whole target population can be costly and also wastage of time. It is better to adopt certain techniques for selecting the true representative samples from population, and the findings can be applied to the whole population instead of studying the whole population.

For example, you want to know the average annual income of the people living in major cities of Pakistan. Just imagine how much resources, efforts, and time you require in gathering the information from all families living in cities. On the other side, you have an easy option to select a few families by employing any sampling strategy based on requirements of your research. Then, you may gather information from the selected samples, and get the average of the income of

selected families. Finally, you can get an estimation of the average income of all other families living in the major cities. Likewise, if you want to identify the average age of the students in your BS class, you may simply ask the age of every student or the other way is to select few students as sample, get information about their age, add them up and divide by the total number of students you have asked. From this result you may make an easy estimation of the average age of whole class of BS.



6.1.1 Sampling Terminology

It is also very important for you to understand certain terminologies that are used in research. Let's consider the previous examples and understand the following terminologies:

- The families, living in cities and the BS class from which you selected the sample are your **Population**. This population size is represented by **N** in the study.
- The selected small number of families from cities and, students from the class for the purpose of getting knowledge are called your **Sample**.
- The number of families and the students which you selected for the purpose of knowing information is known as sample size that is represented by the letter **n**.
- The procedure of selecting the sample from the population is known as **sampling strategy** or **sampling technique**.
- The findings obtained from the sample are called your **sample statistics**.

6.2 DEFINITION OF SAMPLING

From the perspective of research, a sample is a group of participants, objects or items, or that are selected from a large population for research. The selected sample should always be true representative of the target population to make sure that the findings from research sample can be generalized to the population. In short, a sample is a subset of population from which data is collected.

“A sample is a subcategory of the population which is the attention of your research enquiry and is selected in such a way that it represents the study population. A sample is collected of a few individuals from whom you gather the required information. It is done to save time, money, and other resources” (Kumar, p613, 2018)

Sampling is a procedure, a technique, or a way of collecting data from the population. It is the way in which certain techniques or strategies are adopted to select sample from the population.

6.3 ESSENTIAL PRINCIPLES OF SAMPLING

Following are principles of sampling:

Principle No. 1

According to the first principle of sampling, there will be a variance between the population mean, and sample statistics and parameters. The major reason for this variance is that the sample is only a one part of the target population but not the actual whole population itself. The collection of elements via random sampling design can help minimize these variances. There are numerous other methods that can be employed to collect the true representative sample. Multiple samples collected for the similar population may differ in their sample statistics. The variance that occurs between sample and population characteristics is called as the sampling error. Sampling error can be reduced but it cannot be avoided entirely (Kumar, 2018).

Principle No. 2

According to Kumar (2018) the second principle suggests that the sample size should be greater because the greater the size of the sample will be, the more generalizable and accurate the sample will be of population mean. Large sample can easily reduce the difference between the population and sample statistics. Therefore, sampling error can be largely lessened if the large sample size is taken. Large sample size requires greater time to process the data and great effort as well, but it eventually reduced the sampling error.

Principle No. 3

This sampling principle is significant since it states that the greater variation in the population characteristics will result in greater difference between population mean and sample statistics. If the population is widespread and varied, the taken sample will also contain more variability and the obtained findings may not be generalizable and representable of the population mean. The best way to reduce sampling error is to make strata or clusters of the population. Hence, the sample can be taken from each strata and the population characteristics' variability can be diminished in this way (Kumar, 2018).

Principle No. 4

Biases and non-sampling errors is the fourth principle of sampling. In sampling, any error that occurs due to the researcher negligence or biasedness is called as researcher bias. Sometimes defective estimates and inappropriate of sampling techniques can also become the reason of the errors are called non-sampling errors. Therefore, it is important for the researcher to understand the sampling principles before choosing sample from the target population, so that the sampling process must be reliable and valid (Kumar, 2018).

6.4 DETERMINING SAMPLE SIZE

When this question arises, 'How large the sample should be? Or how small a sample can I collect? Unfortunately, we do not have defined rules in selecting the ideal sample size. In order to provide a proper answer to these questions, the researcher needs to consider the following guidelines:

- ***Rules of thumb:*** Dornye (2007) has given us certain rules of thumb for the selection of sample in different kind of studies. According to him in survey research, minimum 100 participants are important to collect as sample of the study. He further stated that at least 15 participants in each group of experimental and comparative study; minimum 30 participants in correlational research and in analytic procedures minimum 100 participants.
- ***Statistical consideration:*** In quantitative research, a simple condition is that the sample should have a 'normal distribution', and Hatch and Lazaraton (1991) stated that to attain this sample one needs to comprise 30 or more than 30 participants. Though, they further highlighted that small sample sizes can be compensated by employing certain particular statistical measures (Dornye, 2007).
- ***Sample composition:*** Another concern is to check any other different subgroups within the same sample that can act in a different way from the

other participants of the sample. If such kind of subgroups can be identified in advance (for instance, in usually L2 classes, girls are found to behave in a different way from boys), we should arrange size of the sample size so that the smallest size applies to the least subgroup in the sample (Dornyei, 2007).

- **Safety margin:** While deciding about the ultimate sample size, it is recommended to skip a decent space to provide for unplanned or unforeseen situations. For instances, some participants can leave at any phase of the study (Dornyei, 2007).

6.5 SAMPLING DIFFERENCES IN QUALITATIVE AND QUANTITATIVE RESEARCH

There are two opposing philosophies for selecting sample in quantitative and qualitative research. Quantitative research demands an unbiased selection of the sample and that sample must be true representative of the target population. On the other side, in qualitative research there are certain other considerations like easy access of the researcher towards the data, judgment of the researcher regarding the knowledge of the situation or event also influences the selection of sample. In quantitative research the primary goal of sampling is to draw interpretations with particular respect to your focus of research, about the population from which the sample has been selected, but in qualitative research the purpose is to get in-depth knowledge about the situation, event or individual. Therefore, true representativeness is not the matter of consideration here.

Same is the case, in determining the sample size in qualitative and quantitative research. In quantitative research, the sample size is predetermined based on other considerations and available number of resources. Conversely, in qualitative research, during the data collection procedure, there is no predetermined size of sample but the researcher waits till the saturation point. When the information is negligible or you are not receiving the new information, it is considered that your data has reached at the saturation point and you stop gathering more information.

In quantitative research randomization is employed to ensure the true representativeness of the population and to avoid biasedness. But in qualitative research, data is gathered purposively by the researcher keeping in mind the requirements of the inquiry.

6.6 SAMPLING TECHNIQUES

Sampling techniques can be divided into two groups:

- a. Probability sampling/random sampling: it involves expensive and complex and procedures that are commonly well beyond the resources of applied linguists.
- b. Non-probability sampling/non-random sampling: it consists of several techniques that try to achieve a judiciously representative sample using means that are within the resources of the common researcher.

6.6.1 Probability Sampling/ Random Sampling

Probability sampling is a broad term used for multiple scientific techniques, the most significant of which are the following:

- i. **Simple Random Sampling:** Random sampling is main constituent of probability sampling. It is a way of selecting sample from the population totally based on random. For instance, by giving numbers to each member and then generating random numbers from the computer. The notion behind this strategy is that the collection of sample is based entirely on chance and probability, consequently reducing the effects of any subjective or extraneous factors. Therefore, an adequately huge sample should comprise participants with characteristics alike to the target population. Though this is not always fully possible to achieve, or we can say it is rarely to achieve, the significant point is that normally random samples are almost always more representative of the population than non-random samples.

To make it clearer, let me explain with the previous example of BS class. Suppose you have 80 students in your BS class, and you want to select 20 students through simple random sampling technique. First, you will identify each student with a number and then you will randomly select any 20 numbers. You may also enter the assigned numbers in computer generated table and randomly select any 20 students as your sample.

Procedure

- Step 1: identify all elements of the population and give them a number.
- Step 2: make a final decision about the size of the sample n .
- Step 3: last step is the selection of sample size through computer generated numbers or manually.

- ii. **Stratified Random Sampling:** Another type of random sampling is stratified random sampling. In this type of sampling the researcher divides the population into various strata or groups and then a decided proportionate size of sample is selected from each strata or group. This strategy can be applied when you have a population having diverse characteristics or parameters because you divide the population into strata or groups based on various characteristics or parameters.

In order to apply this strategy, first you need to determine a number of characteristics or of the wide population, that you consider as significant from the perspective of the study in a ‘sampling frame’. For example, the division of population into male and female, two strata, based on gender, and then selecting participants from each group randomly.

A stratified random sample is, henceforth, a combination of categorization and randomization.

- iii. **Systematic Sampling:** It is a sampling strategy that is commonly used in anonymous surveys. It is statistical methods that involve the selection of elements from an organized and ordered sampling frame. Usually, it becomes difficult to select sample randomly in anonymous surveys since in such situation we do not have sources to identify the elements or participants in advance and their names as well. In such situations the shortcut is to use the systematic sampling. It involves selecting every n th member of the target population (Cohen et al. 2000).

For example, in the BS class if you want to select sample through systematic sampling technique, then you will arrange the 80 students in numbers. Then you will decide about the size of the sample. If you want to select 20 students, then you will select every 5th student of the population. If you want to select 10 students, then you will select every 10th student of the population. In this way you will select the sample in a systematic way that is why it is called systematic sampling.

- iv. **Cluster Sampling:** Another random sampling technique is cluster sampling that is used both in qualitative and quantitative research. It is particularly used when the population is widespread. In this strategy the large groups or units are selected randomly as the sample of the population. For example, there are many schools in the country or city so, on the basis of certain characteristics (requirements of the study) the whole population is divided into different clusters and then randomly a few or one school as a cluster is selected as sample, and the study of all students of the school is conducted. It is clear from these brief accounts that selecting true representative sample is expensive, and very technical articles have been published on the topic. Following is the procedure for the application of this strategy.

Procedure

- Step 1: identify all participants in the overall target population.
- Step 2: pre-plan about the various strata from which you want to stratify the population.
- Step 3: put each participant into the appropriate stratum.
- Step 4: give number to every participant in each stratum independently.

- Step 5: now you need to think and make decision about the total population size n .
- Step 6: make decision about the proportion of each stratum in the target population.
- Step 7: now decide about the number of participants to be selected from each stratum.
- Step 8: select the required number of participants from each stratum by simple random sampling (Kumar, 2018).

6.6.2 Non-Probability Sampling

Here the sample is selected without following the theory of probability. Nonprobability sampling is usually used when all the members of population are not identified, or sometimes unknown. In these conditions, the sample selection is largely dependent on other contemplations. Nonprobability sampling strategies are frequently applied in both kinds of researches qualitative and quantitative (Dornyei, 2007).

The difference is made only at the predetermined sample size. As I already mentioned, in quantitative research, you need to select a predetermined sample size through non-probability sampling design. On the other side, in qualitative research, you do not need to predetermine the sample size, but you need to select the sample till you reach the saturation point.

Mostly 'non-probability samples' are used in actual research of applied linguistics. In qualitative research, such kind of convenience, purposive, judgmental or 'non-probability samples' which are non-representative samples are not considered as a problem, on the other side, in quantitative research, whose purpose is generalizability and true representativeness, non-probability samples are considered as less-than-perfect negotiations that reality forces upon the researcher (Kumar, 2018).

Following are the non-probability sampling techniques:

- i. **Quota Sampling:** Quota sampling' is alike to proportional stratified random sampling except the 'random' element. Here, you start with a sampling frame, and decide the key proportions of the subgroups defined by the characteristics / parameters contained within the frame. The sample is selected according to the proportions but with the subgroups. Here, no random sampling is employed but researcher meets the decided quota by selecting according to his access and convenience.

Ease of access to researcher is the main advantage of this type of sampling strategy. Here, you select the sample from your convenient location.

Whenever you meet the person who fulfills the required characteristics of your research sample, you ask the person to participate in your research and this process continues till you reach at your required quota.

For instance, if you have a sample frame of 300 language learners that requires 50 percent participants should come from monolingual and the other 50 percent from bilingual families. Here, you need to select 150 participants from each group, but the selection would be according to ease of the researcher.

