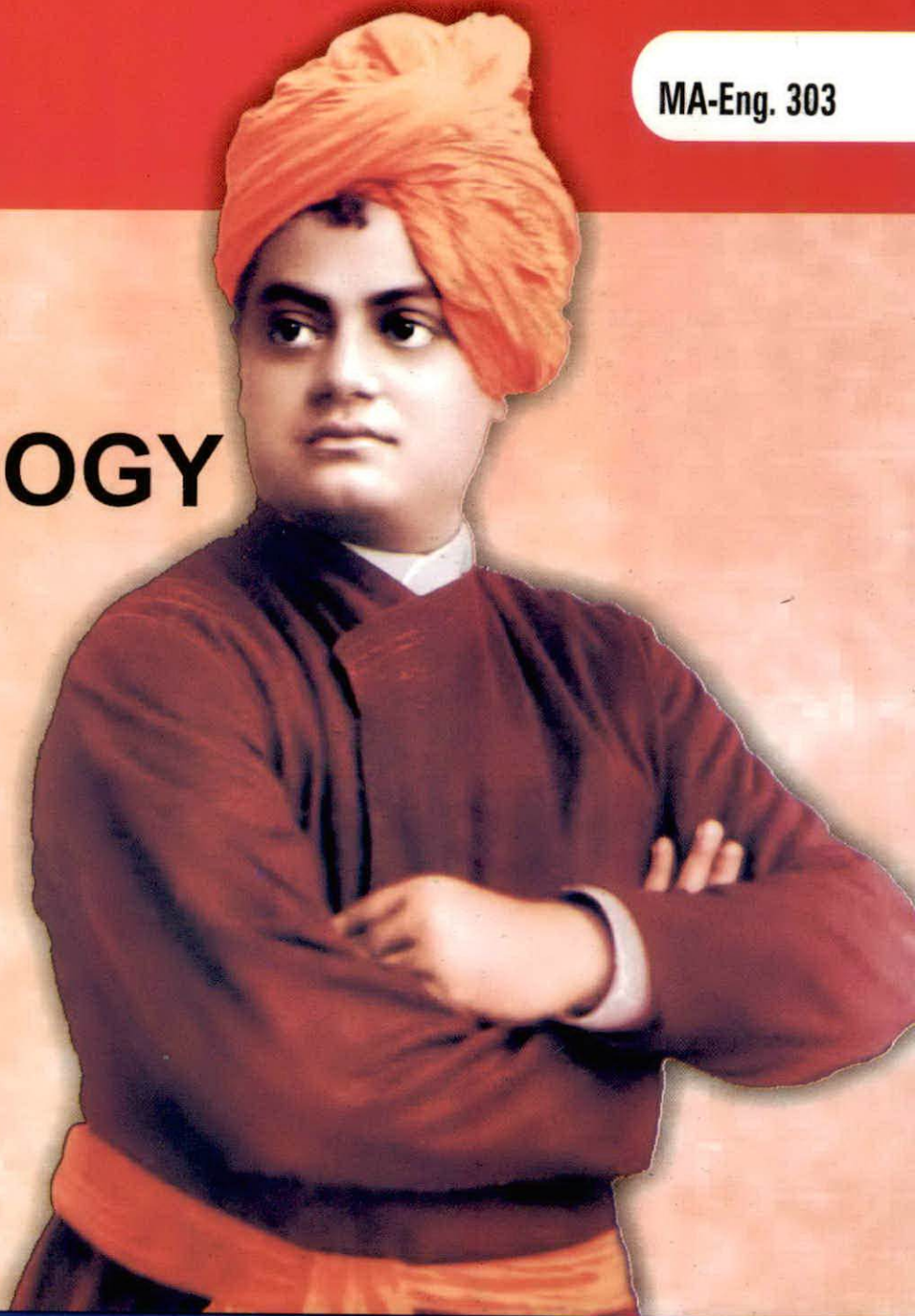


MA-Eng. 303

RESEARCH METHODOLOGY



DIRECTORATE OF DISTANCE EDUCATION

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PREFACE

In this course, we shall deal with various aspects of RESEARCH METHODOLOGY

- o BASICS OF RESEARCH
- o CONSTRUCTING RESEARCH DESIGN
- o RESEARCH PROCESS
- o BASICS OF RESEARCH

SYLLABUS

Semester-III

RESEARCH METHODOLOGY

(MA-Eng.-303)

Unit-I : Basics of Research

Definition of "Research"

Qualities of a good researcher

Key terms in research: investigation, exploration, hypothesis, data, methods and techniques, results and findings, Variables

Research Area and Research Topic

Unit-II : Constructing Research Design

Pre-experimental Designs

Experimental Designs

Pre Test and Post Test Design

Unit-III Research Process

Formulating the Research Problem/Research Topic

Preparing Bibliography for Background Reading

Review of Literature

Defining Aims and Objectives

Developing Hypothesis

Deciding the Scope and Limitations

Adopting Appropriate Research Methodology

Unit-IV

Dimensions of research in English language and English literature

Kinds of research possible in English literature Kinds of research possible in English linguistics

Qualitative Research in linguistics Quantitative Research in linguistics Unit.

CONTENTS

1. BASICS OF RESEARCH	1-43
2. CONSTRUCTING RESEARCH DESIGN	44-84
3. RESEARCH PROCESS	85-124
4. BASICS OF RESEARCH	125-164

1

BASICS OF RESEARCH

Introduction

Research simply seeks the answer of certain questions which have not been answered so far and the answers depend upon human efforts. It may be illustrated by taking an example of the moon. Some years ago man did not know what exactly the moon is? Was this problem which had no solution? Man could only make some assumptions about it but the man now this time by his efforts, he went to the moon brought the soil of the moon and studied it. The man is now able to give concrete answer of the problem what is the moon? But the question arises, "Is the answer of the question in examination also research"? The answer is 'no', because the answers of these questions are available. They are available in text-books, class-notes etc. Research answers only those questions of which the answers are not available in literature *i.e.*, in human knowledge. Thus, we can say research seeks the answer only of those questions of which the answers can be given on the basis of available facilities.

Actually research is simply the process of arriving at a dependable solution to a problem through the planned and systematic collection, analysis and interpretation of data. Research is the most important process for advancing knowledge for promoting progress and to enable man to relate more effectively to his environment to accomplish his purpose and to resolve his conflicts. Although it is not the only way, it is one of the more effective ways of solving scientific problems.

From the beginning of time man has noted certain irregularities among the phenomena and events of his experiences and has attempted to devise laws and principles which express these regularities. These laws and principles are of course not without exception, any law is valid only under the conditions under which it was derived. Even though objects tend to fall, they have been known to rise when other forces are active, but this does not deny the general principle of gravity. Research is devoted to find the conditions under which a certain phenomenon occurs and the conditions under which it does not occur in what might appear to be similar circumstances.

Our culture puts such a premium on science that the terms science and scientific are frequently misused. Research is also frequently in contexts where

little research in the true sense of the world is actually done. A person no longer looks up a word in dictionary or a historical fact in the encyclopaedia he researches it. Many agencies claiming to do research are engaged in nothing more than fact-findings.

Research is difficult to define. One approach is to let researchers define the word by their activities. It is not enough, here, however, to say research is what researchers do. Too many people misuse the word. For example, some faculty colleagues claim to do research to prepare for a class, every week, no less. What they usually mean is they read or reread material that they will be presenting or discussing in class. Such a preparation may take time and effort, but it is not research.

Students frequently are assigned research papers, wherein they read from books and journals, usually in a library, and synthesize the material to form the research paper. The students would claim to be doing research, or at least library research. What they are doing is searching or reviewing the literature on a topic and writing about their findings. It is not research.

A journalist may systematically investigate an occurrence to find out why it happened, and the same journalist may indeed claim that what he or she is doing is research, but it is not. It is journalism.

Research is an activity that makes an impact on theory. In the absence of theory the activity is not research. The activity may be preparing for a class, writing a paper, or developing a story all honorable activities, but they are not research unless they have a connection with something theoretical.

The role of theory is to describe and explain a phenomenon. The presence of theory means the writer has gone beyond the local event and is trying to connect it with similar events or, more accurately, other descriptions or explanations that have served to describe or explain similar events. An example may illustrate the distinction we are trying to make.

A well-known college football coach resigns unexpectedly. A journalist writes about the event in very specific terms, that is, what preceded and possibly pre-capitated the resignation. The story seeks to describe and explain the event, but because there is no attempt to connect anything about the story to anything theoretical, it is journalism. If, on the other hand, the journalist had observed that the coach had been promoted originally from within the organization and the journalist had referred to organizational theory (a body of knowledge that explains human behaviour within an organizational setting) that speaks to the possible consequences of promoting from within, which might include a number of predictable consequences, then the journalist is doing research, because the journalist is extending the story or aspects of it, beyond the specifics of the local event. This extension makes it research.

It is important to note in the example used that including something theoretical, in this case, drawing on organizational theory, can be accomplished in a relatively thorough manner or simply superficially. One can cite a generalization or two from a book on organizational theory and claim to be doing research. A more thorough treatment, however, would be to look carefully for other explanations or other theoretical perspectives that might not be congruent with the first one found. The writer quickly gets into something of a conceptual quagmire when this is done, and just as quickly needs to begin to qualify the generalizations.

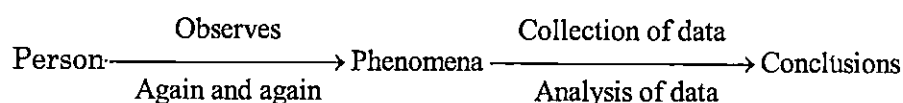
The original event and the interpretations of the many specifics surrounding it can be used to confirm or refute some of the theory that exists to explain similar events. Whenever the effort is made to be more theoretical about what one writes, it is incumbent upon the writer to seek competing theoretical positions and, when found, acknowledge them. In short, to be thorough, one needs to take some time and effort and realize the finished product may raise more questions than it answers. (The deadlines most journalists face preclude their doing very much research, as we define it. And when you think of local nightly television news, there is no doubt that thorough coverage often gives way to superficiality.) We believe the theoretical component of research is what ought to determine most of the substance of course work at the graduate level. In this regard, students become steeped in the theory associated with an area (e.g., the organization and administration of public schools) sufficiently to be able to draw from the theory certain expectations that can be tested, confirmed, or made more or less credible by research. Gaps in the theory, those areas about which precious little is known, can be discovered and speculated about in terms of how subsequent contributions to the knowledge base could fill them. The primary value of course work, then, is to familiarize students with the various theories that abound in any particular field of interest (*viž.*, school finance, teaching methods, and curriculum development, to name a few).

Term Research

The term 'Research' consists of two words :

Research = Re + Search

'Re' means again and again and 'Search' means to find out something, the following is the process :



Therefore, research means to observe the phenomena again and again from different dimensions. For example, there are many theories of learning due to the observation from different dimensions.

The research is a process of which a person observes the phenomena again and again and collects the data and on the basis of data he draws some conclusions.

Research is oriented towards the discovery of relationship that exists among phenomena of the world in which we live. The fundamental assumption is that invariant relationship exists between certain antecedents and certain consequents so that under a specific set of conditions a certain consequent can be expected to follow the introduction of a given antecedent.

Defining Research

According to Rusk : "Research is a point of view, an attitude of inquiry or a frame of mind". It asks questions which have hitherto not been asked, and it seeks to answer them by following a fairly definite procedure. It is not a mere theorising, but rather an attempt to elicit facts and to face them once they have been assembled. Research is likewise not an attempt to bolster up pre-conceived opinions, and it implies a readiness to accept the conclusions to which an inquiry leads, no matter how unwelcome they may prove. When successful, research adds to the scientific knowledge of the subject.

According to George J. Mouly : He defines research as, "The systematic and scholarly application of the scientific method interpreted in its broader sense, to the solution of social studies problems; conversely, any systematic study designed to promote the development of social studies as a science can be considered research."

According to Francis G. Cornell : "To be sure the best research is that which is reliable verifiable and exhaustive, so that it provides information in which we have confidence. The main point here is that research is, literally speaking, a kind of human behaviour, an activity in which people engage. By this definition all intelligent human behaviour involves some research."

"In social studies, teachers, administrators, or others engage in 'Research' when they systematically and purposefully assemble information about schools, school children, the social matrix in which a school or school system is determined, the characteristic of the learner or the interaction between the school and pupil".

According to Clifford Woody of the University of Michigan : He writes that in an article in the Journal of Social Studies Research (1927), research is a carefully inquiry or examination in seeking facts or principles; a diligent investigation to ascertain something, according to Webster's New

International Dictionary. This definition makes clear the fact that research is not merely a search for truth, but a prolonged, intensive, purposeful search. In the last analysis, research constitutes a method for the discovery of truth which is really a method of critical thinking. It comprises defining and redefining problems; formulating hypotheses or suggested solutions; collecting, organising and evaluating data; making deductions and reaching conclusions; and at last, carefully testing the conclusions to determine whether they fit the formulating hypotheses.

According to C.C. Crawford : He writes that "Research is simply a systematic and refined technique of thinking, employing specialised tools, instruments, and procedures in order to obtain a more adequate solution of a problem than would be possible under ordinary means. It starts with a problem, collects data or facts, analysis these critically and reaches decisions based on the actual evidence. It evolves original work instead of mere exercise of personal. It evolves from a genuine desire to know rather than a desire to prove something. It is quantitative, seeking to know not only what but how much, and measurement is therefore, a central feature of it."

John W. Best thinks, "Research is considered to be the more formal, systematic, intensive process of carrying on the scientific methods of analysis. It involves a more systematic structure of investigation, usually resulting in some sort of formal record of procedures and a report of results or conclusions."

"Research is but diligent search which enjoys the high flavour or primitive hunting."

—James Harvey Robinson

"Research is the manipulation of things concepts or symbols for the purpose of generalizing to extend, correct or verify knowledge, whether that knowledge aids in the practice of an art."—**Encyclopedia of Social Science**

"Research is a systematized effort to gain new knowledge."

—V. Redman and A.V.H. Mory

According to C. Francies Rummel : "Research is an endeavour to discover, develop and verify knowledge. It is an intellectual process that has developed over hundreds of years, ever changing in purpose and form and always searching for truth."

P.M. Cook has given a very comprehensive and functional definition of the term research "Research is an honest exhaustive, intelligent searching for facts and their meanings or implications with reference to a given problem. The product or findings of a given piece of research should be an authentic, verifiable and contribution to knowledge in the field studied."

He has emphasised the following characteristics of research in his definition :

1. It is an honest and exhaustive process.
2. The facts are studied with understanding.
3. The facts are discovered in the light of problem. Research is problem-centred.
4. The findings are valid and verifiable.
5. Research work should contribute new knowledge.

According to W.S. Monroe : Monroe, University of Illinois states, "Research may be defined as a method of studying problems whose solutions are to be derived partly or wholly from facts. The facts dealt with in research may be statements of opinion, historical facts, those contained in records and reports, the results of tests, answers to questionnaires, experimental data of any sort, and so forth. The final purpose of research is to ascertain principles and develop procedures for use in the field of social studies; therefore, it should conclude by formulating principles or procedures. The mere collection and tabulation of facts is not research, though it may be preliminary to it on eve a part thereof."

According to R.M. Hutchins : R.M. Hutchins, Chancellor of the University of Chicago, in "The Higher Learning in America" says, "Research in the sense of the development, elaboration, and refinement of principles, together with the collection and use of empirical materials to aid in these processes, is one of the highest activities of a university and one in which all its professors should be engaged."

J.H. McGrath and D.E. Watson have defined the term 'Research' more comprehensively. "Research is a process which has utility to the extent that class of inquiry employed as the research activity vehicle is capable of adding knowledge, of stimulating progress and helping society and man relate more efficiently and effectively to the problems that society and man perpetuate and create."

General Characteristics of Research

The following characteristics may be gathered from the definitions of 'Research' :

1. It gathers new knowledge or data from primary or first-hand sources.
2. It places emphasis upon the discovery of general principles.
3. It is an exact systematic and accurate investigation.
4. It uses certain valid data gathering devices.
5. It is logical and objective.

6. The researcher resists the temptation to seek only the data that support his hypotheses.

7. The researcher eliminates personal feelings and preferences.

8. It endeavours to organise data in quantitative terms.

9. Research is patient and unhurried activity.

10. The researcher is willing to follow his procedures to the conclusions that may be unpopular and bring social disapproval.

11. Research is carefully recorded and reported.

12. Conclusions and generalisations are arrived at carefully and cautiously

Objectives of Research

The purpose of research is to discover answers to questions through the application of scientific procedures. The main aim of research is to find out the truth which is hidden and which has not been discovered as yet. Though each research study has its own specific purpose, we may think of research objectives as falling into a number of following broad groupings :

1. To gain familiarity with a phenomenon or to achieve new insights into it (studies with this object in view are termed as exploratory or formulative research studies);

2. To portray accurately the characteristics of a particular individual, situation or a group (studies with this object in view are known as descriptive research studies);

3. To determine the frequency with which something occurs or with which it is associated with something else (studies with this object in view are known as diagnostic research studies);

4. To test a hypothesis of a causal relationship between variables (such studies are known as hypothesis-testing research studies).

Types of Research

There are several criteria for the classification of research types these include method of research and goal of research. Research can also be classified by the research method used. However, many research projects use methods from more than one class.

1. Action Research : This type of research is mostly essential in applied research where it requires implanting recommended changes to a process, bearing in mind to solve a problem and to carry out research to determine the effectiveness of identified changes. It aims at solving an identified problem based on recommendations made to a process.

2. Creative Research : Creative research involves the development of new theories; new procedures and new inventions and is used to some extent in all fields, in contrast to experimental research, creative research is much less structured and cannot always be preplanned. This type of research includes both practical and theoretical research.

3. Descriptive Research : This type of research is also called a "case-study research". It involves studying a specific situation to ascertain whether any general theories may arise out of it whether an existing theory are borne out by specific situations. *e.g.*, in anthropological studies etc.

4. Experimental Research : The cornerstone of science is experimental and creative research. Experimental research is primarily concerned with cause and effect. Here, the variables of interest are identified (*i.e.*, the dependent and independent variables) and the researcher seeks to determine the effect of changes in the independent variables on the dependent variable.

5. Ex-post facto Research : This is Research "from after the fact" and this type of research typically occurs using data generated from experimental research. While in experimental research, the effect is determined from the cause, here the cause is deduced from the effect.

6. Expository Research : This is research based purely on existing information and normally leads to "review-type reports". It involves reading widely on a field, comparing and contrasting, analysing and synthesizing all points of view and developing new insights.

7. Historical Research : Studies on the past to determine cause-effect patterns. This type of research is often geared towards using past events to examine current situation and to predict future situation. *e.g.*, stock market forecasting. Data is gathered from primary sources (records made at the time of past events) and secondary sources (records made after the event).

Research Approaches

The above description of the types of research brings to light the fact that there are two basic approaches to research, *viz.*, quantitative approach and the qualitative approach. The former involves the generation of data in quantitative form which can be subjected to rigorous quantitative analysis in a formal and rigid fashion. This approach can be further sub-classified into inferential, experimental and simulation approaches to research. The purpose of inferential approach to research is to form a data base from which to infer characteristics or relationships of population. This usually means survey research where a sample of population is studied (questioned or observed) to determine its characteristics, and it is then inferred that the population has the same characteristics. Experimental approach is characterised by much greater

control over the research environment and in this case some variables are manipulated to observe their effect on other variables. Simulation approach involves the construction of an artificial environment within which relevant information and data can be generated. This permits an observation of the dynamic behaviour of a system (or its sub-system) under controlled conditions. The term 'simulation' in the context of business and social sciences applications refers to "the operation of a numerical model that represents the structure of a dynamic process. Given the values of initial conditions, parameters and exogenous variables, a simulation is run to represent the behaviour of the process over time." Simulation approach can also be useful in building models for understanding future conditions.

Qualitative approach to research is concerned with subjective assessment of attitudes, opinions and behaviour. Research in such a situation is a function of researcher's insights and impressions. Such an approach to research generates results either in non-quantitative form or in the form which are not subjected to rigorous quantitative analysis. Generally, the techniques of focus group interviews, projective techniques and depth interviews are used. All these are explained at length in chapters that follow.

Research Methods vs. Methodology

It seems appropriate at this juncture to explain the difference between research methods and research methodology. Research methods may be understood as all those methods/ techniques that are used for conduction of research. Research methods or techniques, thus, refer to the methods the researcher use in performing research operations.

Type		Methods	Techniques
1.	Library Research	1. Analysis of Historical records	Recording of notes, Content analysis, Tape and Film listening and analysis.
		2. Analysis of documents	Statistical compilations and manipulations, reference and abstract guides, contents analysis.
2.	Field Research	1. Non-participant direct observation	Observational behavioural scales, use of score cards etc.
		2. Participant observation	Interactional recording, possible use of tape recorders, photographic techniques.
		3. Mass observation	Recording mass behaviour, interview using independent observers in public places.