The advantage of quota sampling is that it is least expensive technique of selecting sample. You do not need to get information about the number of elements, their location, the sampling frame, and other information. Disadvantage is that it is not a probability sample, it is not a true representative, and findings cannot be generalized to all population.

- ii. Accidental Sampling:* It is particularly based on the convenience of the researcher while collecting sample. In quota sampling, the characteristics of the participants are kept in mind while collecting data but in accidental sampling no such kind of characteristics are considered. Whoever comes across to the researcher is made part of the sample with his/her consent, and this process continues till the saturation point of the sample. This sampling design is common in newspaper reporter research and market research. It has similar advantage and disadvantage like quota sampling.
- iii. Snowball Sampling:* This involves a network or 'chain reaction' in which the researcher first identifies a few people who meet the particular criteria of the study and then asks these participants to identify further suitable members of the population. They refer further participants and researcher meets them to collect data and ask them to refer further if they know. This process continued till the researcher reach at the saturation point of his/her sample for the study. This procedure is advantageous when studying groups whose members are not easily identifiable (for instance, gang teenage members) or when it is difficult, or ease accessibility is not possible to the required respondents. For example, baggers, criminals etc.
- iv. Convenience or Opportunity Sampling:* The utmost common sample type in second Language research is the 'opportunity' or 'convenience sample'. Here the important principle of selecting the sample is the convenience of the researcher. Dornye (2007) called this sampling strategy as the criterion sampling technique because no doubt it requires the convenience of the

researcher but at the same time it requires to meet a certain criterion, such as willingness to volunteers, availability at a certain time, easy accessibility, or geographical proximity.

Available students of the researcher's own class or the student from the researcher's own institution is main example of convenience sample. To be fair, convenience samples are hardly completely convenience-based but are generally partly focused, which means that in addition to the relative ease of convenience, participants also have certain characteristics that are particularly related to the purpose of the research.

For example, you want to select a sample of English Language Teachers from Higher Secondary schools of Islamabad by using purposive sampling technique. Here first of all you will select criteria for the selection of the teachers:

Criteria:

Profession:	English Language Teachers
Age:	35-45 years
Teaching Experience:	minimum 2 years
Teaching level:	9 th , 10 th classes

After setting this criterion, you may select your sample according to your convenience but participants must meet the defined criteria for the study. This criterion is defined keeping in mind the purpose of the study.

- v. **Purposive/Judgmental Sampling:** This is another nonprobability sampling technique that is frequently used in qualitative research. In this technique the prime focus is given to the purpose of the research, or the judgment of the researcher made on the basis of the purpose of the research. Here the sample is selected keeping in mind the purpose of the research as to which elements or respondents can provide the information for achieving the main objective of the research.

This type of sampling technique is helpful when you want to describe something about which little is known, or you want to construct a historical reality or to describe a phenomenon. It is commonly used in qualitative research but when it is used in quantitative study, you need to select a predetermined sample size which according to your judgment is fit for providing your required information for the study. It is totally based on your judgment since you as a researcher need to decide that who can be the fit for providing the best information for your study.

6.7 CONCLUSION

In this unit you have learnt all about sampling, the way of selecting a sample from the target population. It is through sampling that you make an approximation of the statistics of interest population. In this way you do not study the whole relevant population but only the selected sample. There are two opposite philosophies regarding the selection of sample elements in qualitative and quantitative research: In quantitative research the sample is selected in a way as it is meant to represent the whole target population and this purpose can be achieved through random sampling techniques. On the other side, in qualitative research, the sample is selected on the basis of the judgment and choice of the researcher according to convenience and requirements of the research and researcher. Therefore, non-probability sampling techniques are usually used in qualitative research. The length of the sample is usually not taken large in qualitative research. Focus is given to the saturation point, and the selection of sample continues till its research to the saturation point. That is why it can be stated that as compared to the quantitative research, here in qualitative research the sample size is not predetermined.

There are three principles to guide the sample determination in quantitative research: the most important is that the sample size should be greater. The greater the sample size should be the more representative it would be of the population, and the findings obtained from them could be easily generalizable.

Sampling techniques can be divided as random sampling techniques, non-random sampling techniques, and mixed sampling techniques which can also be called probability sampling designs and non-probability sampling designs as well. In random sampling technique, every element of the population has equal chance to be selected as the sample of the population. Four random sampling techniques have been discussed in this unit: cluster random sampling, simple random sampling, and stratified random sampling technique and stratified random sampling technique. The process for random selection has been given in detail step by step. Usually, manually or computer-generated random selection is done.

On the other side, five non-probability or non-random sampling techniques have been discussed in detail: accidental, snowball, quota, convenience, purposive etc. Each sampling technique is used for various purposes, and each has multiple advantages and disadvantages. These can also be used in quantitative studies, but their application is determined by the sample size. However, in qualitative studies it is determined by the saturation point of the data. Among all the non-probability sampling techniques, systematic sampling is a mixed sampling technique because it has characteristics of both probability and non-probability sampling techniques.

6.8 SUMMARY POINTS

- i. The group of participants that is examined by the researcher in an experiential research is called Sample. On the other side, the group of people about whom the study is conducted is called Population.
- ii. The sample size should be greater because the greater the size of the sample will be, the more generalizable and accurate the sample will be of population mean.
- iii. There are no hard and fast rules for determining sample size. However, Dornye (2007) suggests minimum 100 participants for survey study; 15 participants in each group of experimental and comparative study; minimum 30 participants in correlational research and in analytic procedures minimum 100 participants.
- iv. A sample must always be true representative of its population in all aspects.
- v. In quantitative research the sample is selected in a way as it is meant to represent the whole target population and this purpose can be achieved through random sampling techniques. On the other side, in qualitative research, the sample is selected on the basis of the judgment and choice of the researcher according to convenience and requirements of the research and researcher.
- vi. Sampling techniques are divided into random sampling techniques, non-random sampling techniques, and mixed sampling techniques.
- vii. There are four important random sampling techniques: cluster random sampling, simple random sampling, and stratified random sampling and stratified random sampling techniques which are commonly used in quantitative studies.
- viii. Important non-probability or non-random sampling techniques are: accidental, snowball, quota, convenience, purposive. These sampling techniques are commonly used in qualitative studies.

6.9 SELF-ASSESSMENT QUESTIONS

- Q. 1 How would you differentiate between sampling and population? Explain with example.
- Q. 2 Explain with examples the following: Sample size, sample frame, study population, sample statistics and sampling strategy.

- Q. 3 Differentiate between probability and non-probability sampling.
- Q. 4 What are the major sampling differences in qualitative and quantitative research?
- Q. 5 Which sampling techniques are frequently used in quantitative research and what are their advantages and disadvantages?
- Q. 6 Which sampling techniques are frequently used in qualitative research and what are their advantages and disadvantages?
- Q. 7 Identify situation where quota sampling can be used for sample selection, from your own area of interest.
- Q. 8 When will you use cluster sampling in research? Illustrate with an example.

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Unit-7



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INTRODUCTION

This unit builds an understanding of the variables, importance of variables, types of variables and classification of variables according to the nature of relationship, the nature of study design and the nature of measuring unit. The drive behind any research study is actually to state and explicate natural or manipulated variances. This is indicated through the conceptual characteristic features of variables. Variables, thus, are important to be recognized, classified and categorized in order to maintain a steady research procedure. And to make it easy and comprehensible as well as practical the unit 7 is here to explore the uses of different research variables, their ten types lying under three main classes of variables. Dear students, please study it thoroughly along with the suggested readings for achieving the above-mentioned purpose.

OBJECTIVES

At the end of this unit, the students will be able to:

- i. know about the Variables and importance of variables in research projects;
- ii. convert concepts into variables through indicators;
- iii. explain the significant role of variables in a research study;
- iv. understand and distinguish among various types of variables, like:
 - types of variables according to nature of relationship;
 - types of variables according to the design of the study; and
 - types of variables according to nature of measuring unit

7.1 INTRODUCTION TO VARIABLES

Research in social sciences mostly addresses the various variables in the social world. Variance- a reality of the world, needs to be measured to capture the exact nature of the world. The quantitative paradigm in Research, as compared to qualitative paradigm, focuses more its attention on the measurement of variability in the social world. Specially, the experimental research, quasi- experimental research or correlational research which attempt to address the causal relations between the phenomena, concept or factors need to test hypothesis. And it is important that, in a study, the concepts should be operationalized into measurable terms (variables) to reduce the variation in the understanding of the respondents. The concept being the mental models or images cannot be measured, so they ought to be converted via indicators into variables. So the knowledge of the variables is very crucial in the research methodology.

7.2 WHAT IS A VARIABLE?

Any entity, any image or any concept that can be measured or that can have different values is a variable. e.g. age, gender, weight, height, blood group, eye-colour etc. According to Kerlinger, (1986:27) "A variable is a property that takes on different values". Putting redundantly, "a variable is something that varies. A variable is a symbol to which numerals or values are attached". Some Scholars are of the opinion that scientific method cannot measure exactly the feelings, sentiments, preferences and values. While some other scholars are of the view that most of these things are capable of measurement indirectly through proper indicators which can be converted into variables.

A variable, then, is a noun that gives us the variation in a class of objects like gender, motivation, teachings style, ways of pronunciation, forms etc. If all the members of a category or class have similar characteristics and show no variability, then these characteristics are termed as **constants**. It is commonly found practice that in a certain research study, some features or characteristics are taken as variables while some features or characteristics are taken as constants. Let us make it more simple with the help of following example: Suppose that researcher is interested in the study of effectiveness of different teaching styles like demonstrative, presentative or interactive styles. The researcher chooses the 10th class of the boys of a school and studies the different teaching styles of different teachers and their effects on the class. In this study, the class will be a constant whole the teaching styles will be the variables. Similarly, in another study where the researcher wants to study the effect of the number of cigarettes smoked daily by the individuals of the same brand. Here, the brand of cigarette will be constant while the number of cigarettes smoked will be variables.

In short, any concept can be a variable that shows variability and can be measured. That is why measurability is regarded by the scholars as the main criteria to differentiate between a concept and a variable. Concepts being perceptions can vary from person to person, but only those concepts will be variables that can be measured. So it is important for the concepts to be converted into variables directly or indirectly - through a set of indicators.

Table 7.1: Some examples of concepts and variables

Concepts	Variables
richness	income
satisfaction	eye colour
excellence	blood pressure
Impact, etc.	marks obtained in the test, etc.

7.3 CONVERSION OF CONCEPTS INTO VARIABLES

A concept needs to be studied in a research. This process of converting a concept into variable is termed as operationalization. The process of opportunity to the researcher to get measurements necessary for the study. The concepts are first converted into indicators (the characteristics that reflect the concepts). These indicators are then converted into variables. The indicators of a concept may vary from researcher to researcher, but they must have a logical connection with the concept.

For example, if a researcher wants to study whether a person is rich or not, he will have to determine first the indicators of being rich. Suppose that the researcher decides to take income and assets as indicators of the wealth. Here the income being a variable cannot be further changed into another variable because the income of the individuals can be measured in certain unit of currency e.g. in rupees. But so far as the asset is concerned, this indicator needs division into further indicators like home, car, airplane etc. The researcher will charge the value of each indicator into rupees and then the total sum of them will give the researcher the total value of the asset of the person understudy. The researcher may determine a certain amount as a criterion for being rich and can then suggest whether the person is rich or not on the basis of the total amount of the income and the assets of the person.

7.3.1 Difference between Variables and Indicators

Variables are characteristic that the concepts have for example the performance of the students in an educational institution while on the other hand, the indicators are the means or ways of measuring these characteristics like in the above given example the monthly progress report will be the indicator of the variable - performance of the students.

7.4 IMPORTANCE OF VARIABLES

Following points show the importance of variables:

1. Variables must be understood because they provide us the basic units of information.
2. In order to determine the nature of relationship of the things to each other, the value of each and every variable should be cautiously studied.
3. Variables are an important part of the quantitative research as the quantitative research paradigm is mainly interested to measure the relationship among the variables involved in a study.

7.5 TYPES OF VARIABLES

The variables can be classified into three types on the basis of:

1. The nature of relationship
2. The nature of study design
3. The nature of measurement unit

This division is not mutually exclusive, rather mutually inclusive that is a variable established because of the nature of relationship can also be the variable according to the nature of study design.

7.5.1 Types of Variables due to Nature of Relationship

There are four types of variables in the research studies that attempt to study either causal relationship or correlation among the entities. These are classified as four types of variables as under:

1. Independent variables
2. Dependent variables
3. Extraneous variables
4. Intervening variables

1. Independent Variables

There are the variables which bring about the changes in situations or phenomena. These are also called change Variables. They become cause of the changes in a situation, phenomena or circumstances:

These variables are in the control of the researcher. He can manipulate them according to the needs of the study. Independent variables themselves are not changed by other variables though they can change other variables.

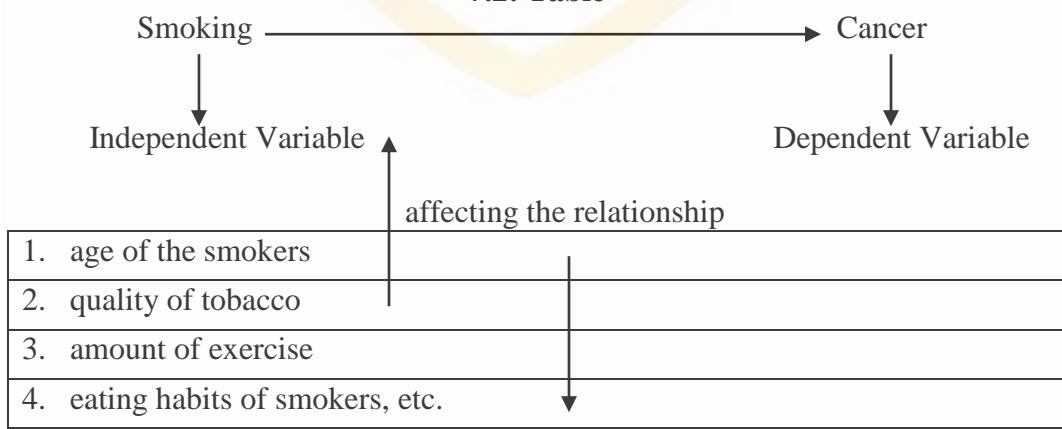
2. Dependent Variables

The outcome of the independent variables is dependent variables. The independent variables bring changes in dependent variables. As they depend upon the independent variables, they are called dependent variables. For example, the researcher wants to study the effects of positive reinforcement on the performance of the students, of the positive reinforcement is independent variable in this study as it is in the control of the researcher, and he can manipulate it according to the demands of the study while the performance of the students is a dependent variable here as it depends upon the amount of positive reinforcement. The dependent variable depends upon other variables for the change in it.

3. Extraneous Variables

When the researcher is studying the working of independent variables on dependent variables, certain other variables also affect the relationship between the independent and dependent variables. Such variables are called extraneous variables. These are not in the control of the researcher. For example, if the researcher is studying that smoking causes cancer. Many factors, like the number of cigarettes, the age of smoker, the quality of tobacco, the eating habits of the smoker etc. all affect this relationship between smoking and cancer. Here the extent of smoking is independent variable, cancer is dependent variable, while all other variables are extraneous variables.

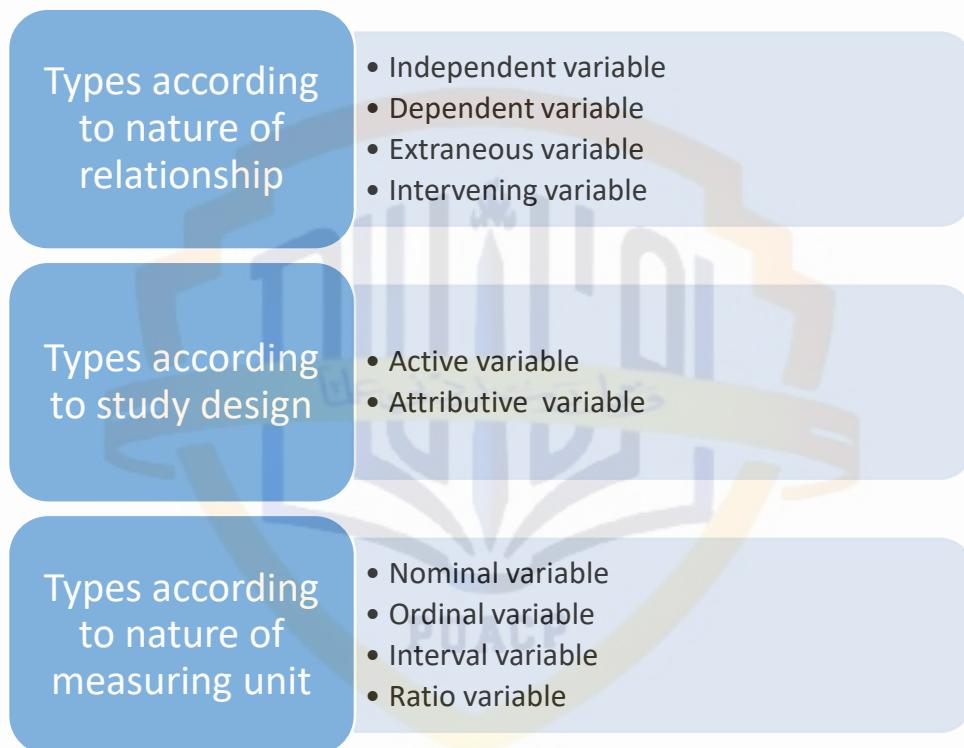
7.2: Table



Extraneous Variables

4. Intervening Variables

Sometimes in certain relationships, the causality does not take place is called intervening variable. It is also called a mediator variable. The researcher uses this variable to interpret the connection between the independent and dependent variables. For example, the connection between the wealth and health is connected through the availability of quality health care- which is the intervening variable, without which there would not be any connection between the wealth and health. Following graphic presentation is about all types of variables:



7.5.2 Types of Variables According to the Study Design

The variables are divided into Active and Attribute variables based on the design of the study. The design can be experimental, quasi- experimental or non-experimental. In these study designs, there are some variables that be controlled by the researcher and there are some which are not in the control of the researcher.

1. Active Variables

Active Variables are those variables which are in the control of researcher. These can be controlled, changed, and manipulated by the researcher e.g., the teaching methods, anxiety level, the amount of cigarette, coffee etc.

2. Attributive Variables

The variables that are not in the control of the researcher are called attributive variables. They cannot be changed, controlled, or manipulated by the researcher e.g., blood group, education, age, income, gender etc.

If the researcher wants to study the effects of positive reinforcement on the performance of the students, the amount of positive reinforcement is in the control of the researcher. He can change the amount of positive reinforcement. So, the positive reinforcement is an active variable in this study. The Attributive variables are the inherent characteristics that cannot be altered. The active variable in a study can be the attribute variable in another study.

7.5.3 Types of Variables According to the Nature of Measuring Units

Four types of measurement scales are used to give the range of values for variables. On basis of these scales, the variables are divided into four types i.e., nominal, ordinal, interval and ratio variables:

1. Nominal Variables

The nominal variable or the categorical variable have values in the form of two or more categories. Nominal variables are gender (male, female), school type (Public, private) etc. These variables are given numbers by the researcher to identify them. For example, the male will be given number '1' while the female category will be given number '2' or vice versa. But one thing should be clear that this type of number does not show any type of ranking i.e. that any number is higher than the other. e.g. number '1' does not represent that male is higher or superior in status to female who are allotted number '2'. There is no measurement of difference between the values in nominal variables.

2. Ordinal Variables

Ordinal Variables are the variables which give the ranking order of the persons or objects along with their categories. These variables show ranking of the entities from the highest to the lowest. For example, if the 50 students of a class are divided into five groups A, B, C, D, E. Then the group A will be having the most intelligent students the group 'B' will be having the less intelligent students and so on. The ordinal variables provide comparison between the objects. Ordinal variables show the performance as high, low, good, better, worse etc. But they do not show how much higher or lower one individual's show performance is as compared to the other person's performance. This will be clear from this example: suppose that the researcher ranks the school in a city based on the student's performance in the tests in English.

The difference in test scores between rank 1 and 2 is 3 points. The difference between rank 2 and 3 is 4 points while the difference rank 3 and 4 is 2. So the interval variables give us the ranking order but they do not give us equal scale intervals or in more simple words the interval variables do not give the exact

difference between the ranks. Ordinal variables give the difference of measurement. They not only give the name or the category but the order, the rank also.

3. Interval Variables

The interval variables share all the characteristics of the nominal and ordinal variables but have this own specific characteristic as well in the sense that they give the equal intervals between the ranks along with giving the categories and the ranking. The interval variables show that the difference between the ranks is equal one. For example, the difference between 36 degrees and 34 degrees on Celsius scale will be equal to the difference between 40 degrees and 41 degrees on Fahrenheit scale. It means that the temperature intervals on both the scale is equal. The interval variables not only show us that one value is higher than the other but also show that the distances between the intervals on the scales are the same. GRE, MAT, SAT scores are some of the examples of interval variables. Interval variables, however, do not represent the true zero point. Thus, if a student gets zero marks in a test, it does not mean that the student does not have any knowledge of the subject. Similarly, if a student gets 100 marks in a test, it does not show his full command over the subject.

4. The Ratio Variables

The ratio variables share all the characteristics of the nominal, ordinal and interval variables but there is one difference between the ratio variables and the rest of the variables i.e. The ratio variables show the true zero-point, weight, height, time, distance is the some of the examples of the ratio variables. The ratio variables give the exact point of measurement. For example, we can say that the 50 feet length is twice as long as 25 feet length of an object because the length is measured on a ratio scale. The difference between the interval and ratio variables is that the ratio variables give the true zero so only that the researcher can have ratios.

7.6 CONCLUSION

In short, the unit 7 is a humble effort to encompass the concept of research variables, data items to be examined for qualitative or quantitative and/or mixed variance analysis. Variables are conceptual characteristics like that of gender, phonological awareness and spoken English etc. having relationships with each or one another. And it is very important to recognize the relative variables just like it is significant enough to find out the research topic. The reason for it is that it determines the researchable study and subsequent appropriate research design as well as its instruments or tools to lead it toward valid and reliable findings. Therefore, considering the importance of variables in a research study, this unit has described different types of variables (ten types) according to their three main divisions of 1) nature of relationship, 2) study design and 3) nature of measuring unit. After making our students familiar with the significant concept of variables, the next unit 8 will explain another relevant concept of research and that is ‘Hypothesis’.

7.7 SUMMARY POINTS

The unit is summarized in the following points:

- i. The mental concepts remain immeasurable unless they are operationalized through indicators into measurable terms, variables.
- ii. Any entity, any image or any concept that can be measured or that can have different values is a variable. e.g., age, gender and weight, etc.
- iii. The importance of variables lies in provision of the basic units of information, determining the nature of relationship of the things to each other, and in measuring the relationship among the various variables, involved in a study.
- iv. The variables can be classified into main three types:
 - The nature of relationship (Independent, dependent, extraneous and intervening variables)
 - The nature of study design (Active and attributive variables)
 - The nature of measurement unit (Nominal, ordinal, interval and ration variables).
- v. The manipulated variables bringing about the changes in situations or phenomena are called independent variables and that are not changed themselves by other variables though they can change other variables.
- vi. The outcome of the independent variables are dependent variables as they depend upon the independent variables.
- vii. During the working of independent variables on dependent variables, certain other variables also affect the relationship between the independent and dependent variables. Such variables are called extraneous variables. These are not in the control of the researcher.
- viii. Sometimes in certain relationships, the causality does not take place and it is called intervening variable, also known as a mediator variable.
- ix. Active Variables are the variables which can be controlled, changed, and manipulated by the researcher e.g., the teaching methods and anxiety level, etc.
- x. The variables that cannot be changed, controlled or manipulated by the researcher are known as attributive variables.
- xi. The nominal variable or the categorical variable have values in the form of two or more categories, and are numbered by the researcher.

- xii. Ordinal Variables are the variables which give the ranking order of the persons or objects along with their categories. These variables show ranking of the entities from the highest to the lowest.
- xiii. The ratio variables share all the characteristics of the nominal, ordinal and interval variables but there is one difference between the ratio variables and the rest of the variables i.e. the ratio variables show the true zero point and give the exact point of measurement.