		4. Mail questionnaire	Identification of social and economic background of respondents.
		5. Opinionnaire	Use of attitude scales, projective techniques, use of sociometric scales.
		6. Personal interview	Interviewer uses a detailed schedule with open and closed questions.
		7. Focused interview	Interviewer focuses attention upon a given experience and its effects.
		8. Group interview	Small groups of respondents are interviewed simultaneously.
		9. Telephone survey	Used as a survey technique for information and for discerning opinion; may also used as a follow up of questionnaire.
		10. Case study and life history	Cross sectional collection of data for intensive analysis, longitudinal collection of data of intensive character.
	3. Laboratory Research	Small group study of random behaviour, play and role analysis	Use of audio-visual recording devices, use of observers, etc.
	—		

In other words, all those methods which are used by the researcher during the course of studying his research problem are termed as research methods. Since the object of research, particularly the applied research, is to arrive at a solution for a given problem, the available data and the unknown aspects of the problem have to be related to each other to make a solution possible. Keeping this in view, research methods can be put into the following three groups :

1. In the first group we include those methods which are concerned with the collection of data. These methods will be used where the data already available are not sufficient to arrive at the required solution;

2. The second group consists of those statistical techniques which are used for establishing relationships between the data and the unknowns;

3. The third group consists of those methods which are used to evaluate the accuracy of the results obtained.

Research methods falling in the above stated last two groups are generally taken as the analytical tools of research.

Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. In it we study the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them. It is necessary for the researcher to know not only the research methods/techniques but also the methodology. Researchers not only need to know how to develop certain indices or tests, how to calculate the mean, the mode, the median or the standard deviation or chi-square, how to apply particular research techniques, but they also need to know which of these methods or techniques are relevant and which are not, and what would they mean and indicate and why. Researchers also need to understand the assumptions underlying various techniques and they need to know the criteria by which they can decide that certain techniques and procedures will be applicable to certain problems and others will not. All this means that it is necessary for the researcher to design his methodology for his problem as the same may differ from problem to problem. For example, an architect, who designs a building, has to consciously evaluate the basis of his decisions, i.e., he has to evaluate why and on what basis he selects particular size, number and location of doors, windows and ventilators, uses particular materials and not others and the like. Similarly, in research the scientist has to expose the research decisions to evaluation before they are implemented. He has to specify very clearly and precisely what decisions he selects and why he selects them so that they can be evaluated by others also.

From what has been stated above, we can say that research methodology has many dimensions and research methods do constitute a part of the research methodology. The scope of research methodology is wider than that of research methods. Thus, when we talk of research methodology we not only talk of the research methods but also consider the logic behind the methods we use in the context of our research study and explain why we are using a particular method or technique and why we are not using others so that research results are capable of being evaluated either by the researcher himself or by others. Why a research study has been undertaken, how the research problem has been defined, in what way and why the hypothesis has been formulated, what data have been collected and what particular method has been adopted, why particular technique of analysing data has been used and a host of similar other questions are usually answered when we talk of research methodology concerning a research problem or study.

Importance of Knowing How Research is Done

The study of research methodology gives the student the necessary training in gathering material and arranging or card-indexing them,

participation in the field work when required, and also training in techniques for the collection of data appropriate to particular problems, in the use of statistics, questionnaires and controlled experimentation and in recording evidence, sorting it out and interpreting it. In fact, importance of knowing the methodology of research or how research is done stems from the following considerations :

1. For one who is preparing himself for a career of carrying out research, the importance of knowing research methodology and research techniques is obvious since the same constitute the tools of his trade. The knowledge of methodology provides good training specially to the new research worker and enables him to do better research. It helps him to develop disciplined thinking or a 'bent of mind' to observe the field objectively. Hence, those aspiring for careerism in research must develop the skill of using research techniques and must thoroughly understand the logic behind them.

2. Knowledge of how to do research will inculcate the ability to evaluate and use research results with reasonable confidence. In other words, we can state that the knowledge of research methodology is helpful in various fields such as government or business administration, community development and social work where persons are increasingly called upon to evaluate and use research results for action.

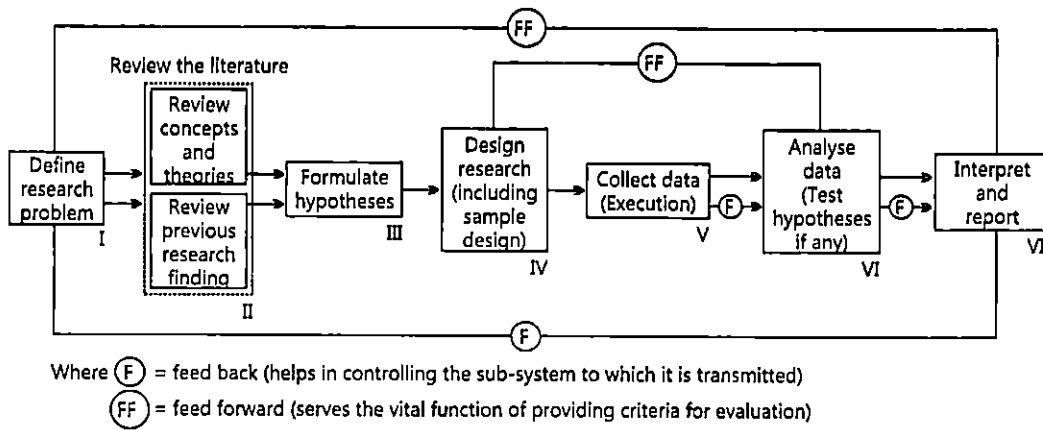
3. When one knows how research is done, then one may have the satisfaction of acquiring a new intellectual tool which can become a way of looking at the world and of judging every day experience. Accordingly, it enables use to make intelligent decisions concerning problems facing us in practical life at different points of time. Thus, the knowledge of research methodology provides tools to look at things in life objectively.

4. In this scientific age, all of us are in many ways consumers of research results and we can use them intelligently provided we are able to judge the adequacy of the methods by which they have been obtained. The knowledge of methodology helps the consumer of research results to evaluate them and enables him to take rational decisions.

Research Process

Before embarking on the details of research methodology and techniques, it seems appropriate to present a brief overview of the research process. Research process consists of series of actions or steps necessary to effectively carry out research and the desired sequencing of these steps. The chart shown in Fig. 1 well illustrates a research process.

Research Process in Flow Chart



The chart indicates that the research process consists of a number of closely related activities, as shown through I to VII. But such activities overlap continuously rather than following a strictly prescribed sequence. At times, the first step determines the nature of the last step to be undertaken. If subsequent procedures have not been taken into account in the early stages, serious difficulties may arise which may even prevent the completion of the study. One should remember that the various steps involved in a research process are not mutually exclusive; nor they are separate and distinct. They do not necessarily follow each other in any specific order and the researcher has to be constantly anticipating at each step in the research process the requirements of the subsequent steps. However, the following order concerning various steps provides a useful procedural guideline regarding the research process :

- (1) formulating the research problem
- (2) extensive literature survey
- (3) developing the hypothesis
- (4) preparing the research design
- (5) determining sample design;
- (6) collecting the data
- (7) execution of the project
- (8) analysis of data
- (9) hypothesis testing
- (10) generalisations and interpretation
- (11) preparation of the report or presentation of the results

A brief description of the above stated steps will be helpful.

1. Formulating the research problem : There are two types of research problems, viz., those which relate to states of nature and those which relate to relationships between variables. At the very outset the researcher

must single out the problem he wants to study, *i.e.*, he must decide the general area of interest or aspect of a subject-matter that he would like to inquire into. Initially the problem may be stated in a broad general way and then the ambiguities, if any, relating to the problem be resolved. Then, the feasibility of a particular solution has to be considered before a working formulation of the problem can be set up. The formulation of a general topic into a specific research problem, thus, constitutes the first step in a scientific enquiry. Essentially two steps are involved in formulating the research problem, *viz.*, understanding the problem thoroughly, and rephrasing the same into meaningful terms from an analytical point of view.

The best way of understanding the problem is to discuss it with one's own colleagues or with those having some expertise in the matter. In an academic institution the researcher can seek the help from a guide who is usually an experienced man and has several research problems in mind. Often, the guide puts forth the problem in general terms and it is up to the researcher to narrow it down and phrase the problem in operational terms. In private business units or in governmental organisations, the problem is usually earmarked by the administrative agencies with whom the researcher can discuss as to how the problem originally came about and what considerations are involved in its possible solutions.

The researcher must at the same time examine all available literature to get himself acquainted with the selected problem. He may review two types of literature-the conceptual literature concerning the concepts and theories, and the empirical literature consisting of studies made earlier which are similar to the one proposed. The basic outcome of this review will be the knowledge as to what data and other materials are available for operational purposes which will enable the researcher to specify his own research problem in a meaningful context. After this the researcher rephrases the problem into analytical or operational terms *i.e.*, to put the problem in as specific terms as possible. This task of formulating, or defining, a research problem is a step of greatest importance in the entire research process. The problem to be investigated must be defined unambiguously for that will help discriminating relevant data from irrelevant ones. Care must, however, be taken to verify the objectivity and validity of the background facts concerning the problem. Professor W.A. Neiswanger correctly states that the statement of the objective is of basic importance because it determines the data which are to be collected, the characteristics of the data which are relevant, relations which are to be explored, the choice of techniques to be used in these explorations and the form of the final report. If there are certain pertinent terms, the same should be clearly defined along with the task of formulating the problem. In fact,

formulation of the problem often follows a sequential pattern where a number of formulations are set up, each formulation more specific than the preceding one, each one phrased in more analytical terms, and each more realistic in terms of the available data and resources.

2. Extensive literature survey : Once the problem is formulated, a brief summary of it should be written down. It is compulsory for a research worker writing a thesis for a Ph.D. degree to write a synopsis of the topic and submit it to the necessary Committee or the Research Board for approval. At this juncture the researcher should undertake extensive literature survey connected with the problem. For this purpose, the abstracting and indexing journals and published or unpublished bibliographies are the first place to go to. Academic journals, conference proceedings, government reports, books etc., must be tapped depending on the nature of the problem. In this process, it should be remembered that one source will lead to another. The earlier studies, if any, which are similar to the study in hand should be carefully studied. A good library will be a great help to the researcher at this stage.

3. Development of working hypotheses : After extensive literature survey, researcher should state in clear terms the working hypothesis or hypotheses. Working hypothesis is tentative assumption made in order to draw out and test its logical or empirical consequences. As such the manner in which research hypotheses are developed is particularly important since they provide the focal point for research. They also affect the manner in which tests must be conducted in the analysis of data and indirectly the quality of data which is required for the analysis. In most types of research, the development of working hypothesis plays an important role. Hypothesis should be very specific and limited to the piece of research in hand because it has to be tested. The role of the hypothesis is to guide the researcher by delimiting the area of research and to keep him on the right track. It sharpens his thinking and focuses attention on the more important facets of the problem. It also indicates the type of data required and the type of methods of data analysis to be used.

How does one go about developing working hypotheses? The answer is by using the following approach :

- (i) Discussions with colleagues and experts about the problem, its origin and the objectives in seeking a solution;
- (ii) Examination of data and records, if available, concerning the problem for possible trends, peculiarities and other clues;
- (iii) Review of similar studies in the area or of the studies on similar problems; and

Exploratory personal investigation which involves original field interviews on a limited scale with interested parties and individuals with a view to secure greater insight into the practical aspects of the problem.

Thus, working hypotheses arise as a result of a-priori thinking about the subject, examination of the available data and material including related studies and the counsel of experts and interested parties. Working hypotheses are more useful when stated in precise and clearly defined terms. It may as well be remembered that occasionally we may encounter a problem where we do not need working hypotheses, specially in the case of exploratory or formulative researches which do not aim at testing the hypothesis. But as a general rule, specification of working hypotheses in another basic step of the research process in most research problems.

4. Preparing the research design : The research problem having been formulated in clear cut terms, the researcher will be required to prepare a research design, *i.e.*, he will have to state the conceptual structure within which research would be conducted. The preparation of such a design facilitates research to be as efficient as possible yielding maximal information. In other words, the function of research design is to provide for the collection of relevant evidence with minimal expenditure of effort, time and money. But how all these can be achieved depends mainly on the research purpose. Research purposes may be grouped into four categories, *viz.*, (i) Exploration, (ii) Description, (iii) Diagnosis, and (iv) Experimentation. A flexible research design which provides opportunity for considering many different aspects of a problem is considered appropriate if the purpose of the research study is that of exploration. But when the purpose happens to be an accurate description of a situation or of an association between variables, the suitable design will be one that minimizes bias and maximizes the reliability of the data collected and analyzed.

There are several research designs, such as, experimental and non-experimental hypothesis testing. Experimental designs can be either informal designs (such as before-and-after without control, after-only with control, before-and-after with control) or formal designs (such as completely randomized design, randomized block design, Latin square design, simple and complex factorial designs), out of which the researcher must select one for his own project. The preparation of the research design, appropriate for a particular research problem, involves usually the consideration of the following:

- (i) the means of obtaining the information;
- (ii) the availability and skills of the researcher and his staff (if any);

- (iii) explanation of the way in which selected means of obtaining information will be organised and the reasoning leading to the selection;
- (iv) the time available for research; and
- (v) the cost factor relating to research, *i.e.*, the finance available for the purpose.

5. Determining sample design : All the items under consideration in any field of inquiry constitute a 'universe' or 'population'. A complete enumeration of all the items in the 'population' is known as a census inquiry. It can be presumed that in such an inquiry when all the items are covered no element of chance is left and highest accuracy is obtained. But in practice this may not be true. Even the slightest element of bias in such an inquiry will get larger and larger as the number of observations increases. Moreover, there is no way of checking the element of bias or its extent except through a resurvey or use of sample checks. Besides, this type of inquiry involves a great deal of time, money and energy. Not only this, census inquiry is not possible in practice under many circumstances. For instance, blood testing is done only on sample basis. Hence, quite often we select only a few items from the universe for our study purposes. The items so selected constitute what is technically called a sample.

The researcher must decide the way of selecting a sample or what is popularly known as the sample design. In other words, a sample design is a definite plan determined before any data are actually collected for obtaining a sample from a given population. Thus, the plan to select 12 of city's 200 drugstores in a certain way constitutes a sample design. Samples can be either probability samples or non-probability samples. With probability samples each element has a known probability of being included in the sample but the non-probability samples do not allow the researcher to determine this probability. Probability samples are those based on simple random sampling, systematic sampling, stratified sampling, cluster/area sampling whereas non-probability samples are those based on convenience sampling, judgement sampling and quota sampling techniques.

6. Collecting the data : In dealing with any real life problem it is often found that data at hand are inadequate, and hence, it becomes necessary to collect data that are appropriate. There are several ways of collecting the appropriate data which differ considerably in context of money costs, time and other resources at the disposal of the researcher. Primary data can be collected either through experiment or through survey. If the researcher conducts an experiment, he observes some quantitative measurements, or the data, with the help of which he examines the truth contained in his hypothesis.

7. Execution of the project : Execution of the project is a very important step in the research process. If the execution of the project proceeds on correct lines, the data to be collected would be adequate and dependable. The researcher should see that the project is executed in a systematic manner and in time. If the survey is to be conducted by means of structured questionnaires, data can be readily machine-processed. In such a situation, questions as well as the possible answers may be coded. If the data are to be collected through interviewers, arrangements should be made for proper selection and training of the interviewers. The training may be given with the help of instruction manuals which explain clearly the job of the interviewers at each step. Occasional field checks should be made to ensure that the interviewers are doing their assigned job sincerely and efficiently. A careful watch should be kept for unanticipated factors in order to keep the survey as much realistic as possible. This, in other words, means that steps should be taken to ensure that the survey is under statistical control so that the collected information is in accordance with the pre-defined standard of accuracy. If some of the respondents do not cooperate, some suitable methods should be designed to tackle this problem. One method of dealing with the non-response problem is to make list of the non-respondents and take a small sub-sample of them, and then with the help of expert's vigorous efforts can be made for securing response.

8. Analysis of data : After the data have been collected, the researcher turns to the task of analysing them. The analysis of data requires a number of closely related operations such as establishment of categories, the application of these categories to raw data through coding, tabulation and then drawing statistical inferences. The unwieldy data should necessarily be condensed into a few manageable groups and tables for further analysis. Thus, researcher should classify the raw data into some purposeful and usable categories. Coding operation is usually done at this stage through which the categories of data are transformed into symbols that may be tabulated and counted. Editing is the procedure that improves the quality of the data for coding. With coding the stage is ready for tabulation. Tabulation is a part of the technical procedure wherein the classified data are put in the form of tables. The mechanical devices can be made use of at this juncture. A great deal of data, specially in large inquiries, is tabulated by computers. Computers not only save time but also make it possible to study large number of variables affecting a problem simultaneously.

Analysis work after tabulation is generally based on the computation of various percentages, coefficients, etc., by applying various well defined statistical formulae. In the process of analysis, relationships or differences

supporting or conflicting with original or new hypotheses should be subjected to tests of significance to determine with what validity data can be said to indicate any conclusion(s). For instance, if there are two samples of weekly wages, each sample being drawn from factories in different parts of the same city, giving two different mean values, then our problem may be whether the two mean values are significantly different or the difference is just a matter of chance. Through the use of statistical tests we can establish whether such a difference is a real one or is the result of random fluctuations. If the difference happens to be real, the inference will be that the two samples come from different universes and if the difference is due to chance, the conclusion would be that the two samples belong to the same universe. Similarly, the technique of analysis of variance can help us in analysing whether three or more varieties of seeds grown on certain fields yield significantly different results or not. In brief, the researcher can analyse the collected data with the help of various statistical measures.

9. Hypothesis-testing : After analysing the data as stated above, the researcher is in a position to test the hypotheses, if any, he had formulated earlier. Do the facts support the hypotheses or they happen to be contrary? This is the usual question which should be answered while testing hypotheses. Various tests, such as Chi square test, t-test, F-test, have been developed by statisticians for the purpose. The hypotheses may be tested through the use of one or more of such tests, depending upon the nature and object of research inquiry. Hypothesis-testing will result in either accepting the hypothesis or in rejecting it. If the researcher had no hypotheses to start with, generalisations established on the basis of data may be stated as hypotheses to be tested by subsequent researches in times to come.

10. Generalisations and interpretation : If a hypothesis is tested and upheld several times, it may be possible for the researcher to arrive at generalisation, *i.e.*, to build a theory. As a matter of fact, the real value of research lies in its ability to arrive at certain generalisations. If the researcher had no hypothesis to start with, he might seek to explain his findings on the basis of some theory. It is known as interpretation. The process of interpretation may quite often trigger off new questions which in turn may lead to further researches.

11. Preparation of the report or the thesis : Finally, the researcher has to prepare the report of what has been done by him. Writing of report must be done with great care keeping in view the following :

1. The layout of the report should be as follows : (i) the preliminary pages; (ii) the main text, and (iii) the end matter.

In its preliminary pages the report should carry title and date followed by acknowledgements and foreword. Then there should be a table of contents followed by a list of tables and list of graphs and charts, if any, given in the report.

The main text of the report should have the following parts :

(a) Introduction : It should contain a clear statement of the objective of the research and an explanation of the methodology adopted in accomplishing the research. The scope of the study along with various limitations should as well be stated in this part.

(b) Summary of findings : After introduction there would appear a statement of findings and recommendations in non-technical language. If the findings are extensive, they should be summarised.

(c) Main report : The main body of the report should be presented in logical sequence and broken-down into readily identifiable sections.

(d) Conclusion : Towards the end of the main text, researcher should again put down the results of his research clearly and precisely. In fact, it is the final summing up.

At the end of the report, appendices should be enlisted in respect of all technical data. Bibliography, *i.e.*, list of books, journals, reports, etc., consulted, should also be given in the end. Index should also be given specially in a published research report.

2. Report should be written in a concise and objective style in simple language avoiding vague expressions such as 'it seems,' 'there may be', and the like.

3. Charts and illustrations in the main report should be used only if they present the information more clearly and forcibly.

4. Calculated 'confidence limits' must be mentioned and the various constraints experienced in conducting research operations may as well be stated.

Criteria of Good Research

Whatever may be the types of research works and studies, one thing that is important is that they all meet on the common ground of scientific method employed by them. One expects scientific research to satisfy the following criteria.

1. The purpose of the research should be clearly defined and common concepts be used.

2. The research procedure used should be described in sufficient detail to permit another researcher to repeat the research for further advancement, keeping the continuity of what has already been attained.

3. The procedural design of the research should be carefully planned to yield results that are as objective as possible.

4. The researcher should report with complete frankness, flaws in procedural design and estimate their effects upon the findings.

5. The analysis of data should be sufficiently adequate to reveal its significance and the methods of analysis used should be appropriate. The validity and reliability of the data should be checked carefully.

6. Conclusions should be confined to those justified by the data of the research and limited to those for which the data provide an adequate basis.

7. Greater confidence in research is warranted if the researcher is experienced, has a good reputation in research and is a person of integrity.

In other words, we can state the qualities of a good research as under :

1. Good research is systematic : It means that research is structured with specified steps to be taken in a specified sequence in accordance with the well-defined set of rules. Systematic characteristic of the research does not rule out creative thinking but it certainly does reject the use of guessing and intuition in arriving at conclusions.

2. Good research is logical : This implies that research is guided by the rules of logical reasoning and the logical process of induction and deduction are of great value in carrying out research. Induction is the process of reasoning from a part to the whole whereas deduction is the process of reasoning from some premise to a conclusion which follows from that very premise. In fact, logical reasoning makes research more meaningful in the context of decision making.

3. Good research is empirical : It implies that research is related basically to one or more aspects of a real situation and deals with concrete data that provides a basis for external validity to research results.

4. Good research is replicable : This characteristic allows research results to be verified by replicating the study and thereby building a sound basis for decisions.

Problems Encountered by Researchers in India

Researchers in India, particularly those engaged in empirical research, are facing several problems. Some of the important problems are as follows :

1. The lack of a scientific training in the methodology of research is a great impediment for researchers in our country. There is paucity of competent researchers. Many researchers take a leap in the dark without knowing research methods. Most of the work, which goes in the name of research is not methodologically sound. Research to many researchers and even to their guides, is mostly a scissor and paste job without any insight shed on the collated materials. The consequence is obvious, *viz.*, the research results, quite

often, do not reflect the reality or realities. Thus, a systematic study of research methodology is an urgent necessity. Before undertaking research projects, researchers should be well equipped with all the methodological aspects. As such, efforts should be made to provide short duration intensive courses for meeting this requirement.

2. There is insufficient interaction between the university research departments on one side and business establishments, government departments and research institutions on the other side. A great deal of primary data of non-confidential nature remain untouched/untreated by the researchers for want of proper contacts. Efforts should be made to develop satisfactory liaison among all concerned for better and realistic researches. There is need for developing some mechanisms of a university-industry interaction programme so that academics can get ideas from practitioners on what needs to be researched and practitioners can apply the research done by the academics.

3. Most of the business units in our country do not have the confidence that the material supplied by them to researchers will not be misused and as such they are often reluctant in supplying the needed information to researchers. The concept of secrecy seems to be sacrosanct to business organisations in the country so much so that it proves an impermeable barrier to researchers. Thus, there is the need for generating the confidence that the information/data obtained from a business unit will not be misused.

4. Research studies overlapping one another are undertaken quite often for want of adequate information. This results in duplication and fritters away resources. This problem can be solved by proper compilation and revision, at regular intervals, of a list of subjects on which and the places where the research is going on. Due attention should be given toward identification of research problems in various disciplines of applied science which are of immediate concern to the industries.

5. There does not exist a code of conduct for researchers and inter-university and interdepartmental rivalries are also quite common. Hence, there is need for developing a code of conduct for researchers which, if adhered sincerely, can win over this problem.

6. Many researchers in our country also face the difficulty of adequate and timely secretarial assistance, including computerial assistance. This causes unnecessary delays in the completion of research studies. All possible efforts be made in this direction so that efficient secretarial assistance is made available to researchers and that too well in time. University Grants Commission must play a dynamic role in solving this difficulty.

7. Library management and functioning is not satisfactory at many places and much of the time and energy of researchers are spent in tracing out the books, journals, reports, etc., rather than in tracing out relevant material from them.

8. There is also the problem that many of our libraries are not able to get copies of old and new Acts/Rules, reports and other government publications in time. This problem is felt more in libraries which are away in places from Delhi and/or the state capitals. Thus, efforts should be made for the regular and speedy supply of all governmental publications to reach our libraries.

9. There is also the difficulty of timely availability of published data from various government and other agencies doing this job in our country. Researcher also faces the problem on account of the fact that the published data vary quite significantly because of differences in coverage by the concerning agencies.

10. There may, at times, take place the problem of conceptualization and also problems relating to the process of data collection and related things.

Qualities of a Good Researcher

There are some important qualities, should be in a good researcher as :

1. Friendly with Respondents : A good researcher must have the quality to become friendly with respondents. It should have to talk to them in the same language in which the responding are answering and make happy made.

2. Least Discouragement : If the people are not co-operate to give correct data, the researcher should not be discouraged and face the difficulties, it would be called a good researcher.

3. Free from Prejudice : A researcher would be good if he has no prejudice or bias study about a problematic situation but he is capable of providing clear information's.

4. Capacity of Depth Information : A researcher should have the capacity to collect more and more information in little time.

5. Accuracy : A researcher would be said to be good, if he is accurate in his views. His ideas must be accurate one.

6. Truthful : A researcher must have to be truthful. Its idea would be free from false reports and saying information.

7. Keen Observer : It is the quality of a good researcher that he may have the ideas of keen and deep observation.

8. Careful in Listening : A researcher would be more careful in listening. He would have the quality of listening very low information's even whispering.

9. Low Dependency on Common Sense : A researcher should be called good if he has low dependency on common sense but keep in observation all the events and happenings.

10. Least time Consumer : Good researcher must have the capacity of least time consuming. It will have to do more work in a little time because of the shortage of time.

11. Economical : Good researcher must have control over his economic resources. He has to keep his finances within limits and spend carefully.

12. Low Care of Disapprovals of Society : A good researcher has no care of the approvals or disapprovals but doing his work with zeal and patience to it.

13. Expert in Subject : A researcher would be a good one if he has full command over his subject. He makes the use of his theoretical study in field work easily.

14. Free from Hasty Statements : It is not expected from a good researcher to make his study hasty and invalid with wrong statements. Its study must be based on reality & validity.

15. Good in Conversation : The conversation of a good researcher should be sympathetic and not boring. He must have the skill and art to be liked by the people.

16. Having Clear Terminology : A good researcher's terminology would be clear. It would be free from outwards to become difficult for the respondents to answer.

17. Trained in Research Tools : Research is impossible without its techniques and tools. So, it should be better for a researcher to know about the use of these tools.

18. Dress and Behavior same to the area : The dress and the behavior of the researcher should be same as to the study area. It is must for him to convince the people easily and adopt their dress.

19. More Analytical : A researcher would be different from other people of the society. On the basis of this quality he may observe the situation very well. Then he should be able to solve the problems easily.

20. Equality and Justice : A good researcher should believe on equality and justice. As equal to all type of people he may collect better information's from the respondents.

Key Terms in Research

Following are main term of Research :

Investigation, Exploration, Hypothesis, Data, Methods and Techniques, Results and Findings, Variables.

Keywords are important words/concepts found in your research question or thesis. A quick and dirty way to pull keywords from a research question/thesis is to choose the most important nouns; all other words are irrelevant. Using keywords to search will always retrieve more results than phrases or sentences.

Investigation

An investigation is an attempt to find, in a scientific way, the answer to an original question. The scientific way may involve careful recording of organised observations such as watching the behaviour of wild birds or the movement of planets. It may use an experimental procedure that involves designing an experiment, controlling variables, interpreting your data and making a conclusion. Investigations always look for reliable results that can be used to explain or predict events.

A research investigation involves :

1. **Choosing and defining a topic** : Pick a topic that interests you.
2. **Asking questions about your topic** : Why? What if...? How? It would be a good idea to do some reading about your selected topic. Libraries and the internet are a very useful resource. You could also discuss ideas with others familiar with your topic.
3. **Forming a hypothesis** : This is an educated "guess" as to what you think will happen in a certain set of circumstances or conditions.
4. **Investigating your hypothesis** : To do this properly you will need to design and carry out experiments in a safe manner.
5. **Carefully recording the results of the experiments** : A survey, if it is used to collect data as part of an investigation, is regarded by STS as an experiment.
6. **Analyzing results** : What do your results mean?
7. **Working logically** : Through your results so as to support or disprove your hypothesis.
8. **Writing a report** : To tell others what you did and what you found, based on experiments you carried out. The experimental report is NOT a research assignment.

Exploration

Investigation into a problem or situation which provides insights to the researcher. The research is meant to provide details where a small amount of information exists. It may use a variety of methods such as trial studies, interviews, group discussions, experiments, or other tactics for the purpose of gaining information. This is known as exploration in research.

Hypothesis

A hypothesis is a specific, testable prediction. It describes in concrete terms what you expect will happen in a certain circumstance.

The Purpose of a Hypothesis : A hypothesis is used in an experiment to define the relationship between two variables. The purpose of a hypothesis is to find the answer to a question. A formalized hypothesis will force us to think about what results we should look for in an experiment. The first variable is called the independent variable. This is the part of the experiment that can be changed and tested. The independent variable happens first and can be considered the cause of any changes in the outcome. The outcome is called the dependent variable. The independent variable in our previous example is not studying for a test. The dependent variable that you are using to measure outcome is your test score.

A hypothesis should always :

1. Explain what you expect to happen
2. Be clear and understandable
3. Be testable
4. Be measurable
5. And contain an independent and dependent variable

How to Develop a Hypothesis : Another important aspect of a hypothesis is that it should be based on research. Remember that the purpose of a hypothesis is to find the answer to a question. The first thing you should do if you want to answer a question is to find as much information on the topic as you can. Before you come up with a specific hypothesis, spend some time doing research. Then, start thinking of questions you still have. After thoroughly researching your question, you should have an educated guess about how things work. This guess about the answer to your question is where your hypothesis comes from.

How to Write a Hypothesis : Let's learn how to properly write a hypothesis using the previous example of tomorrow's test. Examine the differences in the following hypotheses :

Not studying may cause a lower grade on my test.

This statement is not clear enough to be useful. Your hypothesis should be as specific as possible. If the hypothesis is vague, it's unclear how to find the answer to your question.

If I do not study, then I will make a low grade on the test.

This statement makes a common mistake. You have written a simple cause and effect prediction that is based on an unstated assumption. You are

assuming that not studying lowers test performance. A hypothesis is clearer if you state a proposed relationship before making the prediction.

If not studying lowers test performance and I do not study, then I will get a lower grade on the test.

A research hypothesis is the statement created by researchers when they speculate upon the outcome of a research or experiment.

Data

Data can be defined as a collection of facts, figures or any other related material, which has the ability to serve as the information for the basic study and the analysis. It must be kept in mind that data can be either old in nature or it may be the current one.

For getting answers to any of the queries that are made data related to the questions or the queries is very much needed. Data acts as the back bone for the analysis, so it can be said that no question can be answered without the data.

Analyzation of the data often leads to some of the inferences which are very commonly called as the information. The inference which is based on the guess work or on the opinions can never ever make a place in the research but the factors which play a critical role in the research generally include accuracy, suitability, reliability etc.

What is Data Collection and Measurement : After the selection of a proper research design, a research problem is selected followed by a finalized plan of action. After all these steps, comes the stage involving the collection of the data this data is required during the various phases of study. So now we will study about the details of the sources of the data collection, importance of the data collection and also about the various methods that can be used for performing this purpose of the data collection.

Sources of Data : The basic data has a direct effect on the answers to the various questions and hence the source of the data is very much important as it provides the necessary information. The various sources of the data can be summarized as follows :

1. Primary sources : These types of the sources refer to the first hand sources or the original sources at the hands of a researcher, which is not collected in the past. Collection of the primary data can be done with the help of the principle sources of the observation and also the surveys. Primary data in very simple and general language can be defined as the first hand information relating to any type of the research that has been gathered or collected by the researcher or by any of his assistant or an agent.

This type of the data helps in the original investigations and observations, which automatically further leads to the achievement of the various useful and

meaningful results. A very important point to be kept in mind about these types of results obtained, which are based on the primary data are bound to be empirical in nature and also play a very critical and defining role in the research methodology.

If the primary data that has been collected and compiled is not bias in the nature acts as a tool of great utility value as then this type of the data becomes very much reliable, accurate and dependable in nature that ultimately helps a great deal in carrying out the various specified investigations.

Once this primary data is used the original features or the characteristics of these data diminish resulting in the formation of the secondary data.

Hence it can be said that the data which acts as primary data at one point of time is bound to become secondary data at some stage or time in the future.

Methods of the collection of the primary data can be categorized as :

Observation : In general terms observation can be defined as the process involving the collection of the data by either viewing or listening or both. The best method in this category is to directly and personally observe something to get meaningful data this method is also called as the Direct Personal Observation. In this type of the observation the situation is observed by the researcher in order to collect data relevant to the research. If the observation is without any bias the data that is collected with the help of this type of method acts as the most reliable information.

Observation is also a very cheap method and then also is very effective in its nature of working this method is a very old one data collected in the past about the human race, the environment etc used this method only.

But a major drawback of this type of method is that with the help of observation one is not able to quantify the data and also one cannot reach to some concrete solutions on the basis of the data collected by this method. So it can be said that observation method should generally be used for carrying out hypothesis testing.

Questionnaire and Schedule : With the help of this type of method, data is collected by getting questionnaires completed by the various respondents. This method of questionnaire and schedule is generally employed in order to collect the primary data in a very systematic manner. A questionnaire can be defined as a schedule having a number of coherent questions related to the topic which is being studied. A questionnaire acts as a formulated series of the questions and helps in the collection of the information directly by the investigator himself. A schedule can be defined as the collection of the details in a tabulated form and can be sometimes identical to the questionnaire.

Types of Questionnaire

1. Structured questionnaire :

1. Consists of definite, concrete and pre ordinate questions.
2. Has some additional questions as well, limited to those necessary for the classification of the inadequate answers.
3. Is segmented in nature.
4. Provides information under given titles and the sub titles.
5. Helps in getting accurate response and apt information.
6. Saves time and also the energy.

2. Non Structured questionnaire :

1. Is very simple in nature.
2. Is non segmented.
3. Has no sub division.
4. Can be used for very simple types of studies.

3. Codified questionnaire :

1. Expected answers are given in the code numbers.
2. Very easy for carrying out the processing.
3. Very suitable and also very convenient for the informant.

4. Un-codified questionnaire :

1. Very simple in nature.
2. Consist of no codification.
3. Codification may be sometimes made at the time of compilation but only if it is necessary.

Experimentation : Forms a very commonly used and very popular ingredient of the research process, being used in the physical sciences for a long time. An experiment is the process of studying the various aspects of the relationships between the independent and the dependent variables in a controlled situation. It acts as a test or a trial method in order to test a hypothesis in a laboratory.

Stimulation : Stimulation can be defined as the technique used for performing the various sampling experiments on the model of the systems. According to Abelson, stimulation is "the exercise of a flexible imitation of processes and outcomes for the purpose of clearing or explaining the underlying mechanisms involved."

Stimulation is the form of observational method acting as the theoretical model of the elements, relations and the processes. This method is very widely used in the war strategies and the tact business problems etc. It is also used in

the various economic problems, political problems, and behavioural problems and also in the social problems.

Interview method : This method acts as a very important and a critical way to collect data involving a very planned and a very systematic conversation that takes place between the interviewer/ investigator and the respondent. By this one is able to get very suitable information related to a specific research problem.

By this method of data collection one can get a very suitable range of data having both demographic as well as the social characteristics or any one of them.

Projective Techniques : The various direct methods are generally based on some assumptions, for e.g., the direct methods like the personal interview, telephone interview etc pre suppose about a person that he is willing to provide some important information about his own behavior, beliefs, feelings etc.. But this is not the case in all the aspects.

There may be some persons who may not give any type of information about themselves or may not give their opinion in a true sense.

In such cases these techniques play a very vital role as these are not dependent on the subject's self-insight.

Secondary sources : Data can be referred to be secondary in nature if the information provided by the data is not related to the purpose of the research project work i.e., secondary data accounts to the information for the various other purposes and not the purpose involved in the given research work. Secondary data is readily available and the researcher himself has no control over the shape of the data as it is given shape by the others. This type of data is based on the second-hand information i.e., the data that has been collected, compiled and presented in the past by some other company or group and is now being used in the procedures, this type of data is referred to as the secondary data.

Methods of the collection of the secondary data can be categorized as :

1. Internal

1. Involves data that a company is already having.
2. This type of data is collected by the company in routine.
3. This data is used by the company itself.
4. Data collected by such method is always in tune and regard with the research operation's purpose.

2. External

1. Involves data collected by the individuals.

2. Data collected acts as a very useful and a meaningful tool for the researcher in carrying out the various research operations.

3. Further are of two types : personal sources and the public sources.

Personal Sources : These type of sources for the collection of the secondary data generally involve :

- (a) Autobiographies (b) Diaries
- (c) Letters (d) Memoirs

Public Sources : These are further of two types :

Unpublished : Due to various reasons sometimes the data is not at all published and some examples of such sources can be reports of inquiry commissions, report of special inquiry etc.

Published : Such sources include the following :

- (a) Books
- (b) Journals
- (c) Newspapers
- (d) Reports of the government departments
- (e) Reports of the autonomous institutes

Thus data collection is one of the most important stage in conducting a research. You can have the best research design in the world but if you cannot collect the required data you will be not be able to complete your project. Data collection is a very demanding job which needs thorough planning, hard work, patience, perseverance and more to be able to complete the task successfully.

Methods and Techniques

A research method is a systematic plan for doing research. Let's take a look at the four most common research methods

Definition : A research method is a systematic plan for conducting research. Sociologists draw on a variety of both qualitative and quantitative research methods, including the experiments, survey research, participant observation, and secondary data. Quantitative methods aim to classify features, count them, and create statistical models to test hypotheses and explain observations. Qualitative methods aim for a complete, detailed description of observations, including the context of events and circumstances.

Approaches and Techniques : Four commonly-used methods of sociological investigation include the experiment, surveys, participant observation, and the use of existing (secondary) data.

The Experiment : An experiment is a research method for investigating cause and effect under highly controlled conditions. When conducting an

experiment, researchers will test a hypothesis. A hypothesis is a statement of how two or more variables are related. For example, let's say we wanted to examine whether studying affects a person's GPA. Our hypothesis might be : The more a person studies, the higher a person's GPA will be. In this example, studying would be the independent variable (the cause), while a person's GPA would be the dependent variable (the effect).

If we wanted to test this hypothesis, we would randomly assign subjects into two groups. The experimental group is a group of individuals that are exposed to the independent variable. The control group, on the other hand, is not exposed to the independent variable. We would require that the control group doesn't study at all, but that experimental group has to study at least 10 hours a week. After one semester, we would then determine which group has the higher GPA.

If the experimental group has a statistically higher GPA, we can assume our hypothesis is correct. It is important to note that sometimes a change in the dependent variable could be the result of something entirely different than that being studied (maybe, for example, those chosen for the experimental group were simply more intelligent than those in the control group). When two variables change together but neither one causes the other, we call this a spurious correlation.

Survey Research : A survey is a research method in which subjects respond to a series of statements or questions in a questionnaire or an interview. Surveys target some population, which are the people who are the focus of research. Because populations are usually quite large, the researcher will target a sample, which is a part of a population that represents the whole.

Once our sample is selected, we need a plan for asking questions and recording answers. The most common types of surveys are questionnaires and interviews. A questionnaire is series of written statements or questions. With an interview, the researcher personally asks subjects a series of questions, and gives participants the freedom to respond as they wish. Both questionnaires and interviews can include open-ended questions (allowing the subjects to respond freely), or close-ended questions (including a selection of fixed responses).

Participant Observation : The most widely used strategy for collecting qualitative data is participant observation. Participant observation is a research method in which investigators systematically observe people while joining them in their routine activities. Fieldwork makes most participant observation exploratory and descriptive, and has very few hard and fast rules. Unlike other research methods, participant observation can be a lengthy

process. In fact, it may require that the researcher stay in the field for weeks or even months.

Results and Findings

A Strategy for Writing up Research Results :

Get Organized : Lists, Outlines, Note cards, etc. Before starting to write the paper, take the time to think about and develop a list of points to be made in the paper. As you progress, use whichever strategy works for you to begin to order and to organize those points and ideas into sections.

Balanced Review of the Primary Research Literature : Do an in-depth, balanced review of the primary research literature relevant to your study questions prior to designing and carrying out the experiments. This review will help you learn what is known about the topic you are investigating and may let you avoid unnecessarily repeating work done by others. This literature will form the basis of your Introduction and Discussion.

Write the Introduction : Once your hypothesis has been refined for testing, you will draft the Introduction to your paper.

Design and Conduct the Experiment : Keep careful notes on procedures used during the experiment. You should write the Materials and Methods section upon completion of the experiment.

Analyze and Interpret the Results : Once the data are collected, you must analyze and interpret the results. Analysis will include data summaries (e.g., calculating means and variances) and statistical tests to verify conclusions. Most scientists lay out their Tables and Figures upon completion of the data analysis before writing the Results section. Write the Table and Figure legends. It is good practice to note the one or two key results that each Table or Figure conveys and use this information as a basis for writing the Results section. Sequence and number the Tables and Figures in the order which best enables the reader to reach your conclusions.

Write the Results Section : Remember that the Results section has both text and illustrative materials (Tables and Figures). Use the text component to guide the reader through your key results, *i.e.*, those results which answer the question(s) you investigated. Each Table and Figure must be referenced in the text portion of the results, and you must tell the reader what the key result(s) is that each Table or Figure conveys.

Write the Discussion : Interpretation of your results includes discussing how your results modify and fit in with what we previously understood about the problem. Review the literature again at this time. After completing the experiments, you will have much greater insight into the subject, and by going through some of the literature again, information that seemed trivial before, or

was overlooked, may tie something together and therefore prove very important to your own interpretation. Be sure to cite the works that you refer to.

Write the Abstract and Title : The Abstract is always the last section written because it is a concise summary of the entire paper and should include a clear statement of your aims, a brief description of the methods, the key findings, and your interpretation of the key results. The Title will probably be written earlier, but is often modified once the final form of the paper clearly known.

Self-Revise Your Paper : Most authors revise their papers at least 2-3x before giving it out for peer review. Go back over your paper now and read it carefully; read it aloud. Does it say what you wanted it to say? Do any ideas, experiments, or interpretations need to be moved around within the text to enhance the logical flow of your arguments? Can you shorten long sentences to clarify them?

Can you change passive verbs to active forms? Do the Tables and Figures have sufficient information to stand alone outside the context of the paper? Use your dictionary to correct spelling and your spell checker to catch typos.

Peer Review : Have knowledgeable colleagues critique your paper. Use their comments to revise your paper yet again.