7.8 SELF-ASSESSMENT QUESTIONS

- Q. 1 Define and explain research variables with three examples.
- Q. 2 Describe the importance of variables in a research procedure with illustrations.
- Q. 3 Elaborate the four variables according to the nature of relationship: Independent, dependent, extraneous and intervening variables.
- Q. 4 What are the major variables according to the nature of the research design; explain them with a few examples.
- Q. 5 Elucidate the variables according to nature of measurement unit: Nominal, ordinal, interval and ration variables.

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Unit-8



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INTRODUCTION

This unit will develop the basic understanding of learners about the scientific definition of research hypothesis. They will be able to learn about the significance of hypothesis and its characteristics and different functions. The students will not only be familiarized with the various types of Hypothesis but will also be acquainted with some knowledge about how to develop an effective hypothesis. Further, they will learn about hypothesis testing and Hypothesis errors.

OBJECTIVES

After completing this unit, you will be able to:

- i. get to know about the significance of a hypothesis;
- ii. differentiate between hypothesis statement and research question;
- iii. identify the independent and dependent variable in hypothetical statement;
- iv. insert characteristics of a good hypothesis in their research study;
- v. understand different types of hypotheses and their application;
- vi. formulate effective hypothesis statements; and
- vii. identify errors in hypothesis statements.

“Scientific methods are the “Principles and procedures for the systematic pursuit of knowledge involving the recognition and formulation of a problem, the collection of data through observation and experiment, and the formulation and testing of hypotheses.”(Merriam -Webster. 2022)

8.1 WHAT IS A HYPOTHESIS?

8.1.1 Scientific Method and Hypothesis

Research does not start in vacuum. It involves scientific inquiry and researchers' intellectual reflection. The beginning point of scientific inquiry or rational investigation originates with observation. So, out of curiosity, we dig around and look for a solution to a problem. Here, it is important to relate the theoretical description of Dewey's 5-Step reflective thinking practice of Scientific Method which includes the hypothesis as one of the key components of the scientific process.

This is the process of the development of the scientific interventions and knowledge. "A real problem arises out of present experiences, suggestions for a solution come to mind, relevant data are observed, and a hypothesis is formed, acted upon, and finally tested" Deweys, J. (1933). Thus, the scientific method refers to the basic steps the scientist uses to obtain factual knowledge.

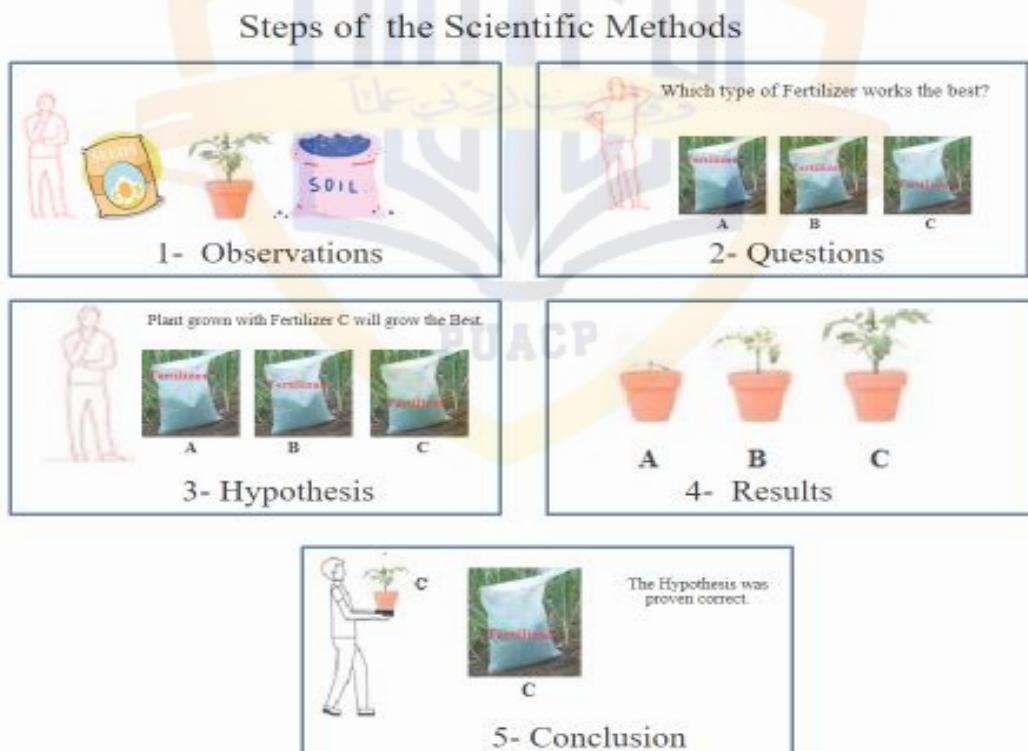


Figure 8.1: Steps of the Scientific Method by Rana, Samina

8.1.2 What is a Research Hypothesis?

The research hypothesis is an educated guess, an intellectual suggestion or a predictive proposition which is the basic requirement of a very sound research study that predicts the research result before one conducts the research. The researchers consider it important at the start to take a wise decision about their research plan and propose the solution to the problem for the authentic results. The research hypothesis fully contributes to the solution of the research problem.

A research problem is about identifying something worth researching.

A research question is a question that focuses your study on the particular research problem.

A hypothesis is a guess at the results before you conduct research. It should be something you can prove to be untrue.

A research hypothesis is defined as a very focused, precise, definite, and testable statement, suggestion about the possible outcome of a scientific research study based on a particular property of a population which predicts differences between groups of variables.

“A hypothesis is a researcher’s prediction of the research findings, a statement of the researcher’s expectations about the relations among the variables in the research topic”. Gay, L. R., Mills, G. E., & Airasian, P. W. (2009).

i. Hypothesis in Quantitative Studies

In quantitative research studies, hypothesis is an essential component of all research studies except the survey studies. The researchers here develop a research hypothesis just at the beginning of the research as mostly the nature off research is classified by the hypothesis. In addition, all aspects of the research such as variables, population, data collection tools and research designs are directly affected by the formulation of hypothesis. For instance, the research studies found the use of colored markers more effective in English language teaching and the researchers postulate the research hypothesis over this theoretical finding if there are no other opposing theoretical findings.

ii. Hypothesis in Qualitative Studies

The objectives, scope and procedures of qualitative researchers used to be significantly different from those of quantitative researchers. Normally, the

qualitative researchers do not form hypotheses before conducting the research rather they may move on some guiding principles or hypothetical pinning for their new research. Instead of hypothesis test, qualitative researchers create a new kind of hypotheses at the end of their investigation. Here, they are practically observing the steps of inductive research process which requires not the previous guesses or hypotheses regarding researchers' study and investigations.

Hypothesis is a tentative relationship or testable assumption/prediction/conjecture between two or more variables which gives direction to a research.

8.1.3 How Many Hypotheses Should a Research Have?

Good research relies on well-crafted hypotheses. There are no imposed limits to the number of hypotheses, unless restricted by the university or institution for experimentation. However, there are a couple guidelines to consider when developing hypotheses, as follows:

- Practically, many hypotheses require additional data collection and analysis, resulting in increased time and cost; therefore, limit the number of variables to keep the study manageable.
- Besides, the number of hypotheses may reflect the number of variables.

8.1.4 Selection of a Testable Hypothesis

Good research heavily relies on the selection of a testable hypothesis. The process of research validity involves **testing of research hypothesis**.

It is important to note that a hypothesis must be testable and that must be either approved or disapproved because of experimentation. Here is an example of a good hypothesis i.e.: if there exists a relationship between the of effective practice of English language listening skills through songs its result may either be very effective or can be vice versa in exceptional cases.

Points to Ponder

- i. Do you wonder about the working of inquiring Minds?
- ii. Can Hypothesis vs. Theory be used interchangeably?
- iii. What is the difference between prediction and Hypothesis?



(Toledo, A. H., Flikkema, R., & Toledo-Pereyra, L. H. (2011)

Figure 8.2: Developing a Research Hypothesis and Theory

8.1.5 Hypothesis Versus Theory

Generally, both the terms hypothesis and theory are often used interchangeably but these two terms mean something different from each other in science. Like a hypothesis, a theory is testable and may be used to make predictions. Scientific understanding is usually organized into different theories. Tested hypothesis may lead to the construction of a new theory. A **theory** is a broad collection of verified, widely practical scientific knowledge (Helmenstine, Anne Marie, (2020,

August 27). The table below describes some of the most important scientific phenomenon:

SCIENTIFIC METHOD	Thinking, Observing, Questioning, Predicting, Investigating, Researching, Experimenting, Modeling, Measuring, Analyzing and Inferring.
HYPOTHESIS	Reasonable and educated prediction based on previous observations.
THEORY	Attempt to explain a pattern
LAW	Rule that describes a pattern
INFER	Draw a conclusion based on observations and facts

Table 8.1: Different Systems of the development of Scientific Method

Want to Know	
Difference between a Hypothesis and Prediction	<p>Prediction <i>A rainbow may be seen today.</i></p> <p>Hypothesis <i>Refraction Theory may cause a rainbow to be seen.</i></p>

Table 8.2: Difference between Prediction and Hypothesis

8.1.6 Developing a Research Hypothesis

A hypothesis is not a simple statement but the researcher's prediction of the research findings, a statement of the researcher's expectations about the relations among the variables in the research. However, there are some important things to consider when building a convincing hypothesis. Precisely, in research situations, a hypothesis is the basic concept, a tentative idea, an educated guess or driving force that the researcher intends to define through experiments and the use of "if-then" statements.

Table 8.3:

What?	Explanation of a phenomenon	Event that will occur if phenomenon is true
What?	Explains why something happens	Forecasts future happening or event?
Variables	Statement with variables	If, then statement
Example	Cholesterol of higher than 400 leads to heart disease	If someone has cholesterol of higher than 400, then they have heart disease.

Most researchers come up with a hypothesis statement at the beginning of the study. Thus basically, they make a prediction about the outcome at the start of the study and conduct experiments to test whether this prediction is true and to what extent.

For example, the following hypothesis:

Walking for 30 minutes every day reduces hypertension.

Diagramming Technique

Drawing a diagram of the hypotheses is a useful technique to help clarify one's concept especially while formulating a statement.

Usually a hypothesis takes the causal relationship as 'X causes Y' or 'X is connected to Y'.



For example, the first hypothesis stated above could be represented by a diagram as follows:



The two variables, or concepts are in boxes that are linked by an arrow going from one concept to the other. The arrow indicates that one variable ('Thirty Minutes' walk) does something to the other variable (adoption of new technology).

The plus sign indicates that the relationship is seen as positive that is more of the one will lead to more of the other. Not all concepts have a positive relationship.

Once you get used to forming hypotheses and making diagrams then you can explore new patterns involving more than two concepts. For example:

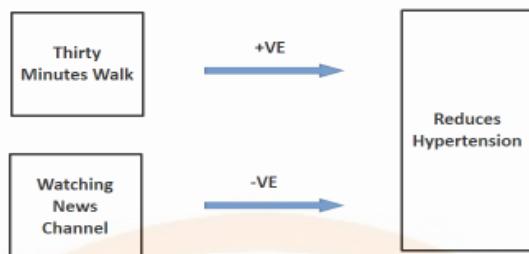


Table 8.4: Developing a Research Hypothesis by Rana, Samina (2022)

Follow this template: If a specific action is taken, then a certain outcome is expected.

Define the Variables

- o Independent variables are the ones which are manipulated, controlled, or changed. Independent variables are isolated from other factors of the study.
- o Dependent variables, as name suggests are dependent on other factors of the study. They are influenced by the change in independent variable.

Examples of Independent and Dependent Variables in a Hypothesis:

Example 1: The greater number of industries in the city (independent variable) increases air pollution (dependent variable).

If you change the independent variable (building more 1 factories), it will change the dependent variable (amount of air pollution).

Example 2: What is the effect of cinnamon water (independent variable) on cholesterol levels (dependent variable)?