Prepare the Final Draft : Carefully proof-read your final draft to make sure its as well done as possible. Double check that you've properly cited all your sources in the text and in the Literature Cited. Check the formatting one last time.

Variables

Very simply, a variable is a measurable characteristic that varies. It may change from group to group, person to person, or even within one person over time. There are six common variable types :

Dependent variables : Dependent variables show the effect of manipulating or introducing the independent variables. For example, if the independent variable is the use or non-use of a new language teaching procedure, then the dependent variable might be students' scores one may involve manipulating existing variables (e.g., modifying existing methods of instruction) or introducing new variables (e.g., adopting a totally new method for some sections of a class) in the research setting. Whatever the case may be, the researcher expects that the independent variable(s) will have some effect on (or relationship with) the dependent variables.

Intervening variables : Intervening variables refer to abstract processes that are not directly observable but that link the independent and

dependent variables. In language learning and teaching, they are usually inside the subjects' heads, including various language learning processes which the researcher cannot observe. For example, if the use of a particular teaching technique is the independent variable and mastery of the objectives is the dependent mode variable, then the language learning processes used by the subjects are the intervening variables.

Moderator Variables : Moderator variables affect the relationship between the independent and dependent variables by modifying the effect of the intervening variable(s). Unlike extraneous variables, moderator variables are measured and taken into consideration. Typical moderator variables in TESL and language acquisition research (when they are not the major focus of study) include sex, age, culture or language proficiency.

Control Variable : Language learning and teaching are very complex processes. It is not possible to consider every variable in a single study. The variables that are not measured in a particular study must be held constant, neutralized/balanced, or eliminated, so they will not have a biasing effect on the other variables. Variables that have been controlled in this way are called control variables.

Extraneous variables : Extraneous variables are those factors in the research environment which may have an effect on the dependent variable(s) but which are not controlled. Extraneous variables are dangerous. They may damage a study's validity, making it impossible to know whether the effects were caused by the independent and moderator variables or some extraneous factor. If they cannot be controlled, extraneous variables must at least be taken into consideration when interpreting results.

Research Area and Research Topic

Selecting a Topic

The ability to develop a good research topic is an important skill. When deciding on a topic, there are a few things that you will need to do :

1. brain storm for ideas
2. choose a topic that will enable you to read and understand the literature
3. ensure that the topic is manageable and that material is available
4. make a list of key words
5. be flexible
6. define your topic as a focused research question
7. research and read more about your topic
8. formulate a thesis statement

Be aware that selecting a good topic may not be easy. It must be narrow and focused enough to be interesting, yet broad enough to find adequate information. Before selecting your topic, make sure you know what your final project should look like.

Use the steps below to guide you through the process of selecting a research topic.

Step 1 : Brainstorm for ideas : Choose a topic that interests you. Use the following questions to help generate topic ideas.

1. Do you have a strong opinion on a current social or political controversy?
2. Did you read or see a news story recently that has piqued your interest or made you angry or anxious?
3. Do you have a personal issue, problem or interest that you would like to know more about?
4. Do you have a research paper due for a class this semester?
5. Is there an aspect of a class that you are interested in learning more about?
6. Be aware of overused ideas when deciding a topic.

Step 2 : Read General Background Information : Read a general encyclopedia article on the top two or three topics you are considering. Reading a broad summary enables you to get an overview of the topic and see how your idea relates to broader, narrower, and related issues. It also provides a great source for finding words commonly used to describe the topic.

1. Use periodical indexes to scan current magazine, journal or newspaper articles on your topic.
2. Use Web search engines. Google and Bing are currently considered to be two of the best search engines to find web sites on the topic.

Step 3 : Focus on Your Topic : Keep it manageable. A topic will be very difficult to research if it is too broad or narrow. One way to narrow a broad topic such as "the environment" is to limit your topic. Some common ways to limit a topic are :

By geographical area : Example : What environmental issues are most important in the Southwestern United States.

By culture : Example : How does the environment fit into the Navajo world view?

By time frame : Example : What are the most prominent environmental issues of the last 10 years?

By discipline : Example : How does environmental awareness effect business practices today?

By population group : Example : What are the effects of air pollution on senior citizens?

Remember that a topic may be too difficult to research if it is too :

Locally confined : Topics this specific may only be covered in these (local) newspapers, if at all.

Example : What sources of pollution affect the Genesee County water supply?

Recent : If a topic is quite recent, books or journal articles may not be available, but newspaper or magazine articles may. Also, Web sites related to the topic may or may not be available.

Broadly interdisciplinary : You could be overwhelmed with superficial information.

Example : How can the environment contribute to the culture, politics and society of the Western states?

Popular : You will only find very popular articles about some topics such as sports figures and high-profile celebrities and musicians.

Step 4 : Make a List of Useful Keywords : Keep track of the words that are used to describe your topic.

1. Look for words that best describe your topic.
2. Look for them in when reading encyclopedia articles and background and general information.
3. Find broader and narrower terms, synonyms, key concepts for key words to widen your search capabilities.
4. Make note of these words and use them later when searching databases and catalogs.

Step 5 : Be Flexible : It is common to modify your topic during the research process. You can never be sure of what you may find. You may find too much and need to narrow your focus, or too little and need to broaden your focus. This is a normal part of the research process. When researching, you may not wish to change your topic, but you may decide that some other aspect of the topic is more interesting or manageable.

Keep in mind the assigned length of the research paper, project, bibliography or other research assignment. Be aware of the depth of coverage needed and the due date. These important factors may help you decide how much and when you will modify your topic.

Step 6 : Define Your Topic as a Focused Research Question : You will often begin with a word, develop a more focused interest in an aspect of something relating to that word, and then begin to have questions about the topic.

For example :

Ideas = Frank Lloyd Wright or modern architecture

Research Question = How has Frank Lloyd Wright influenced modern architecture?

Focused Research Question = What design principles used by Frank Lloyd Wright are common in contemporary homes?

Step 7 : Research and Read More About Your Topic : Use the key words you have gathered to research in the catalogue, article databases, and Internet search engines. Find more information to help you answer your research question. You will need to do some research and reading before you select your final topic. Can you find enough information to answer your research question? Remember, selecting a topic is an important and complex part of the research process.

Step 8 : Formulate a Thesis Statement : Write your topic as a thesis statement. This may be the answer to your research question and/or a way to clearly state the purpose of your research. Your thesis statement will usually be one or two sentences that states precisely what is to be answered, proven, or what you will inform your audience about your topic. The development of a thesis assumes there is sufficient evidence to support the thesis statement.

For example, a thesis statement could be : Frank Lloyd Wright's design principles, including his use of ornamental detail and his sense of space and texture opened a new era of American architecture. His work has influenced contemporary residential design.

The title of your paper may not be exactly the same as your research question or your thesis statement, but the title should clearly convey the focus, purpose and meaning of your research.

For example, a title could be: Frank Lloyd Wright: Key Principles of Design For the Modern Home.

Conclusion

This chapter enables us to know the basic elements of research which is related to systematic investigation and study. It also defines the prerequisites of a good researcher. This chapter also studies the key terms in research: investigation, exploration, hypothesis, data, methods and techniques, results and findings and variables. This chapter guides about the various avenues in research and to select a relevant research topic.

Research comprises “creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of humans, culture and society, and the use of this stock of knowledge to devise new applications.” The major steps in conducting research are: identification of research problem, literature review, specifying the purpose of research, determine specific research questions, specification of a Conceptual framework : Usually a set of hypotheses, choice of a methodology (for data collection), data collection, analyzing and interpreting the data, reporting and evaluating research, communicating the research findings and, possibly, recommendations.

A good researcher needs to have some specific core competencies like : an analytical mind, a people person, the ability to stay calm, intelligence, curiosity, quick thinker, commitment, excellent written and verbal communication skills, sympathetic, systematic, thirst for new information, and a keen sense of things around him, to apply a systematic approach in assessing situations.

A research investigation involves : choosing and defining a topic, asking questions about your topic, forming a hypothesis, investigating your hypothesis, carefully recording the results of the experiments, analysing results, working logically through your results so as to support or disprove your hypothesis, writing a report to tell others what you did and what you found, based on experiments you carried out.

QUESTIONNAIRES

■ **Multiple Choice Questions**

1. The word research is derived from the French word :
 - (a) Reserch
 - (b) Recerch
 - (c) Resourch
 - (d) Riserch
2. Research is related with :
 - (a) Discovery of new idea
 - (b) Solution of a problem
 - (c) Investigation of a problem
 - (d) All of Above
3. What is the purpose of doing research?
 - (a) To identify problem
 - (b) To find the solution

- (c) Both (a) and (b)
 - (d) None of these
4. Research is :
- (a) Searching again and again
 - (b) Finding solution to any problem
 - (c) Working in a scientific way to search for truth of any problem
 - (d) None of the above
5. Applied research is also called :
- (a) Fundamental Research
 - (b) Applied Research
 - (c) Action Research
 - (d) Experimental Research
6. Action research means :
- (a) A longitudinal research
 - (b) An Analytical research
 - (c) A research initiated to solve an immediate problem
 - (d) A research with socioeconomic objective
7. Research conducted to find solution for an immediate problem is :
- (a) Fundamental research
 - (b) Analytical research
 - (c) Survey
 - (d) Action research
8. Basic research is also known as :
- (a) Applied Research
 - (b) Fundamental Research
 - (c) Descriptive Research
 - (d) Analytical Research
9. Analytical research is the type of research that :
- (a) Discovers ways of finding solution of an immediate problem.
 - (b) Gathers knowledge skill.
 - (c) Is useful for formulating hypothesis or testing hypothesis.
 - (d) Analyze the facts or information already available.
10. Research Pertaining to pure mathematics or natural law is example of :
- (a) Qualitative research
 - (b) Empirical research
 - (c) Analytical research
 - (d) Fundamental research

11. Fundamental research is the type of research that :
 - (a) ways of finding solution of an immediate problem
 - (b) Gathers knowledge skill.
 - (c) Is useful for formulating hypothesis or testing hypothesis.
 - (d) None of the above
12. Research related to abstract ideas or concept is :
 - (a) Empirical research
 - (b) Conceptual research
 - (c) Quantitative research
 - (d) Qualitative research
13. Descriptive research is also called as :
 - (a) Analytical research
 - (b) Qualitative research
 - (c) Statistical research
 - (d) Applied research
14. Which one of the following is not a feature of descriptive result?
 - (a) It is a fact finding enquiry.
 - (b) Research has no control over variables.
 - (c) Descriptive research is used for hypothesis testing.
 - (d) It is based on measurement of quantity
15. The process not needed in experimental research is :
 - (a) Controlling
 - (b) Observation
 - (c) Manipulation
 - (d) Reference collection
16. Newton gave three basic laws of motion. This research is categorized as :
 - (a) Descriptive Research
 - (b) Sample Survey
 - (c) Fundamental Research
 - (d) Applied Research
17. Most of the Universities in India :
 - (a) Conduct teaching and research only
 - (b) Affiliate colleges and conduct examinations
 - (c) Conduct teaching/research and examinations
 - (d) Promote research only

18. First stage of research process is :
 - (a) Identification of research problem
 - (b) Review of literature
 - (c) Research design
 - (d) Analysis of data
19. Last stage of research process is :
 - (a) Review of literature
 - (b) Report writing
 - (c) Research design
 - (d) Analysis of data
20. The process not needed in Experimental Researches is :
 - (a) Observation
 - (b) Manipulation
 - (c) Controlling
 - (d) Content Analysis

■ **Short Answers Type Questions**

1. What is research methodology?
2. When is a qualitative research methodology appropriate?
3. When are both quantitative and qualitative methods beneficial?
4. What is the observational method of research?
5. Write short notes on the following :
 - (a) Meaning of research
 - (b) Role of research in business
 - (c) Objectives of research
 - (d) Types of research
 - (e) Literature survey
 - (f) Interpretation of results
 - (g) Report writing
6. Define scientific method of investigation and distinguish it from non-scientific method of investigation.
7. Enlist various characteristics of research.
8. Distinguish between :
 - (a) Descriptive and analytical research
 - (b) Applied and fundamental research
 - (c) Conceptual and empirical research
 - (d) Quantitative and qualitative research

9. What is research investigation?
10. What are the steps in research investigation?
11. What is hypothesis?
12. Define data.
13. Define primary source of data.
14. What are the methods of collecting primary data?
15. What are the types of interview methods?
16. What is secondary data?
17. What are the methods of secondary data collection?
18. What is survey?
19. What is participant observation?
20. What is dependent variable?
21. What is independent variable?
22. What is intervening variables?
23. What is extraneous variable?

■ Long Answers Type Questions

1. What is the meaning of research? Explain its significance in business organizations.
2. Give various definitions of research explaining its meaning and scope.
3. "Many a time management is not convinced about the utility of research and regards it as an unnecessary activity over which no funds should be spent". Comment on this statement explaining the objectives of research.
4. Describe in detail various types of research.
5. Describe the steps involved in research process with suitable examples.
6. "Creative management, whether in public administration or private industry, depends on methods of inquiry that maintain objectivity, clarity, accuracy and consistency". Discuss this statement and examine the significance of research.

Answers

➤ Multiple Choice Questions

- | | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1. (b) | 2. (d) | 3. (c) | 4. (c) | 5. (c) | 6. (c) | 7. (d) | 8. (b) | 9. (d) |
| 10. (d) | 11. (b) | 12. (b) | 13. (c) | 14. (b) | 15. (d) | 16. (c) | 17. (b) | 18. (a) |
| 19. (b) | 20. (d) | | | | | | | |

CONSTRUCTING RESEARCH DESIGN

Meaning of Research Design

The formidable problem that follows the task of defining the research problem is the preparation of the design of the research project, popularly known as the "research design". Decisions regarding what, where, when, how much, by what means concerning an inquiry or a research study constitute a research design. "A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure." In fact, the research design is the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement and analysis of data. As such the design includes an outline of what the researcher will do from writing the hypothesis and its operational implications to the final analysis of data. More explicitly, the design decisions happen to be in respect of :

- (i) What is the study about?
- (ii) Why is the study being made?
- (iii) Where will the study be carried out?
- (iv) What type of data is required?
- (v) Where can the required data be found?
- (vi) What periods of time will the study include?
- (vii) What will be the sample design?
- (viii) What techniques of data collection will be used?
- (ix) How will the data be analysed?
- (x) In what style will the report be prepared?

Keeping in view the above stated design decisions, one may split the overall research design into the following parts :

- (a) the sampling design which deals with the method of selecting items to be observed for the given study;
- (b) the observational design which relates to the conditions under which the observations are to be made;

- (c) the statistical design which concerns with the question of how many items are to be observed and how the information and data gathered are to be analysed;
- (d) the operational design which deals with the techniques by which the procedures specified in the sampling, statistical and observational designs can be carried out.

From what has been stated above, we can state the important features of a research design as under :

- (i) It is a plan that specifies the sources and types of information relevant to the research problem.
- (ii) It is a strategy specifying which approach will be used for gathering and analysing the data.
- (iii) It also includes the time and cost budgets since most studies are done under these two constraints.

In brief, research design must, at least, contain : (a) a clear statement of the research problem; (b) procedures and techniques to be used for gathering information; (c) the population to be studied; and (d) methods to be used in processing and analysing data.

Need for research design

Research design is needed because it facilitates the smooth sailing of the various research operations, thereby making research as efficient as possible yielding maximal information with minimal expenditure of effort, time and money. Just as for better, economical and attractive construction of a house, we need a blueprint (or what is commonly called the map of the house) well thought out and prepared by an expert architect, similarly we need a research design or a plan in advance of data collection and analysis for our research project. Research design stands for advance planning of the methods to be adopted for collecting the relevant data and the techniques to be used in their analysis, keeping in view the objective of the research and the availability of staff, time and money. Preparation of the research design should be done with great care as any error in it may upset the entire project. Research design, in fact, has a great bearing on the reliability of the results arrived at and as such constitutes the firm foundation of the entire edifice of the research work.

Even then the need for a well thought out research design is at times not realised by many. The importance which this problem deserves is not given to it. As a result, many researches do not serve the purpose for which they are undertaken. In fact, they may even give misleading conclusions. Thoughtlessness in designing the research project may result in rendering the research exercise futile. It is, therefore, imperative that an efficient and

appropriate design must be prepared before starting research operations. The design helps the researcher to organize his ideas in a form whereby it will be possible for him to look for flaws and inadequacies. Such a design can even be given to others for their comments and critical evaluation. In the absence of such a course of action, it will be difficult for the critic to provide a comprehensive review of the proposed study.

Features of a good design

A good design is often characterised by adjectives like flexible, appropriate, efficient, economic and so on. Generally, the design which minimises bias and maximises the reliability of the data collected and analysed is considered a good design. The design which gives the smallest experimental error is supposed to be the best design in many investigations. Similarly, a design which yields maximal information and provides an opportunity for considering many different aspects of a problem is considered most appropriate and efficient design in respect of many research problems. Thus, the question of good design is related to the purpose or objective of the research problem and also with the nature of the problem to be studied. A design may be quite suitable in one case, but may be found wanting in one respect or the other in the context of some other research problem. One single design cannot serve the purpose of all types of research problems.

A research design appropriate for a particular research problem, usually involves the consideration of the following factors :

- (i) the means of obtaining information;
- (ii) the availability and skills of the researcher and his staff, if any;
- (iii) the objective of the problem to be studied;
- (iv) the nature of the problem to be studied; and
- (v) the availability of time and money for the research work.

If the research study happens to be an exploratory or a formative one, wherein the major emphasis is on discovery of ideas and insights, the research design most appropriate must be flexible enough to permit the consideration of many different aspects of a phenomenon. But when the purpose of a study is accurate description of a situation or of an association between variables (or in what are called the descriptive studies), accuracy becomes a major consideration and a research design which minimises bias and maximises the reliability of the evidence collected is considered a good design. Studies involving the testing of a hypothesis of a causal relationship between variables require a design which will permit inferences about causality in addition to the minimisation of bias and maximisation of reliability. But in practice it is the most difficult task to put a particular study in a particular group, for a given

research may have in it elements of two or more of the functions of different studies. It is only on the basis of its primary function that a study can be categorised either as an exploratory or descriptive or hypothesis-testing study and accordingly the choice of a research design may be made in case of a particular study. Besides, the availability of time, money, skills of the research staff and the means of obtaining the information must be given due weightage while working out the relevant details of the research design such as experimental design, survey design, sample design and the like.

Important concepts relating to research design

Before describing the different research designs, it will be appropriate to explain the various concepts relating to designs so that these may be better and easily understood.

1. Dependent and independent variables : A concept which can take on different quantitative values is called a variable. As such the concepts like weight, height, income are all examples of variables. Qualitative phenomena (or the attributes) are also quantified on the basis of the presence or absence of the concerning attribute(s). Phenomena which can take on quantitatively different values even in decimal points are called 'continuous variables'. But all variables are not continuous. If they can only be expressed in integer values, they are non-continuous variables or in statistical language 'discrete variables'. Age is an example of continuous variable, but the number of children is an example of non-continuous variable. If one variable depends upon or is a consequence of the other variable, it is termed as a dependent variable, and the variable that is antecedent to the dependent variable is termed as an independent variable. For instance, if we say that height depends upon age, then height is a dependent variable and age is an independent variable. Further, if in addition to being dependent upon age, height also depends upon the individual's sex, then height is a dependent variable and age and sex are independent variables. Similarly, readymade films and lectures are examples of independent variables, whereas behavioural changes, occurring as a result of the environmental manipulations, are examples of dependent variables.

2. Extraneous variable : Independent variables that are not related to the purpose of the study, but may affect the dependent variable are termed as extraneous variables. Suppose the researcher wants to test the hypothesis that there is a relationship between children's gains in social studies achievement and their self-concepts. In this case self-concept is an independent variable and social studies achievement is a dependent variable. Intelligence may as well affect the social studies achievement, but since it is not related to the purpose of the study undertaken by the researcher, it will be termed as an extraneous

variable. Whatever effect is noticed on dependent variable as a result of extraneous variable(s) is technically described as an 'experimental error'. A study must always be so designed that the effect upon the dependent variable is attributed entirely to the independent variable(s), and not to some extraneous variable or variables.

3. Control : One important characteristic of a good research design is to minimise the influence or effect of extraneous variable(s). The technical term 'control' is used when we design the study minimising the effects of extraneous independent variables. In experimental researches, the term 'control' is used to refer to restrain experimental conditions.

4. Confounded relationship : When the dependent variable is not free from the influence of extraneous variable(s), the relationship between the dependent and independent variables is said to be confounded by an extraneous variable(s).

5. Research hypothesis : When a prediction or a hypothesised relationship is to be tested by scientific methods, it is termed as research hypothesis. The research hypothesis is a predictive statement that relates an independent variable to a dependent variable. Usually a research hypothesis must contain, at least, one independent and one dependent variable. Predictive statements which are not to be objectively verified or the relationships that are assumed but not to be tested, are not termed research hypotheses.

6. Experimental and non-experimental hypothesis-testing research : When the purpose of research is to test a research hypothesis, it is termed as hypothesis-testing research. It can be of the experimental design or of the non-experimental design. Research in which the independent variable is manipulated is termed 'experimental hypothesis-testing research' and a research in which an independent variable is not manipulated is called 'non-experimental hypothesis-testing research'. For instance, suppose a researcher wants to study whether intelligence affects reading ability for a group of students and for this purpose he randomly selects 50 students and tests their intelligence and reading ability by calculating the coefficient of correlation between the two sets of scores. This is an example of non-experimental hypothesis-testing research because herein the independent variable, intelligence, is not manipulated. But now suppose that our researcher randomly selects 50 students from a group of students who are to take a course in statistics and then divides them into two groups by randomly assigning 25 to Group A, the usual studies programme, and 25 to Group B, the special studies programme. At the end of the course, he administers a test to each group in order to judge the effectiveness of the training programme on the student's performance-level. This is an example of experimental hypothesis-testing

research because in this case the independent variable, viz., the type of training programme, is manipulated.

7. Experimental and control groups : In an experimental hypothesis-testing research when a group is exposed to usual conditions, it is termed a 'control group', but when the group is exposed to some novel or special condition, it is termed an 'experimental group'. In the above illustration, the Group A can be called a control group and the Group B an experimental group. If both groups A and B are exposed to special studies programmes, then both groups would be termed 'experimental groups.' It is possible to design studies which include only experimental groups or studies which include both experimental and control groups.

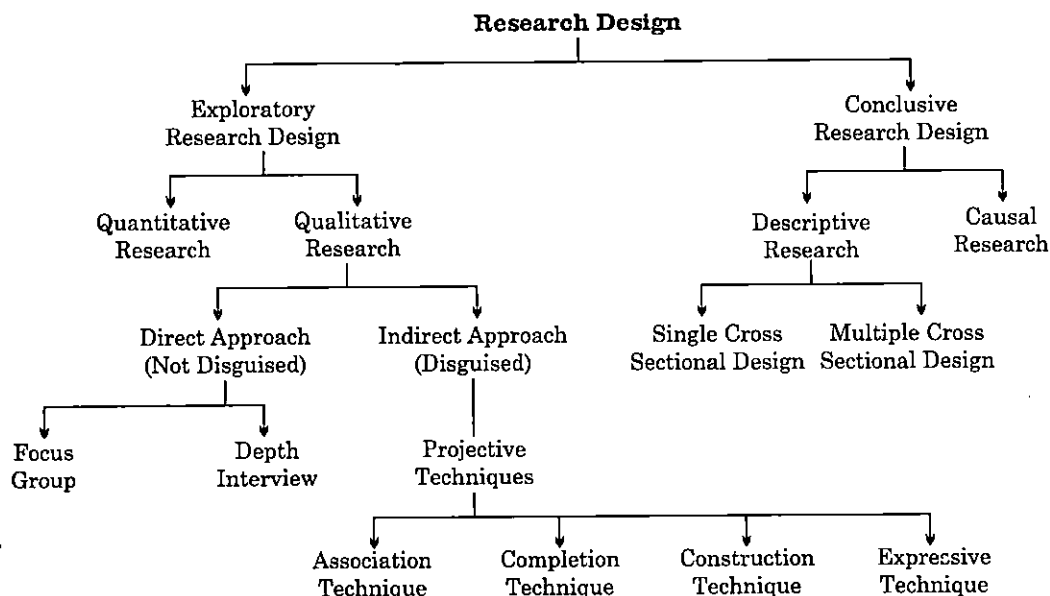
8. Treatments : The different conditions under which experimental and control groups are put are usually referred to as 'treatments'. In the illustration taken above, the two treatments are the usual studies programme and the special studies programme. Similarly, if we want to determine through an experiment the comparative impact of three varieties of fertilizers on the yield of wheat, in that case the three varieties of fertilizers will be treated as three treatments.

9. Experiment : The process of examining the truth of a statistical hypothesis, relating to some research problem, is known as an experiment. For example, we can conduct an experiment to examine the usefulness of a certain newly developed drug. Experiments can be of two types viz., absolute experiment and comparative experiment. If we want to determine the impact of a fertilizer on the yield of a crop, it is a case of absolute experiment; but if we want to determine the impact of one fertilizer as compared to the impact of some other fertilizer, our experiment then will be termed as a comparative experiment. Often, we undertake comparative experiments when we talk of designs of experiments.

10. Experimental unit(s) : The pre-determined plots or the blocks, where different treatments are used, are known as experimental units. Such experimental units must be selected (defined) very carefully.

Different research designs

There are different types of research. A detailed description of the same can be had from Fig.



Different research designs can be conveniently described if we categorize them as :

- (1) Research design in case of exploratory research studies;
- (2) Research design in case of descriptive and diagnostic research studies, and
- (3) Research design in case of hypothesis-testing research studies. We take up each category separately.

1. Research design in case of exploratory research studies :

Exploratory research studies are also termed as formative research studies. The main purpose of such studies is that of formulating a problem for more precise investigation or of developing the working hypotheses from an point of view. The major emphasis in such studies is on the discovery of ideas and insights. As such the research design appropriate for such studies must be flexible enough to provide opportunity for considering different aspects of a problem under study. Inbuilt flexibility in research design is needed because the research problem, broadly defined initially, is transformed into one with more precise meaning in exploratory studies, which fact may necessitate changes in the research procedure for gathering relevant data.

Generally, the following three methods in the context of research design for such studies are talked about :

- (a) the survey of concerning literature;
- (b) the experience survey and
- (c) the analysis of 'insight-stimulating' examples.

The survey of concerning literature happens to be the simplest and fruitful method of formulating precisely the research problem or developing hypothesis. Hypotheses stated by earlier workers may be reviewed and their

usefulness be evaluated as a basis for further research. It may also be considered whether the already stated hypotheses suggest new hypothesis. In this way the researcher should review and build upon the work already done by others, but in cases where hypotheses have not yet been formulated, his task is to review the available material for deriving the relevant hypotheses from it.

Besides, the bibliographical survey of studies, already made in one's area of interest may as well as made by the researcher for precisely formulating the problem. He should also make an attempt to apply concepts and theories developed in different research contexts to the area in which he is himself working. Sometimes the works of creative writers also provide a fertile ground for hypothesis formulation and as such may be looked into by the researcher.

Experience survey means the survey of people who have had practical experience with the problem to be studied. The object of such a survey is to obtain insight into the relationships between variables and new ideas relating to the research problem. For such a survey people who are competent and can contribute new ideas may be carefully selected as respondents to ensure a representation of different types of experience. The respondents so selected may then be interviewed by the investigator. The researcher must prepare an interview schedule for the systematic questioning of informants. But the interview must ensure flexibility in the sense that the respondents should be allowed to raise issues and questions which the investigator has not previously considered. Generally, the experience collecting interview is likely to be long and may last for few hours. Hence, it is often considered desirable to send a copy of the questions to be discussed to the respondents well in advance. This will also give an opportunity to the respondents for doing some advance thinking over the various issues involved so that, at the time of interview, they may be able to contribute effectively. Thus, an experience survey may enable the researcher to define the problem more concisely and help in the formulation of the research hypothesis. This survey may as well provide information about the practical possibilities for doing different types of research.

Analysis of 'insight-stimulating' examples is also a fruitful method for suggesting hypotheses for research. It is particularly suitable in areas where there is little experience to serve as a guide. This method consists of the intensive study of selected instances of the phenomenon in which one is interested. For this purpose, the existing records, if any, may be examined, the unstructured interviewing may take place, or some other approach may be adopted. Attitude of the investigator, the intensity of the study and the ability of the researcher to draw together diverse information into a unified interpretation are the main features which make this method an appropriate procedure for evoking insights.

Characteristics of Exploratory Stage

1. Exploratory research is flexible and very versatile.
2. For data collection structured forms are not used.
3. Experimentation is not a requirement.
4. Cost incurred to conduct study is low.
5. This type of research allows very wide exploration of views.
6. Research is interactive in nature and also it is open ended.

Hypothesis Development at Exploratory Research Stage

1. Sometimes, it may not be possible to develop any hypothesis at all, if the situation is being investigated for the first time. This is because no previous data is available.
2. Sometimes, some information may be available and it may be possible to formulate a tentative hypothesis.
3. In other cases, most of the data is available and it may be possible to provide answers to the problem. The examples given below indicate each of the above type :

Example :

	Research Purpose	Research Question	Hypothesis
1.	What product feature, if stated, will be most effective in the advertisement?	What benefit do people derive from this Ad appeal?	No hypothesis formulation is possible.
2.	What new packaging is to be developed by the company (with respect to a soft drink)?	What alternatives exist to provide a container for soft drink?	Paper cup is better than any other forms, such as a bottle.
3.	How can our insurance service be improved?	What is the nature of customer dissatisfaction?	Impersonalization is the problem.

In example 1 : The research question is posed to determine "What benefit do people seek from the Notes Ad?" Since no previous research is done on consumer benefit for this product, it is not possible to form any hypothesis.

In example 2 : Some information is currently available about packaging for a soft drink. Here it is possible to formulate a hypothesis which is purely tentative. The hypothesis formulated here may be only one of the several alternatives available.

In example 3 : The root cause of customer dissatisfaction is known, *i.e.*, lack of personalised service. In this case, it is possible to verify whether this is a cause or not.

2. Research design in case of descriptive and diagnostic research studies : Descriptive research studies are those studies which are concerned with describing the characteristics of a particular individual, or of a group, whereas diagnostic research studies determine the frequency with which something occurs or its association with something else. The studies concerning whether certain variables are associated are examples of diagnostic research studies. As against this, studies concerned with specific predictions, with narration of facts and characteristics concerning individual, group or situation are all examples of descriptive research studies. Most of the social research comes under this category.

From the point of view of the research design, the descriptive as well as diagnostic studies share common requirements and as such we may group together these two types of research studies. In descriptive as well as in diagnostic studies, the researcher must be able to define clearly, what he wants to measure and must find adequate methods for measuring it along with a clear cut definition of 'population' he wants to study. Since the aim is to obtain complete and accurate information in the said studies, the procedure to be used must be carefully planned. The research design must make enough provision for protection against bias and must maximise reliability, with due concern for the economical completion of the research study. The design in such studies must be rigid and not flexible and must focus attention on the following :

- (a) Formulating the objective of the study (what the study is about and why is it being made?)
- (b) Designing the methods of data collection (what techniques of gathering data will be adopted?)
- (c) Selecting the sample (how much material will be needed?)
- (d) Collecting the data (where can the required data be found and with what time period should the data be related?)
- (e) Processing and analysing the data.
- (f) Reporting the findings.

In a descriptive/diagnostic study the first step is to specify the objectives with sufficient precision to ensure that the data collected are relevant. If this is not done carefully, the study may not provide the desired information.

Then comes the question of selecting the methods by which the data are to be obtained. In other words, techniques for collecting the information must be devised. Several methods (*viz.*, observation, questionnaires, interviewing, examination of records, etc.), with their merits and limitations, are available for the purpose and the researcher may use one or more of these methods which have been discussed in detail in later chapters. While designing data-collection procedure, adequate safeguards against bias and unreliability

must be ensured. Whichever method is selected, questions must be well examined and be made unambiguous; interviewers must be instructed not to express their own opinion; observers must be trained so that they uniformly record a given item of behaviour. It is always desirable to pretest the data collection instruments before they are finally used for the study purposes.

In other words, we can say that "structured instruments" are used in such studies. In most of the descriptive/diagnostic studies the researcher takes out sample(s) and then wishes to make statements about the population on the basis of the sample analysis or analyses. More often than not, sample has to be designed.

To obtain data free from errors introduced by those responsible for collecting them, it is necessary to supervise closely the staff of field workers as they collect and record information. Checks may be set up to ensure that the data collecting staff perform their duty honestly and without prejudice. "As data are collected, they should be examined for completeness, comprehensibility, consistency and reliability."

The data collected must be processed and analysed. This includes steps like coding the interview replies, observations, etc.; tabulating the data; and performing several statistical computations. To the extent possible, the processing and analysing procedure should be planned in detail before actual work is started. This will prove economical in the sense that the researcher may avoid unnecessary labour such as preparing tables for which he later finds he has no use or on the other hand, re-doing some tables because he failed to include relevant data. Coding should be done carefully to avoid error in coding and for this purpose the reliability of coders needs to be checked. Similarly, the accuracy of tabulation may be checked by having a sample of the tables re-done. In case of mechanical tabulation the material (*i.e.*, the collected data or information) must be entered on appropriate cards which is usually done by punching holes corresponding to a given code. The accuracy of punching is to be checked and ensured. Finally, statistical computations are needed and as such averages, percentages and various coefficients must be worked out. Probability and sampling analysis may as well be used. The appropriate statistical operations, along with the use of appropriate tests of significance should be carried out to safeguard the drawing of conclusions concerning the study.

Last of all comes the question of reporting the findings. This is the task of communicating the findings to others and the researcher must do it in an efficient manner. The layout of the report needs to be well planned so that all things relating to the research study may be well presented in simple and effective style.

Thus, the research design in case of descriptive/diagnostic studies is a comparative design throwing light on all points narrated above and must be prepared keeping in view the objective(s) of the study and the resources available. However, it must ensure the minimisation of bias and maximisation of reliability of the evidence collected. The said design can be appropriately referred to as a survey design since it takes into account all the steps involved in a survey concerning a phenomenon to be studied. The difference between research designs in respect of the above two types of research studies can be conveniently summarised in tabular form as under :

Research Design	Types of Study	
	Exploratory of Formulative	Descriptive/ Diagnostic
Overall Design	Flexible design (design must provide opportunity for considering different aspects of the problem)	Rigid design (design must make enough provision for protection against bias and must maximise reliability)
(i) Sampling Design	Non-probability sampling design (purposive or judgement sampling)	Probability sampling design (random sampling)
(ii) Statistical Design	No pre-planned design for analysis	Pre-planned design for analysis
(iii) Observational Design	Unstructured instruments for collection of data	Structured or well thought out instruments for collection of data
(iv) Operational Design	No fixed decisions about the operational procedures	Advanced decisions about operational procedures.

Research design in case of hypothesis-testing research studies :

Hypothesis testing research studies (generally known as experimental studies) are those where the researcher tests the hypotheses of causal relationships between variables. Such studies require procedures that will not only reduce bias and increase reliability, but will permit drawing inferences about causality. Usually experiments meet this requirement. Hence, when we talk of research design in such studies, we often mean the design of experiments.

Professor R.A. Fisher's name is associated with experimental designs. Beginning of such designs was made by him when he was working at Roth Amsted Experimental Station (Centre for Agricultural Research in England). As such the study of experimental designs has its origin in agricultural research. Professor Fisher found that by dividing agricultural fields or plots into different blocks and then by conducting experiments in each of these blocks, whatever information is collected and inferences drawn from them, happens to be more reliable. This fact inspired him to develop certain experimental designs for testing hypotheses concerning scientific

investigations. Today, the experimental designs are being used in researches relating to phenomena of several disciplines. Since experimental designs originated in the context of agricultural operations, we still use, though in a technical sense, several terms of agriculture (such as treatment, yield, plot, block etc.), in experimental designs.

Experimental Designs

Experimental research is the most familiar type of research design for individuals in the physical sciences and a host of other fields. This is mainly because experimental research is a classical scientific experiment, similar to those performed in high school science classes.

Imagine taking two samples of the same plant and exposing one of them to sunlight, while the other is kept away from sunlight. Let the plant exposed to sunlight be called sample A, while the latter is called sample B.

If after the duration of the research, we find out that sample A grows and sample B dies, even though they are both regularly wetted and given the same treatment. Therefore, we can conclude that sunlight will aid growth in all similar plants.

What is Experimental Research?

Experimental research is a scientific approach to research, where one or more independent variables are manipulated and applied to one or more dependent variables to measure their effect on the latter. The effect of the independent variables on the dependent variables is usually observed and recorded over some time; to aid researchers in drawing a reasonable conclusion regarding the relationship between these two variable types.

The experimental research method is widely used in physical and social sciences, psychology, and education. It is based on the comparison between two or more groups with a straightforward logic, which may, however, be difficult to execute.

Mostly related to a laboratory test procedure, experimental research designs involve collecting quantitative data and performing statistical analysis on them during research. Therefore, making it an example of quantitative research method.

Basic principles of Experimental Designs

Professor Fisher has enumerated three principles of experimental designs : (1) the Principle of Replication; (2) the Principle of Randomization; and the (3) Principle of Local Control

According to the **Principle of Replication**, the experiment should be repeated more than once. Thus, each treatment is applied in many experimental units instead of one. By doing so the statistical accuracy of the

experiments is increased. For example, suppose we are to examine the effect of two varieties of rice. For this purpose we may divide the field into two parts and grow one variety in one part and the other variety in the other part. We can then compare the yield of the two parts and draw conclusion on that basis. But if we are to apply the principle of replication to this experiment, then we first divide the field into several parts, grow one variety in half of these parts and the other variety in the remaining parts. We can then collect the data of yield of the two varieties and draw conclusion by comparing the same. The result so obtained will be more reliable in comparison to the conclusion we draw without applying the principle of replication. The entire experiment can even be repeated several times for better results. Conceptually replication does not present any difficulty, but computationally it does. For example, if an experiment requiring a two-way analysis of variance is replicated, it will then require a three-way analysis of variance since replication itself may be a source of variation in the data. However, it should be remembered that replication is introduced in order to increase the precision of a study; that is to say, to increase the accuracy with which the main effects and interactions can be estimated.

The Principle of Randomization provides protection, when we conduct an experiment, against the effect of extraneous factors by randomization. In other words, this principle indicates that we should design or plan the experiment in such a way that the variations caused by extraneous factors can all be combined under the general heading of "chance." For instance, if we grow one variety of rice, say, in the first half of the parts of a field and the other variety is grown in the other half, then it is just possible that the soil fertility may be different in the first half in comparison to the other half. If this is so, our results would not be realistic. In such a situation, we may assign the variety of rice to be grown in different parts of the field on the basis of some random sampling technique *i.e.*, we may apply randomization principle and protect ourselves against the effects of the extraneous factors (soil fertility differences in the given case). As such, through the application of the principle of randomization, we can have a better estimate of the experimental error.

The Principle of Local Control is another important principle of experimental designs. Under it the extraneous factor, the known source of variability, is made to vary deliberately over as wide an arrangement as necessary and this needs to be done in such a way that the variability it causes can be measured and hence eliminated from the experimental error. This means that we should plan the experiment in a manner that we can perform a two-way analysis of variance, in which the total variability of the data is divided into three components attributed to treatments (varieties of rice in our case), the

extraneous factor (soil fertility in our case) and experimental error. In other words, according to the principle of local control, we first divide the field into several homogeneous parts, known as blocks, and then each such block is divided into parts equal to the number of treatments. Then the treatments are randomly assigned to these parts of a block. Dividing the field into several homogeneous parts is known as 'blocking'. In general, blocks are the levels at which we hold an extraneous factor fixed, so that we can measure its contribution to the total variability of the data by means of a two-way analysis of variance. In brief, through the principle of local control we can eliminate the variability due to extraneous factor(s) from the experimental error.

Types of Experimental Research Design

The types of experimental research design are determined by the way the researcher assigns subjects to different conditions and groups. They are of 3 types, namely; pre-experimental, quasi-experimental, and true experimental research.

Pre-experimental Research Design

In pre-experimental research design, either a group or various dependent groups are observed for the effect of the application of an independent variable which is presumed to cause change. It is the simplest form of experimental research design and is treated with no control group. Although very practical, experimental research is lacking in several areas of the true-experimental criteria.

The pre-experimental research design is further divided into three types :

One-shot Case Study Research Design

In this type of experimental study, only one dependent group or variable is considered. The study is carried out after some treatment which was presumed to cause change, making it a post-test study.

One-group Pre-test-post-test Research Design

This research design combines both post-test and pretest study by carrying out a test on a single group before the treatment is administered and after the treatment is administered. With the former being administered at the beginning of treatment and later at the end.

Static-group Comparison

In a static-group comparison study, 2 or more groups are placed under observation, where only one of the groups is subjected to some treatment while the other groups are held static. All the groups are post-tested, and the observed differences between the groups are assumed to be a result of the treatment.

Quasi-experimental Research Design

The word “quasi” means partial, half, or pseudo. Therefore, the quasi-experimental research bearing a resemblance to the true experimental research, but not the same. In quasi-experiments, the participants are not randomly assigned, and as such, they are used in settings where randomization is difficult or impossible.

This is very common in educational research, where administrators are unwilling to allow the random selection of students for experimental samples. Some examples of quasi-experimental research design include; the time series, no equivalent control group design, and the counterbalanced design.

True Experimental Research Design

The true experimental research design relies on statistical analysis to approve or disprove a hypothesis. It is the most accurate type of experimental design and may be carried out with or without a pre-test on at least 2 randomly assigned dependent subjects.

The true experimental research design must contain a control group, a variable that can be manipulated by the researcher, and the distribution must be random. The classification of true experimental design includes :

The post-test-only Control Group Design : In this design, subjects are randomly selected and assigned to the 2 groups (control and experimental), and only the experimental group is treated. After close observation, both groups are post-tested, and a conclusion is drawn from the difference between these groups.

The pre-test-post-test Control Group Design : For this control group design, subjects are randomly assigned to the 2 groups, both are presented, but only the experimental group is treated. After close observation, both groups are post-tested to measure the degree of change in each group.

Solomon four-group Design : This is the combination of the pre-test-only and the pre-test-post-test control groups. In this case, the randomly selected subjects are placed into 4 groups.

The first two of these groups are tested using the post-test-only method, while the other two are tested using the pre-test-post-test method.

Examples of Experimental Research

Experimental research examples are different, depending on the type of experimental research design that is being considered. The most basic example of experimental research is laboratory experiments, which may differ in nature depending on the subject of research.