If you change the independent variable (the type of cinnamon you consume), it will change the dependent variable (cholesterol levels).

8.1.7 A Checklist of Writing up a Strong Hypothesis

- Find something of a genuine interest.
- Create a causal relation between independent and dependent variables by developing hypothesis proposition while using if-then statement.
- Is the language clear and well-focused?
- What is the relationship between your hypothesis and your research topic?
- Is your hypothesis testable? If yes, then how?

- Can you manipulate your variables without hampering the ethical standards?
- You should not ignore the importance of the above steps. The validity of your experiment and its results rely on a robust testable hypothesis.

Notice all of the following possible hypotheses and practice:

Table 8.5:

Research Question	Hypothesis	Null Hypothesis(H₀)
What are the health benefits of consuming food supplements over 60 years of age?	Increasing the consumption of food supplements in 60s will result in decreasing frequency of doctors' visits.	Increasing apple consumption in over- 60s will have no effect on frequency of doctors' visits,
Which Bus Service have the most delays?	Low-cost bus services are more likely to have delays than premium bus services.	Low cost and premium bus services are equally likely to have delays
Can flexible work hours improve employee's job satisfaction?	Employees who have flexible working hours will report greater job satisfaction than employees who work fixed hours.	There is no relationship between working hour flexibility and job satisfaction.
How effective is high school self-esteem training at reducing pessimistic attitude of teenagers towards life?	Teenagers who received self-esteem education lessons throughout high school will have low rates of stress fits than teenagers who did not receive any self-esteem education.	High school self-esteem education lessons has no effect on pessimistic drives/ mental tendencies
What effect does the daily use of mobile and social media have on the attention span of under 16s?	There is a negative correlation between time spent on mobile and social media and attention span is under-16s.	There is no relationship between social media use and attention span is under -16s.

Once you have written research hypothesis, you will need to test it, analyze the data and form your conclusion as well.

Table 8.6: Qualities of a Good Hypothesis Adapted from
(Gay, L. R., Mills, G. E., & Airasian, P. W. (2009).

1. A good hypothesis is based on sound reasoning that must be consistent with previous theory or research.
2. A good hypothesis provides a reasonable explanation for the predicted outcome.
3. A good hypothesis clearly states the expected relation or difference between defined variables.
4. A good hypothesis is testable within a reasonable time frame.

8.2 CHARACTERISTICS AND FUNCTIONS OF HYPOTHESIS

A reasonable hypothesis should have the following attributes, often called the criteria of adequacy:

- The hypothesis should be short but highly significant.
- It must be clear and consistent with previous research.
- It must be relevant to the existing body of knowledge.
- It must establish a cause-and-effect relationship between different Variables.
- It must be possible to test the hypothesis using an experiment. The hypothesis should have the scope for conducting more tests.

Additionally,

- Prudence: The hypothesis relies on the simplest possible explanation.
- Application: A good hypothesis should be widely applicable with limited modification, meaning it should be able to explain and form predictions about closely related scientific phenomena.
- Fruityfulness: The hypothesis must yield a prediction about what will occur during the experiment.
- Conservatism: The hypothesis must align with available information and theories. It should be based on known scientific information while exploring untested facets or applications of the information.

8.3 TYPES OF HYPOTHESIS

Hypotheses can be broadly classified on the basis of how they are derived (i.e., inductive versus deductive hypotheses) or how they are stated (i.e., directional versus null hypotheses). Let's study these terms one by one:

1. Simple Hypothesis

As the term itself reflects, if there exist a simple relationship between two variables such as dependent variable, and an independent variable that is called a simple hypothesis.

2. Complex Hypothesis

If the number of variables are more than two it predicts a complex kind of relationship between two or more variables and been defined as a complex hypothesis.

3. Null Hypothesis

Null hypothesis, denoted by H_0 reflects no relationship between two variables.

"Rejecting the null hypothesis and accepting the alternative hypothesis is the basis for building a good research study."

(Toledo, A. H., Flikkema, R., & Toledo-Pereyra, L. H. (2011).

4. Alternative Hypothesis

An alternative hypothesis, denoted by the H_a or H_1 , shows the causal relationship of the two variables and the significance of significant to the research topic.

5. Directional Hypothesis

It specifies the expected direction to be followed and implies researcher's intellectual commitment to a particular outcome.

6. Non-directional Hypothesis

It is opposite to directional hypothesis and been used when there is no theory involved.

The specific differences among directional, non-directional, and null hypotheses are presented below, but first it is necessary to explain the types of relationships one may find among quantitative variables.

Table 8.7:

Relational, Non-Directional	Handwriting and examination score are related
Relational, Non-Directional	Handwriting and examination score are positively related
Comparative, Directional	Girls got higher final exams score than boys
Comparative, Non-Directional	The scores of Girls and boys students are different
Comparative, Non-directional	The scores of Girls and boys students are different

In most of educational social sciences, relationships among quantitative variables will follow either a positive, negative (inverse), or no relationship pattern. Others are possible as well (e.g., non-linear relationships).

Empirical Hypothesis

An empirical hypothesis is formed by the experiments and is based on the evidence.

Statistical Hypothesis

In a statistical hypothesis, the statement should be very formal, logical or may be illogical, and the hypothesis must be proved statistically.

Besides these types of hypothesis, some other hypotheses are: Associated Hypothesis, Casual Hypothesis.

Points to Ponder

- a) What challenges did you face while formulating hypotheses for scientific research?
- b) How did you assess the strength of your research hypotheses?

8.4 HYPOTHESIS TESTING

Basically, Hypothesis testing is a kind of process which is utilized to assess the credibility of the results obtained out of the sample after experimentation. It further provides a method to reliably make inferences and apply to the larger population.

Thus, Hypothesis testing refers to the process of making inferences or educated guesses about a particular parameter. This can either be done using statistical analysis and sample data, or it can be done on the basis of an uncontrolled observational study.

The first step in testing hypotheses is the transformation of the research question into a null hypothesis (H_0), and an alternative hypothesis, (H_a). The null and alternative hypotheses are concise statements, usually in calculated form, of 2 possible versions of “truth” about the relationship between the predictor of interest and the outcome in the population.

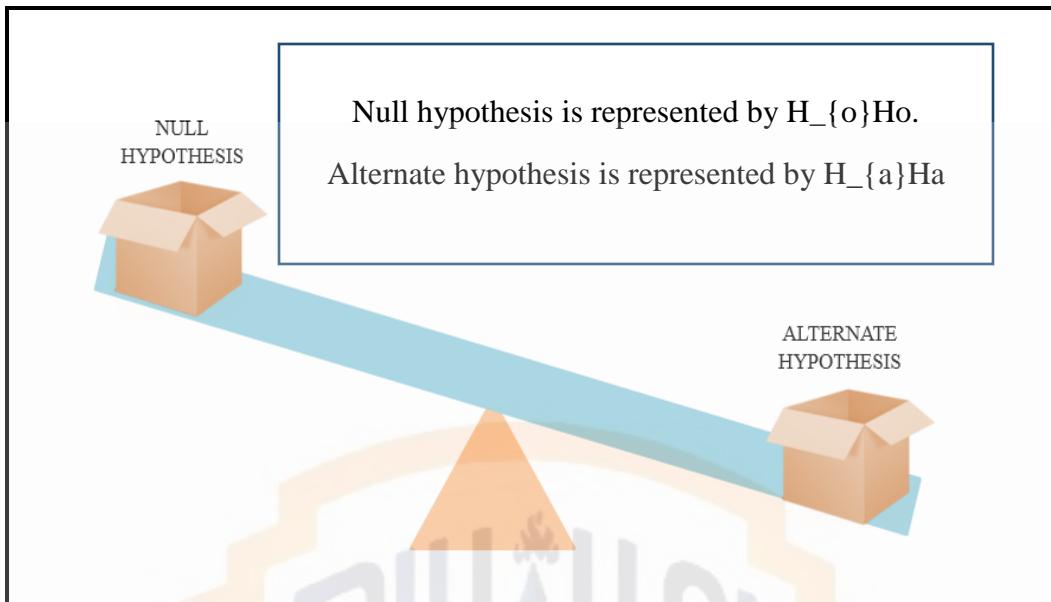


Figure 8.3: Null and Alternate Hypothesis (Rana, Samina, 2022)

The above referred types of hypotheses are the two possible versions of truth that must be very precise and a complete whole as they are responsible of uncovering all possible truth and mutually specific that must be not overlapping. By convention, the null hypothesis is used to describe a lack of usefulness between the predictor and its outcome; the alternative hypothesis describes the strength of a connection and is typically what the researcher has the intention to show.

The goal of statistical testing is to decide whether there is sufficient evidence from the under-observation samples to conclude that the alternative hypothesis should be believed.

Hypothesis testing has been akin to a court trial of some criminal act, where jury must use evidence to decide that out of innocence (H_0) or guilt (H_a), which of the two possible truths have to be believed.

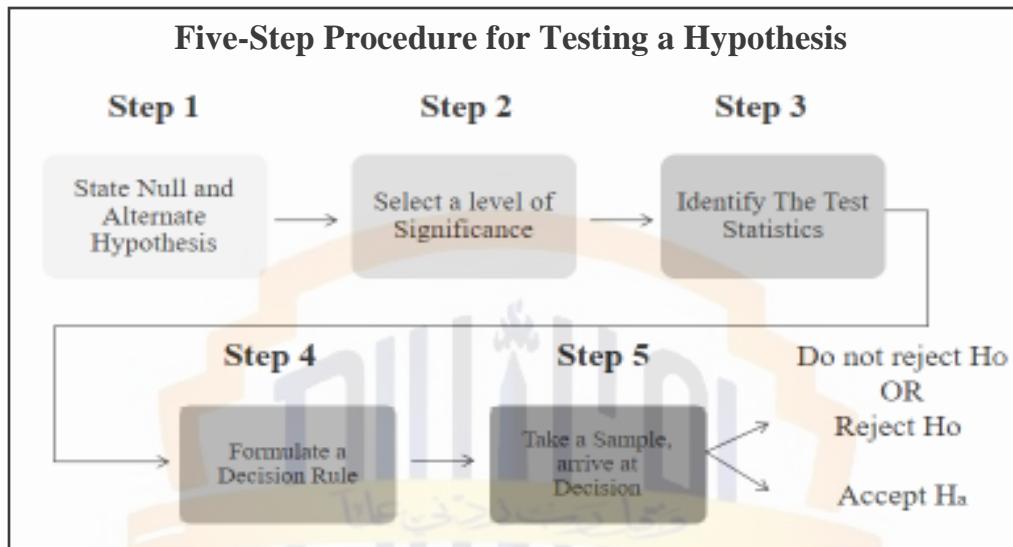
Just as a jury follows the law to assume that the suspect would be considered innocent unless proven with evidence otherwise, the investigator should assume there is no liaison with the allegation unless there is a strong evidence to prove that accusation.

8.4.1 How to Test a Hypothesis?

There are very definite steps of Hypothesis test. First, we will thoroughly examine all the steps to test a hypothesis. Then, we may be able to understand and enjoy

some examples of hypothesis testing. At first, in a fixed sample, the status of an "alternative hypothesis, and" null hypothesis" either approved or disapproved must be ascertained through the hypothesis test.

Table 8.8: Null and Alternate Hypothesis (Rana, Samina, 2022)



At this point, we are prepared to work on a hypothesis and to determine the strength of the conclusions. Following are the steps we need to consider for testing the hypothesis:

- i. **State a Null/Alternative Hypothesis:** The null hypothesis shows least effectiveness of the introduced experimentation. The researchers used to work either to prove null hypotheses or disapprove null hypotheses. By rejecting the null hypothesis, the researchers used to accept the alternative hypothesis or prove the usefulness of the experimentation. As far as the statement of an alternative hypothesis is concerned, that is opposite to the null hypothesis, demonstrating the significant result.
- ii. **Select a Significance Level:** The significance level is basically a statistical way of indicating the assurance level of researchers while drawing conclusions. The alpha (α), a determiner, defines the chances of probability that the null hypothesis would be inverted/rejected. Let's suppose if a typical significance level is set at 0.06 (or 6%). One may probably receive 0.2 or 0.02, depending on the areas of research.
- iii. **Identify a Test Statistics:** If the researcher sets the alpha at 0.06, then there would be a 6% chance that the researcher may find support for the alternative hypothesis which means almost rejecting the null hypothesis

where, in truth, the null hypothesis would be actually true and the analyst are wrongly rejecting it whereas, the researchers would have a better blast at supporting their alternative hypothesis, if they set a high alpha (0.35), that shows they are not looking for a big a difference in their experimental groups. However, at times, they might have a greater chance at being wrong about their conclusions.