Administering Exams after the End of Semester

During the semester, students in a class are lectured on particular courses and an exam is administered at the end of the semester. In this case, the students are the subjects or dependent variables while the lectures are the independent variables treated on the subjects.

Only one group of carefully selected subjects are considered in this research, making it a pre-experimental research design example. We will also notice that tests are only carried out at the end of the semester, and not at the beginning. Further making it easy for us to conclude that it is a one-shot case study research.

Employee Skill Evaluation

Before employing a job seeker, organizations conduct tests that are used to screen out less qualified candidates from the pool of qualified applicants. This way, organizations can determine an employee's skill set at the point of employment.

In the course of employment, organizations also carry out employee training to improve employee productivity and generally grow the organization. Further evaluation is carried out at the end of each training to test the impact of the training on employee skills, and test for improvement.

Here, the subject is the employee, while the treatment is the training conducted. This is a pre-test-post-test control group experimental research example.

Evaluation of Teaching Method

Let us consider an academic institution that wants to evaluate the teaching method of 2 teachers to determine which is best. Imagine a case whereby the students assigned to each teacher is carefully selected probably due to personal request by parents or due to stubbornness and smartness.

This is a no equivalent group design example because the samples are not equal. By evaluating the effectiveness of each teacher's teaching method this way, we may conclude after a post-test has been carried out.

However, this may be influenced by factors like the natural sweetness of a student. For example, a very smart student will grab more easily than his or her peers irrespective of the method of teaching.

Detailed study of Experimental Designs

Experimental design refers to the framework or structure of an experiment and as such there are several experimental designs. We can classify experimental designs into two broad categories, *viz.*, informal experimental designs and formal experimental designs. Informal experimental

designs are those designs that normally use a less sophisticated form of analysis based on differences in magnitudes, whereas formal experimental designs offer relatively more control and use precise statistical procedures for analysis. Important experiment designs are as follows :

(a) Informal experimental designs :

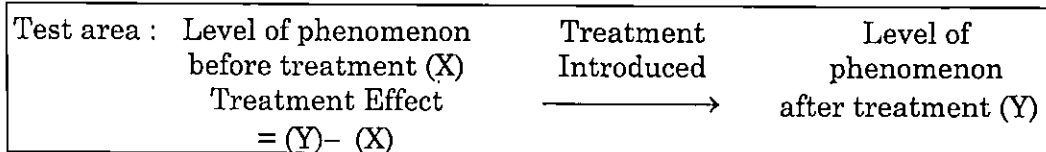
- (i) Before-and-after without control design.
- (ii) After-only with control design.
- (iii) Before-and-after with control design.

(b) Formal experimental designs :

- (i) Completely randomized design (C.R. Design).
- (ii) Randomized block design (R.B. Design).
- (iii) Latin square design (L.S. Design).
- (iv) Factorial designs.

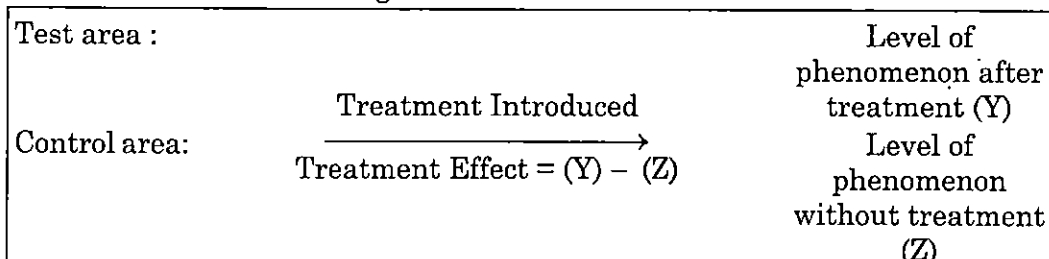
We may briefly deal with each of the above stated informal as well as formal experimental designs.

1. Before-and-after without control design : In such a design a single test group or area is selected and the dependent variable is measured before the introduction of the treatment. The treatment is then introduced and the dependent variable is measured again after the treatment has been introduced. The effect of the treatment would be equal to the level of the phenomenon after the treatment minus the level of the phenomenon before the treatment. The design can be represented thus



The main difficulty of such a design is that with the passage of time considerable extraneous variations may be there in its treatment effect.

2. After-only with control design : In this design two groups or areas (test area and control area) are selected and the treatment is introduced into the test area only. The dependent variable is then measured in both the areas at the same time. Treatment impact is assessed by subtracting the value of the dependent variable in the control area from its value in the test area. This can be exhibited in the following form :



The basic assumption in such a design is that the two areas are identical with respect to their behaviour towards the phenomenon considered. If this assumption is not true, there is the possibility of extraneous variation entering into the treatment effect. However, data can be collected in such a design without the introduction of problems with the passage of time. In this respect the design is superior to before-and-after without control design.

3. Before-and-after with control design : In this design two areas are selected and the dependent variable is measured in both the areas for an identical time-period before the treatment. The treatment is then introduced into the test area only, and the dependent variable is measured in both for an identical time-period after the introduction of the treatment. The treatment effect is determined by subtracting the change in the dependent variable in the control area from the change in the dependent variable in test area. This design can be shown in this way :

	Time Period I		Time Period II
Test area :	Level of phenomenon before treatment (X)	Treatment Introduced →	Level of phenomenon after treatment (Y)
Control area :	Level of phenomenon without treatment (A)		Level of phenomenon without treatment (Z)
Treatment Effect = $(Y - X) - (Z - A)$			

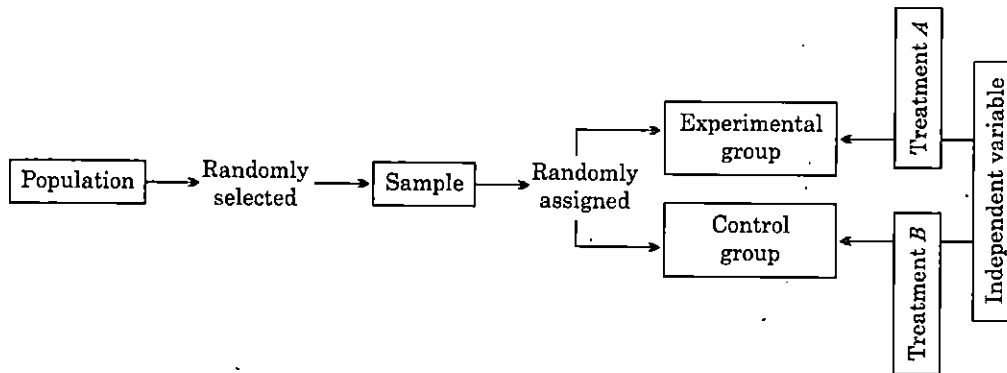
This design is superior to the above two designs for the simple reason that it avoids extraneous variation resulting both from the passage of time and from non-comparability of the test and control areas. But at times, due to lack of historical data, time or a comparable control area, we should prefer to select one of the first two informal designs stated above.

4. Completely randomized design (C.R. design) : Involves only two principles *viz.*, the principle of replication and the principle of randomization of experimental designs. It is the simplest possible design and its procedure of analysis is also easier. The essential characteristic of the design is that subjects are randomly assigned to experimental treatments (or vice-versa). For instance, if we have 10 subjects and if we wish to test 5 under treatment A and 5 under treatment B, the randomization process gives every possible group of 5 subjects selected from a set of 10 an equal opportunity of being assigned to treatment A and treatment B. One-way analysis of variance (or one-way ANOVA) is used to analyse such a design. Even unequal replications can also work in this design. It provides maximum number of degrees of freedom to the

error. Such a design is generally used when experimental areas happen to be homogeneous. Technically, when all the variations due to uncontrolled extraneous factors are included under the heading of chance variation, we refer to the design of experiment as C.R. design.

(i) Two-group simple randomized design : In a two-group simple randomized design, first of all the population is defined and then from the population a sample is selected randomly. Further, requirement of this design is that items, after being selected randomly from the population, be randomly assigned to the experimental and control groups (Such random assignment of items to two groups is technically described as principle of randomization). Thus, this design yields two groups as representatives of the population. In a diagram form this design can be shown in this way :

We can present a brief description of the two forms of such a design as given in Fig.

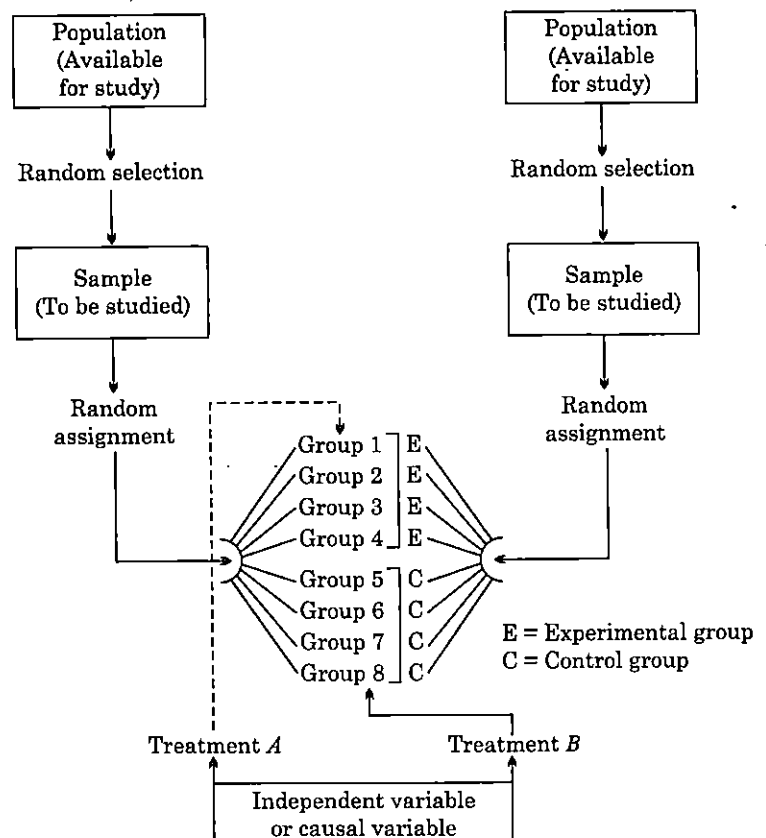


Since in the sample randomized design the elements constituting the sample are randomly drawn from the same population and randomly assigned to the experimental and control groups, it becomes possible to draw conclusions on the basis of samples applicable for the population. The two groups (experimental and control groups) of such a design are given different treatments of the independent variable. This design of experiment is quite common in research studies concerning behavioural sciences. The merit of such a design is that it is simple and randomizes the differences among the sample items. But the limitation of it is that the individual differences among those conducting the treatments are not eliminated, i.e., it does not control the extraneous variable and as such the result of the experiment may not depict a correct picture. This can be illustrated by taking an example. Suppose the researcher wants to compare two groups of students who have been randomly selected and randomly assigned. Two different treatments viz., the usual training and the specialised training are being given to the two groups. The researcher hypothesises greater gains for the group receiving specialised training. To determine this, he tests each group before and after the training, and then compares the amount of gain for the two groups to accept or reject his

hypothesis. This is an illustration of the two-groups randomized design, wherein individual differences among students are being randomized. But this does not control the differential effects of the extraneous independent variables (in this case, the individual differences among those conducting the training programme)

(ii) Random replications design : The limitation of the two-group randomized design is usually eliminated within the random replications design. In the illustration just cited above, the teacher differences on the dependent variable were ignored, i.e., the extraneous variable was not controlled. But in a random replications design, the effect of such differences are minimised (or reduced) by providing a number of repetitions for each treatment. Each repetition is technically called a 'replication'. Random replication design serves two purposes viz., it provides controls for the differential effects of the extraneous independent variables and secondly, it randomizes any individual differences among those conducting the treatments.

Diagrammatically we can illustrate the random replications design thus : From the diagram it is clear that there are two populations in the replication design. The sample is taken randomly from the population available for study and is randomly assigned to, say, four experimental and four control groups. Similarly, sample is taken randomly from the population available to conduct experiments (because of the eight groups eight such individuals be selected) and the eight individuals so selected should be



randomly assigned to the eight groups. Generally, equal number of items are put in each group so that the size of the group is not likely to affect the result of the study. Variables relating to both population characteristics are assumed to be randomly distributed among the two groups. Thus, this random replication design is, in fact, an extension of the two-group simple randomized design.

5. Randomized block design (R.B. design) is an improvement over the C.R. design. In the R.B. design the principle of local control can be applied along with the other two principles of experimental designs. In the R.B. design, subjects are first divided into groups, known as blocks, such that within each group the subjects are relatively homogeneous in respect to some selected variable. The variable selected for grouping the subjects is one that is believed to be related to the measures to be obtained in respect of the dependent variable. The number of subjects in a given block would be equal to the number of treatments and one subject in each block would be randomly assigned to each treatment. In general, blocks are the levels at which we hold the extraneous factor fixed, so that its contribution to the total variability of data can be measured. The main feature of the R.B. design is that in this each treatment appears the same number of times in each block. The R.B. design is analysed by the two-way analysis of variance (two-way ANOVA) technique. Fig. below shows the concept.

Let us illustrate the R.B. design with the help of an example. Suppose four different forms of a standardised test in statistics were given to each of five students (selected one from each of the five I.Q. blocks) and following are the scores which they obtained.

	Very Low I.Q.	Low I.Q.	Average I.Q.	High I.Q.	Very High I.Q.
	Student A	Student B	Student C	Student D	Student E
Form 1	82	67	57	71	73
Form 2	90	68	54	70	81
Form 3	86	73	51	69	84
Form 4	93	77	60	65	71

If each student separately randomized the order in which he or she took the four tests (by using random numbers or some similar device), we refer to the design of this experiment as a R.B. design. The purpose of this randomization is to take care of such possible extraneous factors (say as fatigue) or perhaps the experience gained from repeatedly taking the test.

6. Latin square design (L.S. design) is an experimental design very frequently used in agricultural research. The conditions under which agricultural investigations are carried out are different from those in other studies for nature plays an important role in agriculture. For instance, an

experiment has to be made through which the effects of five different varieties of fertilizers on the yield of a certain crop, say wheat, it to be judged. In such a case the varying fertility of the soil in different blocks in which the experiment has to be performed must be taken into consideration; otherwise the results obtained may not be very dependable because the output happens to be the effect not only of fertilizers, but it may also be the effect of fertility of soil. Similarly, there may be impact of varying seeds on the yield. To overcome such difficulties, the L.S. design is used when there are two major extraneous factors such as the varying soil fertility and varying seeds.

The Latin-square design is one wherein each fertilizer, in our example, appears five times but is used only once in each row and in each column of the design. In other words, the treatments in a L.S. design are so allocated among the plots that no treatment occurs more than once in any one row or any one column. The two blocking factors may be represented through rows and columns (one through rows and the other through columns). The following is a diagrammatic form of such a design in respect of, say, five types of fertilizers, viz., A, B, C, D and E and the two blocking factor viz., the varying soil fertility and the varying seeds

		Fertility Level				
		I	II	III	IV	V
Seeds Differences	X ₁	A	B	C	D	E
	X ₂	B	C	D	E	A
	X ₃	C	D	E	A	B
	X ₄	D	E	A	B	C
	X ₅	E	A	B	C	D

The above diagram clearly shows that in a L.S. design the field is divided into as many blocks as there are varieties of fertilizers and then each block is again divided into as many parts as there are varieties of fertilizers in such a way that each of the fertilizer variety is used in each of the block (whether column-wise or row-wise) only once. The analysis of the L.S. design is very similar to the two-way ANOVA technique. The merit of this experimental design is that it enables differences in fertility gradients in the field to be eliminated in comparison to the effects of different varieties of fertilizers on the yield of the crop. But this design suffers from one limitation, and it is that although each row and each column represents equally all fertilizer varieties, there may be considerable difference in the row and column means both up and across the field. This, in other words, means that in L.S. design we must assume that there is no interaction between treatments and blocking factors. This defect can, however, be removed by taking the means of rows and columns equal to the field mean by adjusting the results.

Another limitation of this design is that it requires number of rows, columns and treatments to be equal. This reduces the utility of this design. In case of (2×2) L.S. design, there are no degrees of freedom available for the mean square error and hence the design cannot be used. If treatments are 10 or more, than each row and each column will be larger in size so that rows and columns may not be homogeneous. This may make the application of the principle of local control ineffective. Therefore, L.S. design of orders (5×5) to (9×9) are generally used.

7. Factorial designs : Factorial designs are used in experiments where the effects of varying more than one factor are to be determined. They are especially important in several economic and social phenomena where usually a large number of factors affect a particular problem.

Factorial designs can be of two types :

- (i) simple factorial designs and
- (ii) complex factorial designs.

(i) Simple factorial designs : In case of simple factorial designs, we consider the effects of varying two factors on the dependent variable, but when an experiment is done with more than two factors, we use complex factorial designs. Simple factorial design is also termed as a 'two-factor-factorial design', whereas complex factorial design is known as 'multi factor-factorial design.' Simple factorial design may either be a 2×2 simple factorial design, or it may be, say, 3×4 or 5×3 or the like type of simple factorial design. We illustrate some simple factorial designs as under :

Illustration 1 : (2×2 simple factorial design).

A 2×2 simple factorial design can graphically be depicted as

2×2 simple factorial design

Experimental Variable		
Control Variables		
	Treatment A	Treatment B
Level I	Cell 1	Cell 3
Level II	Cell 2	Cell 4

In this design the extraneous variable to be controlled by homogeneity is called the control variable and the independent variable, which is manipulated, is called the experimental variable. Then there are two treatments of the experimental variable and two levels of the control variable. As such there are four cells into which the sample is divided. Each of the four combinations would provide one treatment or experimental condition. Subjects are assigned at random to each treatment in the same manner as in a

randomized group design. The means for different cells may be obtained alongwith the means for different rows and columns. Means of different cells represent the mean scores for the dependent variable and the column means in the given design are termed the main effect for treatments without taking into account any differential effect that is due to the level of the control variable. Similarly, the row means in the said design are termed the main effects for levels without regard to treatment. Thus, through this design we can study the main effects of treatments as well as the main effects of levels. An additional merit of this design is that one can examine the interaction between treatments and levels, through which one may say whether the treatment and levels are independent of each other or they are not so. The following examples make clear the interaction effect between treatments and levels. The data obtained in case of two (2×2) simple factorial studies may be as given in Fig.

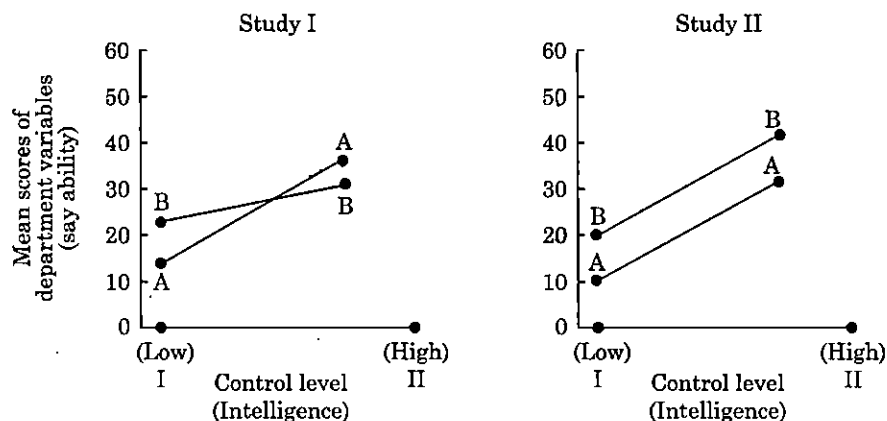
Study I Data

		Training		Row Mean
		Treatment A	Treatment B	
Control (Intelligence)	Level I (Low)	15.5	23.3	19.4
	Level II (High)	35.8	30.2	33.0
	Column Mean	25.6	26.7	

Study II Data

		Training		Row Mean
		Treatment A	Treatment B	
Control (Intelligence)	Level I (Low)	10.4	20.6	15.5
	Level II (High)	30.6	40.4	35.5
	Column Mean	20.5	30.5	

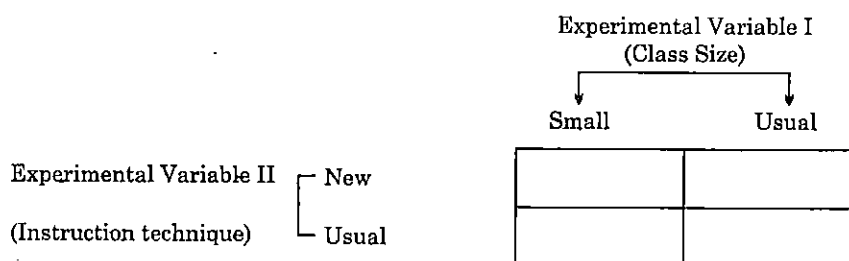
All the above figures (the study I data and the study II data) represent the respective means. Graphically, these can be represented as shown in Fig.



The graph relating to Study I indicates that there is an interaction between the treatment and the level which, in other words, means that the treatment and the level are not independent of each other. The graph relating to Study II shows that there is no interaction effect which means that treatment and level in this study are relatively independent of each other.

The 2×2 design need not be restricted in the manner as explained above i.e., having one experimental variable and one control variable, but it may also be of the type having two experimental variables or two control variables. For example, a college teacher compared the effect of the class size as well as the introduction of the new instruction technique on the learning of research methodology.

For this purpose, he conducted a study using a 2×2 simple factorial design. His design in the graphic form would be as follows :



But if the teacher uses a design for comparing males and females and the senior and junior students in the college as they relate to the knowledge of research methodology, in that case we will have a 2×2 simple factorial design wherein both the variables are control variables as no manipulation is involved in respect of both the variables.

Illustration 2 : (4×3 simple factorial design).

The 4×3 simple factorial design will usually include four treatments of the experimental variable and three levels of the control variable. Graphically it may take the following form :

4×3 Simple Factorial Design

Control Variable	Experimental Variable			
	Treatment A	Treatment B	Treatment C	Treatment D
Level I	Cell 1	Cell 4	Cell 7	Cell 10
Level II	Cell 2	Cell 5	Cell 8	Cell 11
Level III	Cell 3	Cell 6	Cell 9	Cell 12

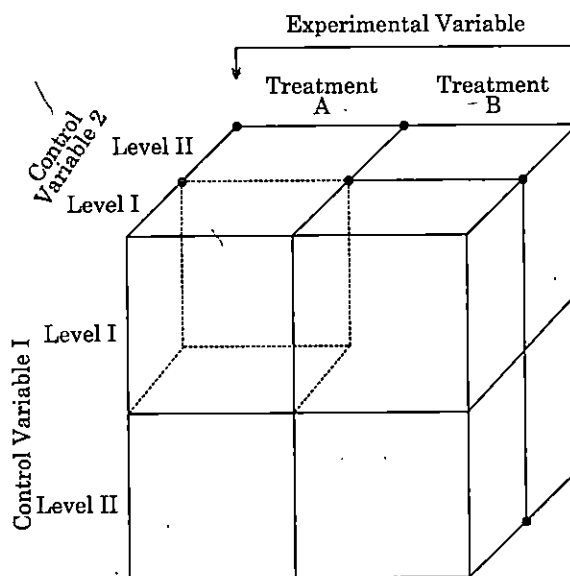
This model of a simple factorial design includes four treatments viz., A, B, C, and D of the experimental variable and three levels viz., I, II and III of the control variable and has 12 different cells as shown above. This shows that a 2×2 simple factorial design can be generalised to any number of treatments and

levels. Accordingly we can name it as such and such ($- \times -$) design. In such a design the means for the columns provide the researcher with an estimate of the main effects for treatments and the means for rows provide an estimate of the main effects for the levels. Such a design also enables the researcher to determine the interaction between treatments and levels.

(ii) **Complex factorial designs** : Experiments with more than two factors at a time involve the use of complex factorial designs. A design which considers three or more independent variables simultaneously is called a complex factorial design. In case of three factors with one experimental variable having two treatments and two control variables, each one of which having two levels, the design used will be termed $2 \times 2 \times 2$ complex factorial design which will contain a total of eight cells as shown below in Fig. a pictorial presentation is given of the design shown below.

$2 \times 2 \times 2$ Complex Factorial Design

		Experimental Variable			
		Treatment		Treatment	
		A		B	
		Control Variable 2 Level I	Control Variable 2 Level II	Control Variable 2 Level I	Control Variable 2 Level II
Control Variable 1	Level I	Cell 1	Cell 3	Cell 5	Cell 7
	Level II	Cell 2	Cell 4	Cell 6	Cell 8



The dotted line cell in the diagram corresponds to Cell 1 of the above stated $2 \times 2 \times 2$ design and is for Treatment A, level I of the control variable 1, and level I of the control variable 2. From this design it is possible to determine the main effects for three variables *i.e.*, one experimental and two control

variables. The researcher can also determine the interactions between each possible pair of variables (such interactions are called 'First Order interactions') and interaction between variable taken in triplets (such interactions are called Second Order interactions). In case of a $2 \times 2 \times 2$ design, the further given first order interactions are possible :

Experimental variable with control variable 1 (or $EV \times CV 1$);

Experimental variable with control variable 2 (or $EV \times CV 2$);

Control variable 1 with control variable 2 (or $CV1 \times CV2$);

There will be one second order interaction as well in the given design (it is between all the three variables *i.e.*, $EV \times CV1 \times CV2$).

To determine the main effects for the experimental variable, the researcher must necessarily compare the combined mean of data in cells 1, 2, 3 and 4 for Treatment A with the combined mean of data in cells 5, 6, 7 and 8 for Treatment B. In this way the main effect for experimental variable, independent of control variable 1 and variable 2, is obtained. Similarly, the main effect for control variable 1, independent of experimental variable and control variable 2, is obtained if we compare the combined mean of data in cells 1, 3, 5 and 7 with the combined mean of data in cells 2, 4, 6 and 8 of our $2 \times 2 \times 2$ factorial design. On similar lines, one can determine the main effect for the control variable 2 independent of experimental variable and control variable 1, if the combined mean of data in cells 1, 2, 5 and 6 are compared with the combined mean of data in cells 3, 4, 7 and 8. To obtain the first order interaction, say, for $EV \times CV1$ in the above stated design, the researcher must necessarily ignore control variable 2 for which purpose he may develop 2×2 design from the $2 \times 2 \times 2$ design by combining the data of the relevant cells of the latter design as shown in Fig.

		Experimental Variable	
		Treatment A	Treatment B
Control Variable 1	Level I	Cell 1, 3	Cell 5, 7
	Level II	Cell 2, 4	Cell 6, 8

Similarly, the researcher can determine other first order interactions. The analysis of the first order interaction, in the manner described above, is essentially a sample factorial analysis as only two variables are considered at a time and the remaining one is ignored. But the analysis of the second order interaction would not ignore one of the three independent variables in case of a $2 \times 2 \times 2$ design. The analysis would be termed as a complex factorial analysis.

It may, however, be remembered that the complex factorial design need not necessarily be of $2 \times 2 \times 2$ type design, but can be generalised to any number and combination of experimental and control independent variables. Of course, the greater the number of independent variables included in a complex factorial design, the higher the order of the interaction analysis possible. But the over all task goes on becoming more and more complicated with the inclusion of more and more independent variables in our design.

Factorial designs are used mainly because of the two advantages.

(i) They provide equivalent accuracy (as happens in the case of experiments with only one factor) with less labour and as such are a source of economy. Using factorial designs, we can determine the main effects of two (in simple factorial design) or more (in case of complex factorial design) factors (or variables) in one single experiment. (ii) They permit various other comparisons of interest. For example, they give information about such effects which cannot be obtained by treating one single factor at a time. The determination of interaction effects is possible in case of factorial designs.

Characteristics of Experimental Research

Variables

Experimental research contains dependent, independent and extraneous variables. The dependent variables are the variables being treated or manipulated and are sometimes called the subject of the research.

The independent variables are the experimental treatment being exerted on the dependent variables. Extraneous variables, on the other hand, are other factors affecting the experiment that may also contribute to the change.

Setting

The setting is where the experiment is carried out. Many experiments are carried out in the laboratory, where control can be exerted on the extraneous variables, thereby eliminating them.

Other experiments are carried out in a less controllable setting. The choice of setting used in research depends on the nature of the experiment being carried out.

Multi variable

Experimental research may include multiple independent variables, *e.g.*, time, skills, test scores, etc.

Uses of Experimental Research Design

Experimental research design can be majorly used in physical sciences, social sciences, education, and psychology. It is used to make predictions and draw conclusions on a subject matter.

Some uses of experimental research design are highlighted below.

Medicine

Experimental research is used to provide the proper treatment for diseases. In most cases, rather than directly using patients as the research subject, researchers take a sample of the bacteria from the patient's body and are treated with the developed antibacterial.

The changes observed during this period are recorded and evaluated to determine its effectiveness. This process can be carried out using different experimental research methods.

Education

Asides from science subjects like Chemistry and Physics which involves teaching students how to perform experimental research, it can also be used in improving the standard of an academic institution. This includes testing students' knowledge on different topics, coming up with better teaching methods, and the implementation of other programs that will aid student learning.

Human Behavior

Social scientists are the ones who mostly use experimental research to test human behaviour. For example, consider 2 people randomly chosen to be the subject of the social interaction research where one person is placed in a room without human interaction for 1 year.

The other person is placed in a room with a few other people, enjoying human interaction. There will be a difference in their behaviour at the end of the experiment.

UI/UX

During the product development phase, one of the major aims of the product team is to create a great user experience with the product. Therefore, before launching the final product design, potential are brought in to interact with the product.

For example, when finding it difficult to choose how to position a button or feature on the app interface, a random sample of product testers are allowed to test the 2 samples and how the button positioning influences the user interaction is recorded.

Disadvantages of Experimental Research

1. It is highly prone to human error due to its dependency on variable control which may not be properly implemented. These errors could eliminate the validity of the experiment and the research being conducted.

2. Exerting control of extraneous variables may create unrealistic situations. Eliminating real-life variables will result in inaccurate conclusions. This may also result in researchers controlling the variables to suit his or her personal preferences.
3. It is a time-consuming process. So much time is spent on testing dependent variables and waiting for the effect of the manipulation of dependent variables to manifest.
4. It is expensive.
5. It is very risky and may have ethical complications that cannot be ignored. This is common in medical research, where failed trials may lead to a patient's death or a deteriorating health condition.
6. Experimental research results are not descriptive.
7. Response bias can also be supplied by the subject of the conversation.
8. Human responses in experimental research can be difficult to measure.

Differences between Experimental and Non-Experimental Research

1. In experimental research, the researcher can control and manipulate the environment of the research, including the predictor variable which can be changed. On the other hand, non-experimental research cannot be controlled or manipulated by the researcher at will.
This is because it takes place in a real-life setting, where extraneous variables cannot be eliminated. Therefore, it is more difficult to conclude non-experimental studies, even though they are much more flexible and allow for a greater range of study fields.
2. The relationship between cause and effect cannot be established in non-experimental research, while it can be established in experimental research. This may be because many extraneous variables also influence the changes in the research subject, making it difficult to point at a particular variable as the cause of a particular change.
3. Independent variables are not introduced, withdrawn, or manipulated in non-experimental designs, but the same may not be said about experimental research.

Summary

Research Design Construction

The research design is a framework for planning your research and answering your research questions. Creating a research design means making decisions about :

1. The type of data you need
2. The location and timescale of the research

3. The participants and sources
4. The variables and hypotheses (if relevant)
5. The methods for collecting and analyzing data

The research design sets the parameters of your project: it determines exactly what will and will not be included. It also defines the criteria by which you will evaluate your results and draw your conclusions. The reliability and validity of your study depends on how you collect, measure, analyze, and interpret your data. A strong research design is crucial to a successful research proposal, scientific paper, or dissertation.

Table of contents

1. Consider your priorities and practicalities
2. Determine the type of data you need
3. Decide how you will collect the data
4. Decide how you will analyze the data
5. Write your research proposal

Step 1

Consider your priorities and practicalities. For most research problems, there is not just one possible research design, but a range of possibilities to choose from. The choices you make depend on your priorities in the research, and often involve some trade-offs—a research design that is strong in one area might be weaker in another.

A qualitative case study is good for gaining in-depth understanding of a specific context, but it does not allow you to generalize to a wider population.

A laboratory experiment allows you to investigate causes and effects with high internal validity, but it might not accurately represent how things work in the real world (external validity). As well as scientific considerations, you also need to think practically when designing your research.

1. How much time do you have to collect data and write up the research?
2. Will you be able to gain access to the data you need (*e.g.*, by travelling to a specific location or contacting specific people)?
3. Do you have the necessary research skills (*e.g.*, statistical analysis or interview techniques)?
4. If you realize it is not practically feasible to do the kind of research needed to answer your research questions, you will have to refine your questions further

Step 2 : Determine the type of data you need

You probably already have an idea of the type of research you need to do based on your problem statement and research questions. There are two main choices that you need to start with.

Primary vs. Secondary Data	
Primary Data	Secondary Data
You will directly collect original data (e.g., through surveys, interviews, or experiments) and then analyze it.	You will analyze data that someone else already collected (e.g., in national statistics, official records archives, publications, and previous studies).
This makes your research more original, but it requires more time and effort, and relies on participants being available and accessible.	This saves time and can expand the scope of your research, but it means you don't have control over the content or reliability of the data.
Qualitative vs. Quantitative Data	
Qualitative Data	Quantitative Data
If your objectives involve describing subjective experiences, interpreting meanings, and understanding concepts, you will need to do qualitative research.	If your objectives involve measuring variables, finding frequencies or correlations, and testing hypotheses, you will need to do quantitative research.
Qualitative research designs tend to be more flexible, allowing you to adjust your approach based on what you find throughout the research process.	Qualitative research designs tend to be more fixed, with variables and methods determined in advance of data collection.

Note that these pairs are not mutually exclusive choices : You can create a research design that combines primary and secondary data and uses mixed methods (both qualitative and quantitative).

Step 3 : Decide how you will collect the data

Once you know what kind of data you need, you need to decide how, where and when you will collect it. This means you need to determine your research methods - the specific tools, procedures, materials and techniques you will use. You also need to specify what criteria you'll use to select participants or sources, and how you will recruit or access them.

Research Methods	
Method	What do consider
Surveys	How many respondents to you need and what sampling method will you use (e.g., simple random or stratified sampling)?

Research Methods	
Method	What do consider How will you distribute the survey (e.g., in person, by post, online)? How will you design the questionnaire (e.g., open or closed questions)?
Interviews	How will you select participants? Where and when will the interviews take place? Will the interviews be structured, semi-structured or unstructured?
Experiments	Will you conduct the experiment in a laboratory setting or in the field? How will you measure and control the variables? How will you design the experiment (e.g., between-subjects, within-subjects, randomized, double-blind)?
Secondary data	Where will you get your sources from (e.g., online or a physical archive)? What criteria will you use to select sources (e.g., date range, content)?

Step 4 : Decide how you will analyze the data

To answer your research questions, you will have to analyze the data you collected. The final step in designing the research is to consider your data analysis methods.

Quantitative data analysis

To analyse numerical data, you will probably use statistical methods. These generally require applications such as Excel, SPSS or SAS. Statistical methods can be used to analyse averages, frequencies, patterns, and correlations between variables. When creating your research design, you should clearly define your variables and formulate hypotheses about the relations between them. Then you can choose appropriate statistical methods to test these hypotheses.

Qualitative data analysis

Analysing words or images is often a more flexible process that involves the researcher's subjective judgements. You might focus on identifying and categorizing key themes, interpreting patterns and narratives, or understanding social context and meaning. When creating your research design, you should consider what approach you will take to analysing the data. The main themes and categories might only emerge after you have collected the data, but you need to decide what you want to achieve in the analysis. For

example, do you simply want to describe participants' perceptions and experiences, or will you analyze the meaning of their responses in relation to a social context? Will your analysis focus only on what is said or also on how it is said?

Step 5 : Write your research proposal

The research design is an important component of your dissertation or thesis proposal. It describes exactly what you plan to do and how you plan to do it, showing your supervisor that your project is both practically feasible and capable of answering your research questions. In a proposal, the steps of your research that have yet to be completed should be written in the future tense. The research design or methodology section of your completed paper, on the other hand, describes the research steps in the past tense.

QUESTIONNAIRES

■ Multiple Choice Questions

1. Which of the following should not be a criterion for a good research project?
 - (a) Demonstrates the abilities of the researcher
 - (b) Is dependent on the completion of other projects
 - (c) Demonstrates the integration of different fields of knowledge
 - (d) Develops the skills of the researcher
2. Which form of reasoning is the process of drawing a specific conclusion from a set of premises?
 - (a) Objective reasoning
 - (b) Positivist reasoning
 - (c) Inductive reasoning
 - (d) Deductive reasoning
3. Research that seeks to examine the findings of a study by using the same design but a different sample is which of the following?
 - (a) An exploratory study
 - (b) A replication study
 - (c) An empirical study
 - (d) Hypothesis testing
4. A researcher designs an experiment to test how variables interact to influence job-seeking behaviours. The main purpose of the study was :
 - (a) Description
 - (b) Prediction
 - (c) Exploration

- (d) Explanation
5. Cyber bullying at work is a growing threat to employee job satisfaction. Researchers want to find out why people do this and how they feel about it. The primary purpose of the study is :
- (a) Description
 - (b) Prediction
 - (c) Exploration
 - (d) Explanation
6. A theory :
- (a) Is an accumulated body of knowledge
 - (b) Includes inconsequential ideas
 - (c) Is independent of research methodology
 - (d) Should be viewed uncritically
7. Which research method is a bottom-up approach to research?
- (a) Deductive method
 - (b) Explanatory method
 - (c) Inductive method
 - (d) Exploratory method
8. How much confidence should you place in a single research study?
- (a) You should trust research findings after different researchers have replicated the findings
 - (b) You should completely trust a single research study
 - (c) Neither (a) nor (b)
 - (d) Both (a) and (b)
9. A qualitative research problem statement :
- (a) Specifies the research methods to be utilized
 - (b) Specifies a research hypothesis
 - (c) Expresses a relationship between variables
 - (d) Conveys a sense of emerging design
10. Which of the following is a good research question?
- (a) To produce a report on student job searching behaviours
 - (b) To identify the relationship between self-efficacy and student job searching behaviours
 - (c) Students with higher levels of self-efficacy will demonstrate more active job searching behaviours
 - (d) Do students with high levels of self-efficacy demonstrate more active job searching behaviours?
11. A review of the literature prior to formulating research questions allows the researcher to :
- (a) Provide an up-to-date understanding of the subject, its significance, and structure
 - (b) Guide the development of research questions
 - (c) Present the kinds of research methodologies used in previous studies
 - (d) All of the above

12. Sometimes a comprehensive review of the literature prior to data collection is not recommended by :
 - (a) Ethnomethodology
 - (b) Grounded theory
 - (c) Symbolic interactionism
 - (d) Feminist theory
13. Research hypotheses are :
 - (a) Formulated prior to a review of the literature
 - (b) Statements of predicted relationships between variables
 - (c) (b) but not (a)
 - (d) Both (a) and (b)
14. In qualitative research, sampling that involves selecting diverse cases is referred to as :
 - (a) Typical-case sampling
 - (b) Critical-case sampling
 - (c) Intensity sampling
 - (d) Maximum variation sampling
15. In a qualitative research proposal you would not expect to see a
 - (a) Research question
 - (b) Research aim
 - (c) Hypothesis
 - (d) Operational definition
16. Which of the following statement is not true?
 - (a) A research proposal is a document that presents a plan for a project
 - (b) A research proposal shows that the researcher is capable of successfully conducting the proposed research project
 - (c) A research proposal is an unorganized and unplanned project
 - (d) A research proposal is just like a research report and written before the research project
17. After identifying the important variables and establishing the logical reasoning in theoretical framework, the next step in the research process is
 - (a) To conduct surveys
 - (b) To generate the hypothesis
 - (c) To focus group discussions
 - (d) To use experiments in an investigation
18. The fundamental characteristic of the scientific method is
 - (a) Theories
 - (b) Empiricism
 - (c) Replication
 - (d) Evaluating data
19. According to Goodstein's (2000) "evolved theory of science," which of the following is not a characteristic of scientific inquiry?

- (a) Scientists make observations that are accurately reported to other scientists and the public so others can replicate the methods and obtain the same results.
 - (b) Science flourishes when there is an open system for the exchange of ideas in which supporters and those who disagree with an idea can report their research and it can be evaluated by others.
 - (c) Research studies must be reviewed by peers before they become a part of the scientific literature.
 - (d) Scientists search for observations that support ideas popular to others and viewed by other scientists as publishable.
20. The main advantage of producing a written research proposal is
- (a) Informs all interested parties
 - (b) Helps with credibility
 - (c) Helps the institution
 - (d) Helps keep people employed
21. The one which will always appear in a research proposal is
- (a) Business objective
 - (b) Research objective
 - (c) Marketing objective
 - (d) Creative objective
22. Good research proposals will always
- (a) Consider all possible research that had previously been done on the topic
 - (b) Provide respondent names and addresses
 - (c) Focus on the Harvard style
 - (d) Focus on addressing the research objectives
23. The proposal's literature review is important because :
- (a) It is expected by the university
 - (b) The tutor insists upon it
 - (c) It looks authoritative
 - (d) It shows that you are knowledgeable about the literature that relates to your research topic
24. The proposal section which intended to describe the purpose with a full statement of the research question is
- (a) Literature review
 - (b) References
 - (c) Introduction
 - (d) Proposed Method
25. Which of the following statement is not true?
- (a) A research proposal is a document that presents a plan for a project
 - (b) A research proposal shows that the researcher is capable of successfully conducting the proposed research project
 - (c) A research proposal is an unorganized and unplanned project
 - (d) A research proposal is just like a research report and written before the research project

26. The statement of purpose in a research study should
 - (a) Identify the design of the study
 - (b) Identify the intent or objective of the study
 - (c) Specify the type of people to be used in the study
 - (d) Describe the study
27. The research participants are described in detail in section of the research plan.
 - (a) Introduction
 - (b) Method
 - (c) Data analysis
 - (d) Discussion
28. The Method section of the research plan typically specifies
 - (a) The research participants
 - (b) The apparatus, instruments, and materials for the research study
 - (c) The planned research procedures
 - (d) all of the above
29. The word 'Research' means :
 - (a) A lab experiment
 - (b) A report.
 - (c) A systematic enquiry
 - (d) A procedure

■ **Short Answers Type Questions**

1. Can all causal research hypotheses be studied? Why or why not?
2. For each of the situation mentioned below, state whether the research should be exploratory, descriptive or causal and why :
 - (a) To find out the relationship between promotion and sales.
 - (b) To find out the consumer reaction regarding use of new detergents which are notes economical
 - (c) To identify the target market demographics, for a shopping mall.
 - (d) Estimate the sales potential for ready-to-eat food in the northeaster parts of India.
3. In your analysis, what are the advantages and disadvantages of panel data?
4. What do you see as the reason behind Latin Square Design testing only one variable?
5. Do you see any benefit of factorial design over that of before-after design? Support your answer with reasons.
6. Is it necessary for the researcher to mention about the bibliographies and appendices? Why/why not?
7. Illustrate advantages of experience survey by the help of examples.