- iv. **Formulate a Decision Rule:** Calculated p-value, or probability, indicates the probability of achieving the results of the null hypothesis. While the alpha (α) is that impact level which the researchers have been trying to achieve. A low p-value presents stronger support for their alternative hypothesis.
- v. **Arrive at Decision:** If the p-value meets the researcher's significance level requirements, then their alternative hypothesis would be valid, and they may reject the null hypothesis. That means, if the researchers' p-value is lower than their impact level (e.g., if their planned p-value is 0.04 and their significance level is 0.08) then they may simply reject the null hypothesis and accept their alternative hypothesis.

The graphical description below summarizes both kinds of possibilities at the end of analysis:

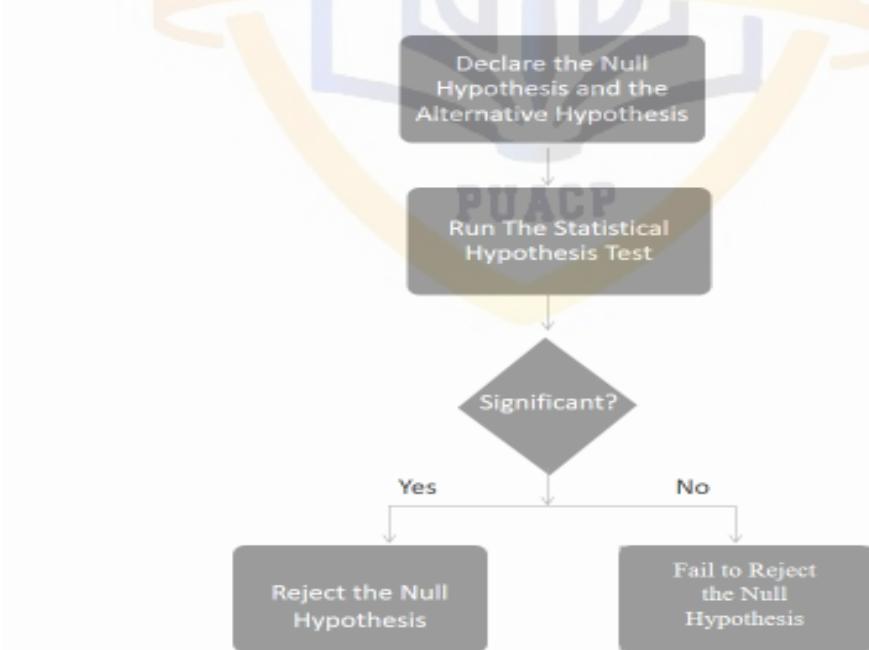


Table 8.9: Steps of Hypothesis Testing (Rana, Samina, 2022)

Examples of Hypothesis Testing

Example 1: The greater number of coal power stations in the city (independent variable) may cause the depletion of the ozone layer in (dependent variable).

The depletion of the ozone layer (independent variable) leads to an increase in ground-level ultraviolet radiation. (Dependent variable).

Example 2: Is it true that the use of citrus fruits has the ability to either cure or prevent from the viral diseases? There is no such in-depth investigation to prove the reality of this myth. A potential hypothesis test will proceed on the following steps:

Null Hypothesis – People who used to take Citrus fruits are no less likely to become ill because of viral diseases.

Alternative Hypothesis – People who take Citrus fruits are less likely to become ill because of viral diseases.

Significance Level - The impact level is 0.04.

P-value - The p-value is estimated to be 0.18.

Conclusion - After providing one group with citrus fruits all through winter season and the other with no such treatment, the researchers may record the impact of the independent variable that whether the participants got sick by the end of winter season or not. After conducting complete statistical analysis of the results, one may clearly determine a p-value of 0.18. That is above the desired significance level of 0.04, and therefore one may not reject the null hypothesis. Based on their research, there is no support for the (alternative) hypothesis that the use of citrus fruits can prevent flu or viral diseases.

8.4.2 Additional Alternative Hypotheses Examples

Here we are going to check out different alternative hypotheses. Let's have a look.

- i. Consuming high-fat food items may cause more skin oils.
- ii. Taking seven hours of sleep makes employees more productive.
- iii. Employees who are contented at their workplace work harder.

8.5 ERRORS IN HYPOTHESIS TESTING

By now we have learned that the motivation of hypothesis testing is to obtain the definite result of a null hypothesis and an alternate hypothesis with respect to specific experimentation.

The null hypothesis explains the status quo while claiming that there appears no obvious change after the application of an intervention and if there exist any slight difference between data obtained before and after the implementation of research intervention that is just by chance. Whereas an alternate hypothesis defines that there is a remarkable difference between data obtained before and after an intervention or carrying out a research and such a difference is the result of experimentation and cannot occur merely by chance.

After data analysis, a conclusion is made regarding the status of a null hypothesis to either reject by illustrating the given data, or other researchers are unable to reject it.

Sometimes, it happens that our research findings do not match the actual results. That may be the result of errors in hypothesis testing. There used to be two kinds of errors in hypothesis testing such as:

Hypothesis Error: Type I

Hypothesis Error: Type II

A) Hypothesis Error: Type I

When we reject the results of null hypothesis in favor of the alternate, despite being true, that is known as a **false positive**. This means we are falsely making believe that a changes before and after an experiment is done due to the treatment where actually this is not the case.

B) Hypothesis Error: Type II

When we do not invert the null hypothesis, despite being false, that is known as a **false negative**. This means we believe that differences before and after the execution an experiment are only due to chance and not treatment. This results in wastage of experimental resources though the results have been achieved.

Example of Hypothesis Errors

Let us think about a scientist who wants to determine the effectiveness of greenhouse effects on environment. They experiment it on a sample target population and carry out further tests.

Type I: The first error might be committed if the null hypothesis was totally rejected and scientists favored the alternate hypothesis. The alternate hypothesis would have been that the greenhouse effects are very much effective even when it was not.

Therefore, the scientists overrated the effectiveness of the greenhouse effects on environment.

Type II: The second error might be occurred if the null hypothesis had not been rejected despite the fact that it should have been. This means the greenhouse effects was effective, but the scientist thought that it was not. So, resources were wasted over experimentation, and the experiment was discarded.

The alpha and omega of hypothesis testing is to devise such kind of hypothesis that is testable (one of the indicators of scientific inquiry) and there must be three of the following main criterions:

1. A chance to verify that the hypothesis is true.
2. A chance to verify that the hypothesis is false.
3. The inferences of the hypothesis must necessarily be testable,

Without following any such criteria, the hypothesis results will remain ambiguous. Consequently, the experiment will not be able to validate or reject anything substantial or important.

"If a hypothesis is not supported, a valuable contribution may be made through the development of new research methods or even a revision of some aspect of a theory. Such revisions can generate new or revised hypotheses and new and original studies. Thus, hypothesis testing contributes to education primarily by expanding, refining, or revising its knowledge base" (Gay, L. R., Mills, G. E., & Airasian, P. W. (2009).

8.6 RESEARCH WITHOUT HYPOTHESES

Deductive research and Inductive research are the two most popular scientific research types. If we compare these two research types, the quantitative research mostly utilize hypothesis to ascertain the informed prediction or educated guess whereas mostly qualitative research which is inductive in nature does not require hypotheses.

Generally, the empirical research, exploratory and interpretative or descriptive research might not require any hypothesis or experimental evidence because of the lack of evidence and knowledge at the start of the research. For instance, in descriptive study design there is no such focus on the study of causal relationship.

8.7 CONCLUSION

Hypothesis formulation is one of the important steps of scientific method and integral part of good research. A hypothesis is an informed assumption that is based on some evidence. This is the starting point of any research investigation that translates the research problems into predictive statements and propositions. It includes components like variables, population and the relation between the variables. A hypothesis test is used to investigate the relationship between two or more variables. The researchers should have an idea of deductive and inductive research, of null hypothesis and alternative hypothesis and quantitative and qualitative research. The hypothesis must be testable and must determine the strength of hypothesis on the basis of the hypothesis test result while determining the causal effectiveness between dependent and independent variables.

8.8 SUMMARY POINTS

Summary points of the unit are as followings:

- i. A hypothesis is a researcher's reasoned prediction based on a sound rationale. Researchers start their research and collect data to either approve or disapprove their hypothesis.
- ii. Hypotheses (plural) are essential for making research study more focused, goal-specific and clear.
- iii. After following the initial steps, the researcher should be able to create a hypothesis that must be testable.
- iv. A good hypothesis states clearly and concisely the expected relations or differences between variables. Variables should be stated in measurable terms.
- v. In order to create a research hypothesis there, have to be both a dependent and independent variable, set to bring an expected outcome.
- vi. Independent variables are what may be changed in the experiment to bring some result or effect. The dependent variables are what the experiment intends to measure based on changes made to the independent variable.

- vii. The researcher should know how to write a hypothesis statement through different steps and examples. A research hypothesis predicts the most probable association and variance between different variables, which the researcher intends to test through data collection and data analysis.
- viii. Generally, a researcher follows a standard procedure, formulates the hypothesis statement, tests, and afterwards modifies the hypothesis based on the outcomes of the experiment.
- ix. There are many types of hypothesis and the following two are the most functional and reliable: such as, Null Hypothesis and an Alternative Hypothesis.
- x. A Null Hypothesis predicts that there exists no apparent relation or realizable difference between variables whereas Alternative Hypothesis verifies the existence of relation between different variable and their effective causal connection.
- xi. If we consider the significance of a deductive hypothesis, it is derived from the theory and it aims at providing those evidence which may support, expand, or contradict aspects of a certain theory.
- xii. An inductive hypothesis is a kind of statement made produced after several observations. A non-directional hypothesis foresees only a connection or points of differences whereas a directional hypothesis may point out the dimension of the difference as well.
- xiii. In both qualitative and quantitative research, the use and importance of hypotheses during research is considerably different.
- xiv. While doing qualitative research, usually researchers do not frame hypothesis at the outset of the research. Nevertheless, after having identified the focal point of hypothesis, the researcher may take in the hypothesis in the form of research questions that set a direction for their research study. In Qualitative research, a new kind of hypotheses are contributed because of their studies.
- xv. The scientific method requires the test of hypothesis after setting the hypothesis. But if any one of the other research steps does not comply with the research standards or that is considered inappropriate that may make the whole research process meaningless.
- xvi. Thus, it can further lead to hypothesis test error. There are two types of Research Hypothesis Error. If the null hypothesis is true and researcher

- should not have to reject it then Type I error occurs whereas if the researcher conversely accepts a null hypothesis despite that is wrong and should not be accepted by the researcher.
- xvii. There are a few research types such as: Exploratory Research, Descriptive Research and Empirical Research which can be equally reliable even without hypothesis formulation.
 - xviii. Conclusively, in a typical application a proposal must be proven through facts, direct testing and evidence and modified on the basis of the research outcome.

8.9 SELF-ASSESSMENT QUESTIONS

- Q. 1 Define hypothesis and describe, ‘What is the significance of Hypothesis?’
- Q. 2 What is the difference between hypothesis and hypotheses? Explain with examples.
- Q. 3 Can Hypothesis vs. Theory be used interchangeably? Explain it.
- Q. 4 What is the difference between prediction and Hypothesis, explain with examples?
- Q. 5 Why are there different types of hypothesis? Describe them with detail.
- Q. 6 What is the difference between Null Hypothesis and Alternate Hypothesis?
- Q. 7 Describe the most effective ways of formulating effective hypothesis.
- Q. 8 How can we use hypotheses in qualitative research design?
- Q. 9 Which research types do not utilize hypothetical statements? Elaborate it.
- Q. 10 What does hypothesis test mean? Explain with example.

Possible Hypotheses

- i. Wind pressure used to be commonly low before a dust storm in summer season.
- ii. If the wind pressure is low and temperature is very high, then a dust storm will happen to come.

Practice

1. Conceptualize the key definitions listed at the beginning of this chapter i.e. Scientific Method, Hypothesis, Research Problem, Theory and relate it with hypotheses.
2. Based on what you have read, formulate two or three hypotheses statements. Ideally, that must be related to your own areas of interest and consider those factors that might affect their validity?

SUGGESTED READINGS

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Unit-9



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INTRODUCTION

Dear Students! Till here, all the discussion about research study was based on theoretical knowledge to have a solid foundation for practical research work. After going through, therefore, all the 8 units now you are ready to transform your knowledge into practical work. But before going to actual conduction of research work, you must plan for it and that is known as research proposal or synopsis. We need it so that your audience or readers can know your proposed plan of action as actually how you would proceed for it. This can be done, when you write down your plan and share it with your audience or readers. Now the question is how to go for it. To answer it, this Unit 9 is laid out to make you familiar with all the skills and conventions of writing a research proposal or synopsis. Once it is done, the practical work and writing of the research study become quite easy and feasible. Every tertiary institution has its own standard of writing it, known as format and lay out of writing synopsis and thesis or dissertation. This is to produce uniformity in their students' work; so, it must be followed up. Same is applied on the students of Allama Iqbal Open University, Islamabad, Pakistan. Accordingly, this unit is written and by following the conventions of writing synopsis and thesis, mentioned within it, you can produce standard research works.

OBJECTIVES

By the end of this unit, dear students, you will be able to:

- i. recognize What is a research proposal;
- ii. describe its significance in conducting a research work;
- iii. explain the importance of lay out and formatting;
- iv. implement formatting on your own research studies;
- v. develop their productive skills to write down chapter 1, Introduction;
- vi. write down a well-organized as well as analytical literature review;
- vii. utilize the knowledge about research methodology for writing a chapter on it.;
- viii. acquire knowledge about writing of Chapters on Data Analysis and Conclusion; and
- ix. know how to arrange references or bibliography and appendices.

9.1 AN OVERVIEW

To begin with, definition of ‘Research’ was described in the very first unit of this study guide. Referring to it, research is, in fact, a systematic art and scientific procedure of investigation, conducted practically to find out applicable answers to the research questions as well as feasible solutions to the prevalent social or scientific or educational issues. Thus, it is the quest of knowledge to expand its domain. However, any research work could not be conducted properly and appropriately unless and until it is pre-planned well before the actual research work. Planning is at two levels: Cognitive plan and the structured formal written plan to provide its readers with an outline of the appropriate information on the topic, chosen to be studied. Synopsis or a research proposal, after having planned cognitively, is written before doing research work. Its length is precise while fulfilling words requirement, which may range from 1500 to 2000 words at master’s level and 5000 to 8000 words at higher levels, but it is rough estimate here. The real one is provided by the universities, and it may vary from university to university or according to different disciplines. In short, it is a concise and precise description of a researcher’s intentions about what, why and how of the research work at hand. The details of which are going to be mentioned in the following sections of the unit.

9.2 WHAT IS A RESEARCH PROPOSAL?

‘What is a research proposal?’ It has been already introduced in the preceding section, 9.2, of this Unit. However, to describe it briefly, it is merely a formally structured written manuscript to explain the research topic (what), justification for selecting the topic as well as for the research work by analyzing gap between it and the previous studies (why) and the practical approach or research procedure including research design, tools and data analysis (how). So, it is a whole, covering everything between title and references. It means that a synopsis is a whole story starting from how to write a title and title page, then introduction, background of the study, research problem, questions, objectives, literature review, research methodology, data analysis, conclusion or findings that ends with references. Synopsis is, subsequently, a brief description of all these categories while a thesis is an expended form of all of these. In other words, we can say that a synopsis or a research proposal is a mini project whereas a thesis is a mega project of carrying our any research study.

9.3 IMPORTANCE OF LAY OUT AND FORMATTING

Before explaining importance of lay out and formatting, it is better to shed some light on these terms. A lay out is sketching or mapping out an outline or a plan to arrange the separate building blocks of writing a research work into an organized systematic whole. It means that for writing a sequentially organised research proposal, there is a set definite plan to be followed. That is mostly provided by the institutions themselves like English Department, AIOU or by some international associations like MLA or APA. Hence, this is known as a lay out. And formatting is the way to arrange individual building blocks into a whole to reflect how do they appear or look like. In simple words it is a style of writing. For example, lay out for writing a synopsis of MA TEFL (Master's in teaching of English as a Foreign Language) is to divide it into 5 chapters as shown in the following figure 9.1. While formatting is that double space should be used, and Font should be Times New Roman with 18 size for chapters' heading and 14 for main headings.

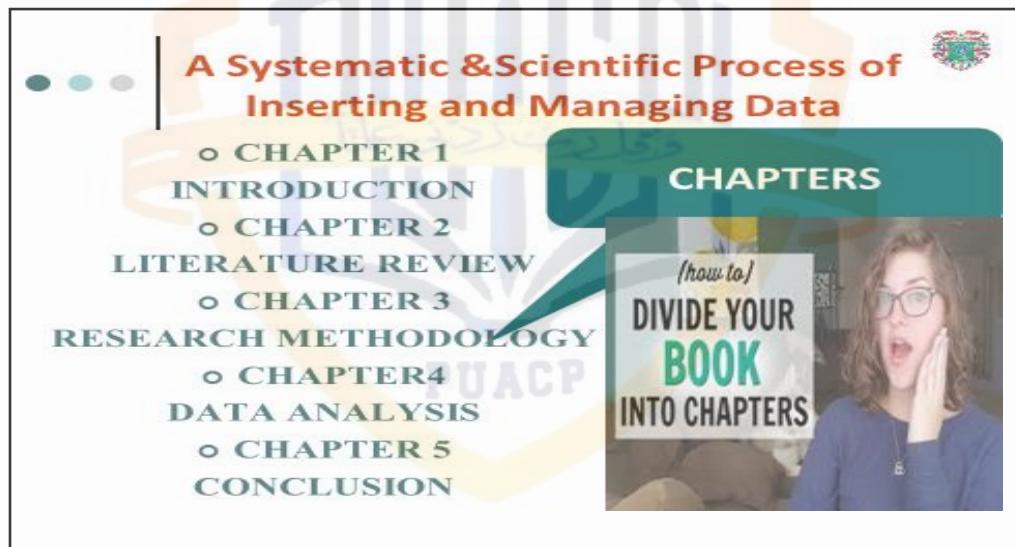


Figure 9.1: Lay out of MA TEFL Synopsis

These chapters have their own lay out of dividing contents into main and sub-headings, and they have to be arranged and tabulated in Content List or List of Contents also. Page numbers must also be given with the content. Here, in the following figure 9.2 a sample Content List, for the above chapters, is shown though without page numbers.


Content List


- Introduction
- Background of The Study
- Objectives of The Study
- Statement of the Problem
- Research Questions
- Significance of the Study
- Delimitation of the Study
- Duration of the Study
- Literature Review
- Research Methodology
- Research Design
- Research Tools
- Target Population
- Sample and Sampling Technique
- Research Procedure
- Data Analysis
- Conclusion
- References



Figure 9.2: Lay out of MA TEFL Synopsis: Content List

Lay out and formatting are having their own significance in ensuring the organising uniformity in a large no of students' formal written documents, otherwise they will be just like peddling a boat without oars. Now let us have a glance on formatting example for preparation of the title page in the following figure 9.3:


Formatting Example: TITLE PAGE


Title of Thesis: 24 Bold (Times New Roman)

- 1. Content Analysis of SNC Based English Syllabus for Primary Level**
- 2. CONTENT ANALYSIS OF SNC BASED ENGLISH SYLLABUS FOR PRIMARY LEVEL**

Student's Name: 18 Bold

Saima Naz



Name of the Department: 16 Bold

Department of English Language

Name of the University: 18 Bold

Allama Iqbal Open University, Islamabad

Figure 9.3: Example of Formatting of Title Page

In this example, title or topic has been written in 2 formats while using the same font size, 24 Times New Roman. In first example title has been written in a format of ‘Capitalize Each Word’ whereas in the second example, format of ‘UPPER CASE’ has been used for writing the title.

9.4 INTRODUCTION (CHAPTER 1)

We have seen title page in the previous section, 9.4. This is the point where writing of a thesis or synopsis starts. After completion of this, we must add preliminary pages on inner title, acknowledgement, and dedication as well as forwarding sheet, approval letter and content list etc. Then actually starts body of the synopsis or a thesis, the starting point of which is first chapter on Introduction. Here we must introduce our topic and explain the title or research study itself to explain its necessary components. It is important to note down that introduction must be practical one and not theoretical one. It means please do not include here any theoretical explanation of the topic rather just introduce your own topic. However, definitions of terms can be included in it. The other points to be taken care of while writing introductory paragraph are:

- i. The topic should be made clear via its explanation.
- ii. As a researcher, state your own position on the research work to be conducted.
- iii. There should be mentioned something relevant between your topic and something prevalent in the current situation.
- iv. Some striking facts or statistics, you have found out about your topic, should be mentioned.
- v. Your introductory paragraph would be more strengthened if repetition of the title, cute or folksy opening and a cliché or platitude are avoided. The reason is that a research study is a serious work of scholarship.

After introductory paragraph, there are included many essential components of what of the research study in the first chapter of Introduction. They are:

- Background of the study;
- SMART objectives as mentioned in Unit 1;
- statement of the problem;
- research questions or hypothesis;
- significance of the study (advantages to all stakeholders of the field);
- delimitation (narrowing down the research study); and
- duration of the study.

All these components are explained in our Unit 1 of this research study guide. Please refer to it for their explanatory descriptions. So now let us move forward to one of another important chapters in thesis or synopsis writing and that is literature review.

9.5 LITERATURE REVIEW

What is a Literature Review? It has already been discussed in detail in section 3.3 of Unit 3 of this research study guide. But to recall it in a brief way is that it permits one to explore and examine a variety of literature related to one's research study in a decisive and in an organized way for honing in one's objectives and interest. The purpose behind a literature review is to remain abreast with the up-to-date improvements in the field, to know more about the topic, to file up central facts as well as ideas one wishes to study in light of the previous studies, to comprehend nature of data and its analysis, and the last one also but not the least to afford your readers the sources to be consulted easily on their own. How to write it, a sample paragraph of a literature review is given here in the following:

2.10.4 Klippel's (1985) Communicative Fluency Activities

Klippel (1985:5) states, "Learning is more effective if the learners are actively involved in the process." He is of the point of view that "curiosity "is inculcated through various audio-visual aids and learner centered activities. The learners are intrinsically motivated through activities like games, jigsaws, songs, pictures, missing information, intentional mistakes to be corrected and many other materials which the teacher is using in the class. This makes the learner to explore the situation for the correct answer which ultimately makes them active in the class.

From the researcher's point of view, learner-centered activities in the classroom motivate the learners to participate in the class and learn more effectively. The communicative language teaching stimulates the pace of learning of the learners. Their interest in learning foreign language increases and they take part more actively in the learning phenomena. The learners, who are intrinsically motivated, have more in-depth curiosity and aptitude to get knowledge through fun. The motivated attitude towards learning speaking or any others language skill in a communicative classroom is a positive symbol to learn a foreign language in a second language learning context like in Tehsil Jhelum. Such type of teaching activities in the classroom makes the learners to build cooperation, mutual understanding and sharing the problems. They share their problems more frequently in a communicative classroom as compared to the traditional one. Harmer (2001) mentions different activities for different levels. He says that Information gaps, Describe and Draw, Story-Telling activities are ideal till intermediate level from the very basic. ... Adding more to it, discussions and role-plays are good activities of speaking for intermediate, upper intermediate and advanced levels.

... many other activities are going to be added to develop argumentative communication in the primary level learners. Hassan (2016)

9.6 RESEARCH METHODOLOGY

Research Methodology does make Chapter 3 in a synopsis or in a thesis. It is the chapter that has a pivotal role in a synopsis or thesis as it reflects the whole research procedure, surely a plan in a synopsis and real work in a thesis, to collect the practical data. It comprises of different contributing sections like that of describing research type, design, tools, population, sample, sampling size, sampling technique (s), and research procedure. These terms are described in detail in our previous units of this study guide, for example, research types in Unit 2, research designs and tools respectively in Units 4 and 5, and population to sampling technique(s) in Unit 6 are elaborated. So please consult all these units for your better understanding of these terms. Here just they are mentioned to convey you that all these are constituting parts of our synopsis or thesis chapter on Research Methodology. In the following there is given an example of research methodology chapter from a synopsis:

3. RESEARCH METHODOLOGY

3.1 Type of Research

The research study will follow quantitative research type.

3.2 Design of Research Study

An Experimental Research Design will be followed to conduct the study.

3.3 Research Tool

Test will be taken as a tool to collect the data before and after the treatment. The scores of the test will be the actual data collected for further analysis.

3.4 Population

All the private schools of Tehsil Jhelum will be taken as population. Through Random Sampling, only one school will be chosen for the implementation of the treatment. Class five will be taken as representative of Primary level.

3.5 Brief Overview of the Trajectory of the Research

Firstly, the learners will take a pretest before treatment. This will reflect their aptitude for argumentative communication. Secondly, the treatment will be given and the learners will be exposed to speaking guidelines and motivating activities to develop their argumentative faculty in speaking. Teaching methodology will include activity method. This will be carried out under communicative language teaching. Thirdly, the posttest as a speaking event will be taken as the outcome of the treatment. Fourthly, the results will be compared quantitatively. Hassan (2016)

9.7 DATA ANALYSIS AND CONCLUSION

After having mentioned the research methodology to collect data, another very important section of the synopsis is followed up and that is data analysis, without which it is impossible to draw out findings and conclusion depending on that. However, it is just a supposed one section in writing a synopsis as data is not yet available because of research study just being planned or proposed, not yet conducted. So, these two terms of data analysis and conclusion make up our chapters 4 and 5 respectively in synopsis and thesis. But in synopsis just a view must be described as how to analyze the data or which analytical tools will be used. In these sections, therefore, it will be mentioned only how you are going to analyze your data, quantitatively or qualitatively and that also with which tools. If quantitative analysis would be there, whether you are going to tabulate the data or just graphical presentation and whether you are going to use SPSS analytical tools or just simple mathematical analysis, along with the reasons for doing so. And in the Conclusion chapter findings are drawn out from the analysis of data, already done in chapter of data analysis. And then conclusion is based on these findings; and it is not the general statement of general or usual findings. So in synopsis a few of them can be supposedly written, which will be modified or verified after actual conduction of the research study. Sample data analysis and conclusion are added up here in the following figures 9.4 and 9.5:

Data Analysis

Findings obtained from the research instruments would be analyzed statistically for the purpose of interpretation. For the manipulation of data, the means, standard deviations and differences of means would be computed for each group of learners: one being the controlled group and the other one the experimental group.

Figure 9.4: Sample Data Analysis

Delimitation of the Study

The study is delimited to:

- Male students of B.A. class.
- City of Wahh Cantt., Rawalpindi District.
- Recommended Textbook of Robert Frost for Graduation Level.

Duration of the Study

The undertaken research study will be completed within 6 months, after the approval of the synopsis.

Conclusion

The conclusions can only be now anticipated, the validity of which can be checked after conducting the research in reality and these can be then changed.

Figure 9.5: Sample Delimitation, Duration of the Study and Conclusion.

9.8 REFERENCES/BIBLIOGRAPHY

The difference between references and bibliography has previously been mentioned in Section 3.7 of Unit 3 of this study guide. Please check it once before proceeding further. Now, here we are going to describe how to refer to the quoted or unquoted research works in your synopsis or in thesis. This section of the synopsis is almost end of synopsis writing and comes before appendices. It includes all the sources referred to within texts (References) or not within texts rather just consulted (Bibliography). In case of published books, the information about sources is comprised of the author's name, year of publication, title of the research work, publication place and publishers. Whereas collections or anthologies of different studies are included with the names of editors for which (Ed.) or (Eds.) abbreviations are used after their names. e.g.

- Weinshall, T. D. and Eisner, E. W. (Eds.). (1996). *Readings in Arts Education*. Harmondsworth: Penguin.

In case of articles, the title of the main publication is italicized, and page numbers of articles are also given. Moreover, if some journals articles are referred to, the journal name is italicized. In this case, volume and issue numbers of journals are also included along with the page numbers of articles. To add to it, mostly issue number is given in brackets. e.g.

- Hannigan, J.W. (1981). Fragmentation in Science. The case of Future. *Sociology. Rev.* 26 (1), pp. 315-30.

For unpublished documents like theses/dissertations, study title is italicized along with description of it being unpublished and university name. e.g.

- Hancock, N. (1980). *Creativity in Education – A Selective Review*. Unpublished M.A. thesis, University of Glasgow.

Whereas, if some sources are taken from net, then websites should be referred with the date of access also. In the following is given a sample of some more references.

- Bailey. K. M. (2000) *Practical English Language Teaching: Speaking*, New York: The Mc Graw. Hill companies
- Brown, H. D. (2001). *Teaching by Principles: An Interactive Approach to Language Pedagogy*. White Plains, NY: Longman.
- Efrizal, D. (2012). *Improving Students' Speaking through Communicative Language Teaching Method* at Mts Ja-alhaq, Sentot Ali Basa Islamic Boarding School of Bengkulu, Indonesia, State Institute for Islamic Studies of Bengkulu, Indonesia
- Harmer, J, (1998) *How to Teach English*, Longman Pearson, England
- Hughes, A. (2003). *Testing for language teachers*. Cambridge: Cambridge University Press.
- Johnson.K, Morrow (1981), *Communicative in Classroom Application and Method for Communicative Approach*. Hong Kong: Longman Group Ltd.

One very important thing to be noted down is that these references or bibliography list must be compiled in alphabetical order of the authors' names. But if many works are referred to of the same author, then the works should be listed in chronological order of publications. If, for example, date of publication is not known for some work, then write (n.d.) in brackets meaning not dated. Nowadays, nonetheless, there are available many software like EndNote that arrange the references or bibliography automatically and also according to the style of referencing which you want to use and that is assigned to you by your institutions.

9.9 APPENDICES

This section in synopsis and thesis is storehouse for the research tools information supporting the study but not directly a part of it. So, in this section, according to the research study, any of the actual questionnaires, interviews, observation lists pre- and post-tests, glossary of important terminology, modules, and filled in questionnaires, interviews or tests, extracts from long documents or textbooks are attached herewith. However, in synopsis they are not needed. Adding to it, appendices should also be given headings and their pages numbered in order to locate them easily. For example:

Appendix A: Questionnaire for Students

Appendix B: Questionnaire for Teachers

9.10 CONCLUSION

Dear Students, with the end of this unit 9, here your study guide on ‘Research’ has also come to an end. It is hoped that this study guide proved helpful in making you understand the basic concepts of conducting and writing a research work. Here, also it is important to clarify that all the formatting mentioned in the last unit is according to APA style of referencing, which itself has many editions. Among these any one from 6th to 8th edition can be opted for by you. The theoretical knowledge gained from this study guide will be solidified only if you just implement it for conducting your research work. So, try to search for your own research topic and problem to be studied and develop a plan and write a synopsis initially in the light of the guidelines provided here. Moreover, get also benefit of suggested readings to expand horizons of your knowledge on research to make it deeper and vaster so that you can prove yourself a skilled researcher in the coming days.

9.11 SUMMARY POINTS

Dear Students! Main points of the unit are summarized here in the following:

- i. A research proposal or a synopsis is a concise and precise formal written plan of a researcher’s intentions about what, why and how of the research work at hand.

- ii. A synopsis is a whole story starting from how to write a title and title page, then introduction, background of the study, research problem, questions, objectives, literature review, research methodology, data analysis, conclusion or findings that ends with references.
- iii. Synopsis is a mini project whereas a thesis is a mega project of carrying our any research study.
- iv. A lay out is mapping out a plan to arrange the separate building blocks of writing a research work into an organized systematic whole.
- v. And formatting is the way to arrange individual building blocks into a whole to reflect how they appear. In simple words it is a style of writing.
- vi. Lay out and formatting are having their own significance in ensuring the organising uniformity in a large no of students' formal written documents.
- vii. In Chapter 1 on Synopsis, the introductory paragraph introduces your topic and explain the title or research study itself to explain its necessary components.
- viii. Moreover, Chapter on Introduction comprises of background of the study, SMART Objectives., statement of the problem, research questions or a hypothesis, significance of the study, delimitation, and duration of the study.
- ix. Literature Review explores and examines a variety of literature related to one's research study in a decisive and in an organized way for honing in one's objectives and interest.
- x. Chapter on Research Methodology comprises of different contributing sections like that of describing research type, design, tools, population, sample, sampling size, sampling technique (s), and research procedure.
- xi. Data Analysis and Conclusion are just supposed sections in writing a synopsis as data is not yet available because of research study just being planned or proposed till yet.
- xii. So these two terms of data analysis and conclusion actually make up our chapters 4 and 5 respectively in synopsis and thesis. But in synopsis just a view has to be described as how to analyze the data or which analytical tools will be used.

- xiii. Reference or Bibliography includes all the sources referred to within texts (References) or not within texts rather just consulted (Bibliography).
- xiv. Appendices are supportive material gathered through research tools like questionnaires and interviews to provide evidence to the research study.
- xv. If needed, they are attached with synopsis also.

9.12 SELF-ASSESSMENT QUESTIONS

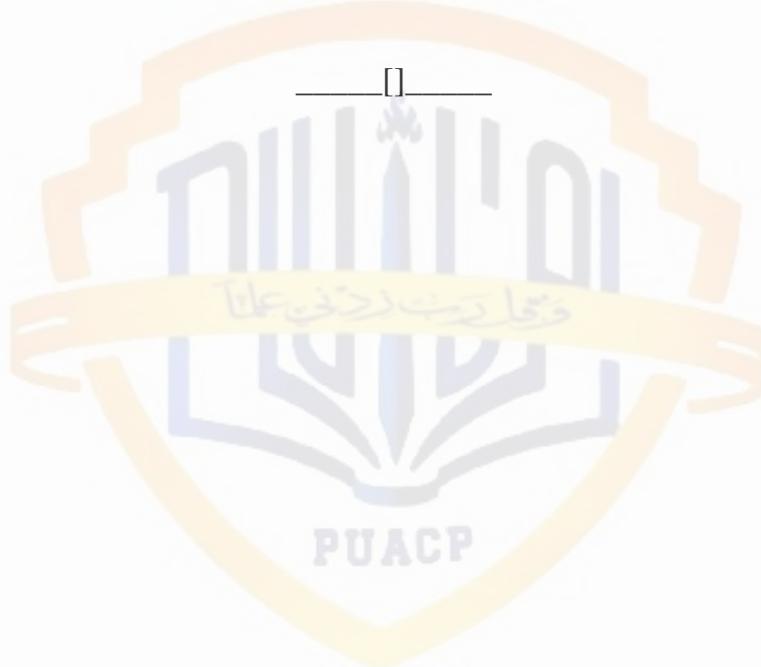
- Q. 1 Explain what is a research proposal and how is it important for conducting a research work?
- Q. 2 Elaborate the significance of lay out and formatting in writing a research proposal or a thesis. Support your answer with examples.
- Q. 3 What have you understood about writing a literature review for a synopsis? Elucidate your answer with examples.
- Q. 4 Describe in detail all the components that make up the chapter of Research Methodology.
- Q. 5 What is the role of chapters of Data Analysis and Conclusion and how they should be written for a synopsis? Give arguments to prove your point of view.
- Q. 6 Select your own research topic and develop a plan for your proposed research study. Then write a synopsis on it, in the light of guidelines provided in Unit 9.

SUGGESTED READINGS

Flick, U. (2015). *Introducing Research Methodology: A Beginner's Guide to Doing a Research Project*. Sage.

Kumar, R. (2018). *Research Methodology: A Step-by-Step Guide for Beginners*. Sage.

Ridley, D. (2012). *The Literature Review: A Step-by-Step Guide for Students*.





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