8. Why is an exploratory research used in the initial stages of research?
9. Which type of research would you use to generate new product ideas and why?
10. Which type of research study would you use to determine the characteristics of market?
11. Describe survey research design.
12. Explain randomized factorial block design.
13. Explain the quasi-experimental research design.
14. Explain factor analysis.
15. Differentiate between quantitative and qualitative research.
16. Describe the various research steps.
17. State the importance of tools of displaying results.
18. Give a detailed account of survey research design.
19. Explain the various types of experiments.
20. Explain the various types of research.
21. Define questionnaire and its characteristics of a standard questionnaire.
22. Explain in detail the case study method.
23. State the importance of operational definition of variables.
24. Explain internet survey and its limitations.
25. What is laboratory experiment? Give advantages and disadvantages.

■ Long Answers Type Questions

1. Explain the experimental designs with principles and functions.
2. What is the scaling? Explain psycho-physical scaling methods.
3. Write a various research steps in detail to writing the research report as per APA style.
4. Describe the types of survey research designs.
5. Explain the randomized block factorial designed with examples.
6. Describe the types of quasi-experimental designs.
7. What is factor analysis? Explain its different methods.
8. What is APA style of research writing? Explain research proposal in APA style.
9. What are experimental design and its importance? Explain types of experimental designs.
10. Explain in detail various factorial designs.
11. What is quasi-experimental design? Explain types of quasi-experimental designs.

12. Explain between group design with special reference to two groups design and randomized groups design.
13. Define qualitative research design and write in detail the qualitative analysis of data.
14. What is research design? Discuss advantages and disadvantages of factorial design.
15. Describe the basic principles and functions of experimental design.
16. What is data? Explain the different methods of data collection.
17. Write in detail the characteristics and types of quasi-experimental designs.
18. What is multi variate analysis? Explain in detail multi variate techniques.

Answers

➤ Multiple Choice Questions

- | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|
| 1. (b) | 2. (d) | 3. (b) | 4. (d) | 5. (c) | 6. (a) | 7. (c) | 8. (a) |
| 9. (d) | 10. (d) | 11. (d) | 12. (b) | 13. (c) | 14. (d) | 15. (c) | 16. (c) |
| 17. (b) | 18. (b) | 19. (d) | 20. (a) | 21. (b) | 22. (d) | 23. (c) | 24. (c) |
| 25. (c) | 26. (b) | 27. (b) | 28. (d) | 29. (c) | | | |

3

RESEARCH PROCESS**Objectives**

This chapter introduce you to the research process. This chapter will help you to explain how to formulate a research problem or research topic.

1. To prepare bibliography for background reading
2. To make a review of literature
3. To define aims and objectives
4. To develop hypothesis
5. To decide the scope and limitations of research
6. To adopt appropriate research methodology

Introduction

In the previous chapter we studied how to construct appropriate research design. This chapter will formulate the research design. The chapter will help to make background preparation of research. It will help to make bibliography for background reading and literature review. It will help to make aims and objectives and hypothesis of research study. It will also help to set the scope and limitations of research.

Formulating the Research Problem/Research Topic

Once the general topic or problem has been identified, this should then be stated as a clear research problem that is, taken from just a statement about a problematic situation to a clearly defined researchable problem that identifies the issues you are trying to address.

It is not always easy to formulate the research problem simply and clearly. In some areas of scientific research, the investigator might spend years exploring, thinking, and researching before they are clear about what research questions they are seeking to answer. Many topics may prove too wide-ranging to provide a researchable problem. Choosing to study, for instance a social issue such as child poverty, does not in itself provide a researchable problem. The problem is too wide-ranging for one researcher to address. Time and resources would make this unfeasible and the results from such a study would consequently lack depth and focus.

Statement of Research Problem

An adequate statement of the research problem is one of the most important parts of the research. Different researchers are likely to generate a variety of researchable problems from the same situation since there are many research issues that can arise out of a general problem situation.

Your research will be able to pursue only one in depth.

For a problem statement to be effective in the planning of applied research it should have the following characteristics (Andrew and Hildebrand 1982).

1. The problem reflects felt needs
2. The problem is non-hypothetical, i.e., it must be based on factual evidence
3. It should suggest meaningful and testable hypotheses - to avoid answers that are of little or no use to the alleviation of the problem
4. The problems should be relevant and manageable
5. Formulating the research problem allows you to make clear, both to yourself and the reader, what the purpose of your research is. Subsequent elaboration of method should be oriented to providing information to address that problem. The problem statement is therefore a very important device for keeping you on track with your research. It is also one means by which your research will be evaluated - does the research address the problem as stated.

What is a good research question?

It is important to start your thinking about the dissertation with a question rather than simply a topic heading. The question sets out what you hope to learn about the topic. This question, together with your approach, will guide and structure the choice of data to be collected and analysed.

Some research questions focus your attention onto the relationship of particular theories and concepts: 'how does gender relate to career choices of members of different religions?' Some research questions aim to open an area to let possible new theories emerge: 'what is going on here?' is the most basic research question in exploratory research. For an undergraduate dissertation, your question needs to be more targeted than either of these.

Creating a research question is a task. Good research questions are formed and worked on, and are rarely simply found. You start with what interests you, and you refine it until it is workable. There is no recipe for the perfect research question, but there are bad research questions. The following guidelines highlight some of the features of good questions:

1. Relevant:

2. Manageable in terms of research and in terms of your own academic abilities.
3. Substantial and with original dimensions.
4. Consistent with the requirements of the assessment.
5. Clear and simple.
6. Interesting

Relevant

The question will be of academic and intellectual interest to people in the field you have chosen to study. The question arises from issues raised in the literature or in practice.

You should be able to establish a clear purpose for your research in relation to the chosen field. For example, are you filling a gap in knowledge, analysing academic assumptions or professional practice, monitoring a development in practice, comparing different approaches or testing theories within a specific population?

Manageable

You need to be realistic about the scope and scale of the project. The question you ask must be within your ability to tackle. For example, are you able to access people, statistics, or documents from which to collect the data you need to address the question fully? Are you able to relate the concepts of your research question to the observations, phenomena, indicators or variables you can access? Can this data be accessed within the limited time and resources you have available to you?

Sometimes a research question appears feasible, but when you start your fieldwork or library study, it proves otherwise. In this situation, it is important to write up the problems honestly and to reflect on what has been learnt. It may be possible, with your supervisor, to develop a contingency plan to anticipate possible problems of access.

Substantial and (within reason) original : The question should not simply copy questions asked in other final year modules, or modules previously undertaken. It shows your own imagination and your ability to construct and develop research issues. And it needs to give sufficient scope to develop into a dissertation.

Consistent with the requirements of the assessment : The question must allow you the scope to satisfy the learning outcomes of the course.

For example, you can choose to conduct a theoretical study, one that does not contain analysis of empirical data. In this case, it will be necessary for you to think carefully before making such a choice. You would be required to give an

account of your methodology, to explain why theoretical analysis was the most appropriate way of addressing the question and how you have gone about using theoretical models to produce new insights about the subject.

Clear and simple : The complexity of a question can frequently hide unclear thoughts and lead to a confused research process. A very elaborate research question, or a question which is not differentiated into different parts, may hide concepts that are contradictory or not relevant. This needs to be clear and thought-through, but it is one of the hardest parts of your work.

Equally, you may want to begin with your literature review and data collection and you may feel tempted to 'make do' with a broad and vague research question for the moment. However, a muddled question is likely to generate muddled data and equally muddled analysis.

If you create a clear and simple research question, you may find that it becomes more complex as you think about the situation you are studying and undertake the literature review. Having one key question with several sub-components will guide your research here.

Interesting : This is essential. The question needs to intrigue you and maintain your interest throughout the project. There are two traps to avoid :

1. Some questions are convenient : The best you can come up with when you are asked to state a question on a form, maybe - or perhaps the question fits in with your units so you decide it will suffice.

2. Some questions are fads : They arise out of a particular set of personal circumstances, for example a job application. Once the circumstances change you can lose enthusiasm for the topic and it becomes very tedious.

Make sure that you have a real, grounded interest in your research question, and that you can explore this and back it up by academic and intellectual debate. It is your interest that will motivate you to keep working and to produce a good dissertation.

Moving into action

1. Make sure you note, either on computer or on index cards, anything you read that is relevant to your study. Can you map out the contemporary debates and critiques in the area? Are there any recent legal or policy changes of significance? What are the main practice issues to consider?
2. Where (*i.e.*, in what settings) does the work you are interested in take place? What access do you have to it? Will there be ethical issues? How might you be able to negotiate access? What obstacles are there? While it is early days to be specific about your data collection, it is important to know that you are on a course which will yield data, rather than a series of negative responses.

3. What sort of time scales are you going to need to do the sort of research you are planning? How much time have you got? Are your plans unrealistic?
4. Having thought about these things, try narrowing down your ideas again to the sort of research you can do.
5. Make a list of the skills and knowledge you bring to the research task. Do you like interviewing? Will you be able to have the interviews transcribed? Are you keen to do surveys? Remember that you will need to have a reasonable sample to undertake meaningful quantitative analysis.
6. Are there sources of secondary data that you could access?
7. Are there possibilities for documentary analysis?

Necessary Conditions for Formulating a Research Problem

We may now list some of the conditions that experience has proved to be conducive to formulation of significant research problems :

1. Systematic Immersion in the Subject matter through first hand observation : The researcher must immerse him/her self in the subject matter area with which he/ she wishes to pose specific problem. This exercise helps a great deal in suggesting to the researcher the specific questions that may be posed for the study to answer. This process is known as pilot survey, preliminary survey or exploratory study.

2. Study of Relevant Literature on the Subject : This would help the researcher to know if there are certain gaps in the theories (his/her research will then be to bridge this gap) or whether the prevailing theories applicable to the problem are in consistent with theoretical expectations and so on. This is also an aspect of exploration.

3. Discussions with persons having rich practical experience in the field of study : This is often known as an experience survey, which again is an exercise at exploration. These people help in sharpening the focus of attention on specific aspects within the field.

Sources of Research Problem

The research problem may be selected from the following sources :

1. theory of one's own interest
2. daily problems
3. technological changes
4. un explored areas
5. discussions with other people

A research may select a problem for investigation from a given theory in which he has considerable interest. In such situations the researcher must have thorough knowledge of that theory and should be sufficiently inquisitive to explore some unexplained aspects or assumptions of that theory.

Research problem can also be selected on the basis of daily experience of a researcher. Everyday problems constantly present something new and worthy of investigation and it depends on the worthy of investigation and it depends on the sharpness of the researcher intellect to knit his daily experiences in to a research problem.

Technological changes in a fast changing society are constantly brought forth new problems and new opportunities for research. What is the impact of a changed technology on the existing socio-economic set up, always interests the researcher and tempts him to undertake such studies as are revealing regarding the impact of new technology on the existing system.

Research problems can be both abstract and of applied interest. These may also be selected from those areas which have not been explored so far. Such area may be theoretical or empirical in nature.

Sometimes the researcher while discussing the interest with some other people may come across a problem that can be researched by the investigator. The problem may relate to any source as discussed above. In the same way reading assignments in text books, special assignments, research reports and term papers may also suggest some additional areas of needed research.

Many research articles suggest some additional areas of needed research. Many research articles suggest problem for further investigation that may prove fruitful.

Criteria of a Good Research Problem

Factors to be taken in to account in the choice of research problem are both external and personal. External criteria involve such issues as newness and significance for the area, availability of data and method and administrative and institutional cooperation personal criteria include such consideration as interest, training, cost and time. The following are move detailed list of criteria for the choice of research problem :

1. Novelty : It should be sufficiently original so that it does not involve objectionable duplication. Ignorance of prior studies may lead a student to spend time a problem already investigated. The study should also employ the most recent data. Although originality is an important consideration, there is also a constant need for verification of the findings of the previous investigations, using newer and better devices and procedures. There is also a need for the testing of former findings under changed conditions.

2. Interesting : The problem should be interesting for the investigator himself. If he is not interested in to, he will be able to face and overcome the obstacles which come at every step in research. His interest should be purely intellectual and should not be there only for a reward, material benefit, advancement in position, increased authority, etc.

3. Importance : If it is not worthwhile, if adds to neither knowledge nor lead to any improvements in the current practices, it would be in vain set up as a discipline and to previous research findings in any way.

4. Immediate Application : The investigator should ask himself question, will my research help in solving an urgent problem

Feasibility or Amenability

The suitability of the problem for a particular research worker is the matter of its feasibility. The investigator should be able to carry it to a successful conclusion. He should possess the required competence, knowledge and understanding. He should be skilful enough to develop, administer, and interpret the necessary data gathering devices and procedures etc.

Feasibility issue of research includes the following :

1. Availability of data
2. Availability of cooperation
3. Availability of guidance
4. Availability of other facilitates
5. Experience and creativity
6. Coverage and confidence

Common Errors in Formulating Research Problem

1. Naming a Broad Field
2. To choose the broad area of study instead of specific problem makes no justification.
3. Narrowing or Localizing a Topic
4. The problem should not be narrowed to such an extent that it becomes too small and insignificant from research point or view.

Preparing Bibliography for Background Reading

Overview : The Importance of Background Information

After choosing a topic, you will need to locate introductory sources that give basic background information about the subject. Finding background information at the beginning of your research is especially important if you are unfamiliar with the subject area, or not sure from what angle to approach your topic. Some of the information that a background search can provide includes :

1. Broad overview of the subject
2. Definitions of the topic
3. Introduction to key issues
4. Names of people who are authorities in the subject field
5. Major dates and events
6. Keywords and subject-specific vocabulary terms that can be used for database searches
7. Bibliographies that lead to additional resources

Encyclopedias

Encyclopedias are important sources to consider when initially researching a topic. General encyclopedias provide basic information on a wide range of subjects in an easily readable and understandable format.

If you are certain about what subject area you want to choose your topic from, you might want to use a specialized or subject encyclopedia instead. Subject encyclopedias limit their scope to one particular field of study, offering more detailed information about the subject.

General Encyclopedias provide information about nearly every topic. Using an encyclopedia is an effective way to quickly get a broad overview of a subject. Some encyclopedias will provide more in-depth information than others, however any general encyclopedia is a good source to consult for background information of your chosen subject area. Most encyclopedias provide the following :

1. Main concepts
2. Titles of important books written about topic
3. Names of authors who have written about topic
4. Keywords and subject terms related to topic
5. Lists of related articles or additional resources
6. Gale Virtual Reference Desk

Gale Virtual Reference Desk

This online encyclopedia is a vast online library giving instant access to the most authoritative and up-to-date scholarship across the arts, humanities, social sciences, and sciences. It is one of the largest academic reference collections online.

Subject-Specific Encyclopedias are important background sources for information. Unlike general encyclopedias which cover a wide range of topics, subject-specific encyclopedias focus their information in one particular subject area. Some features of subject-specific encyclopedias include :

1. Detailed articles written by experts within a field
2. • Extensive and comprehensive bibliographies of important resources
3. Wikipedia

From Wikipedia's own page, "the free encyclopedia that anyone can edit". This includes the 10-year-old down the street so reading the entry and treating it as fact is not the best thing to do. Instead use the References or Further Readings at the end of an entry to verify the information presented in the Wikipedia entry.

Periodicals

Periodicals (also known as serials) are publications printed "periodically", either daily, weekly, monthly, quarterly, or on an annual basis. Journals, magazines, and newspapers are different types of periodicals. Examples of periodicals include the following :

1. Newspapers : New York Times
2. Popular Magazines : Time or Vogue
3. Scholarly Journals/Peer-Reviewed : Journal of Advertising Research
4. Trade Publications : Consumer Marketing

Because of their up-to-date information, articles from newspapers, and popular and general interest periodical publications make great resources for choosing topics. However, scholarly or peer-reviewed journals, because they often require specialized knowledge or vocabulary, should not be used for selecting topics and instead used later in the research process when you have established a better understanding of your topic.

You may search in the following ways :

1. Keyword search example : journal and advertising
2. Title search example : American marketing journal
3. Title search example : New York times
4. Subject heading search example : advertising-periodicals

Frequently Used Databases for Newspapers

Newspapers are good sources for up-to-date as well as historical information about events and issues. Databases such as :

1. InfoTrac Newsstand
2. Factiva

are excellent sources for locating newspaper articles from leading newspapers such as the New York Times and the Wall Street Journal.

Browsing Current Print Periodical Collections

It is also a good idea to browse current print periodical collections to see what the UB Libraries own, and to stay up-to-date in your subject area.

Current periodicals in the Humanities, Social Sciences, Sciences and Engineering are located in the current periodicals area, on the third floor of Lockwood Library. The periodicals are placed in an alphabetical order by title.

Internet

Using search interfaces like Google can lead you to an ocean of good and bad information. Being critical of everything you see on the Internet is crucial when getting background information for an academic writing assignment. Professors often prohibit students from citing Internet sites on a research paper so be careful that you understand what is acceptable and unacceptable to quote. However, there are places on the Internet that will give you references that you may want to track down through your library.

Wikipedia

(<http://www.wikipedia.org/>)

From Wikipedia's own page, "the free encyclopedia that anyone can edit". This includes the 10-year-old kid down the street so reading the entry and treating it as fact is not the best thing to do. Instead use the References or Further Readings at the end of an entry to verify the information presented in the Wikipedia entry.

Google Books

(<http://books.google.com/>)

Enter your search terms in Google books and digitized holdings of some of the world's greatest academic libraries will appear. Google collaborated with some of the finest research libraries in the world to digitize items found in the "public domain". They also provide access to chapters within contemporary books. This might give you just enough background information to get your paper started without coming in to the library to borrow a book.

Google Scholar

(<http://scholar.google.com/>)

Here you are finding scholarly research, but from a limited number of journals. Once you put in your search terms you can get a good overview of a topic by limiting to time period on the left. Tip : Select "Settings" from the main page then "Library Links" (on the left). Once there enter University at Buffalo and select the university. This then allows you to find the article through your library by clicking the "Find it @ UB" link.

Searching for sources

1. Identify important concepts in your topic.
2. Once you have articulated your topic, try to pick out important concepts or keywords which you can use when you search for articles.

e.g., How will global warming affect developing countries?

3. Identify the subject area.
4. For the global warming and developing countries topic there are a couple subject areas to consider when trying to choose a database or index. The issue of global warming could be described as environmental or scientific. The fact that the issue of developing countries is also a factor means that the subject area also involves international issues.
5. Consider how recent or historical your search is.
6. Since global warming is a recent concern, finding the most current articles would be useful.
7. Choose the appropriate article database or index.
8. Look at the Online Journals and Databases and match the subject areas of your topic with the subject areas of the different article databases that are available for you to search.

e.g., For the Global Warming topic, you can look at the Life Sciences & Medicine database subject area and see that there is an Environmental Sciences and Pollution Management database that deals with environmental issues. By looking at the Social Sciences, Business, & Education database subject area, you can also see that the PAIS Archive (Public Affairs Information Service) database might have articles dealing with developing countries. Searching both of these databases for articles relating to your topic would be a good place to start your research.

9. Run the search.
10. Think about the important concepts and subject area of your topic. Choose keywords that you can use to search the databases.

e.g., In the topic "How will global warming affect developing countries?" the important concepts are global warming and developing countries. One way to make sure that your search for articles is effective is to think of synonyms or additional words to describe your topic.

Global warming : greenhouse effect, climate change

Developing countries : developing nations, underdeveloped countries, third world

Most article databases allow you to build your searches by combining similar concepts with the word OR. This will result in a broader search.

e.g., global warming OR greenhouse effect OR climate change will find any article that has any of the three concepts in it. You can combine dissimilar concepts to create a focused search.

e.g., The search "global warming AND developing countries" will find any article that has both concepts in it. For example, the search "(global warming OR greenhouse effect) AND developing countries" will find any article that has either global warming or greenhouse effect as terms and the term developing countries.

Evaluate your results

1. Look at the number of article citations you were able to retrieve. If you retrieved more articles than you expected and they don't seem to be relevant to your topic, you may need to add another concept or keyword to your search statement in order to narrow your search. If you retrieved fewer articles than you expected, perhaps your search statement was too narrow. You might want to take some keywords out of your search statement to create a broader search which will retrieve more articles.
2. Look at the abstract or subject headings of the article citations you have retrieved to determine if they are relevant to your research.
3. If you want more information about how to search article databases, workshops are offered every semester.

Review of Literature

The literature review provides you, the student, with the foundation you need to intensively explore a topic. It is an overview and evaluation of the writings in a specific area of interest. You will find literature reviews in many types of writing - annual reviews by commercial publishers, scholarly journal articles, and theses and dissertations to name a few. The ultimate purpose of the literature review is to bring together and analyze significant writings on a topic. For the student in the process of writing a thesis or dissertation, the purpose of the literature review is to show your intellectual grasp of a topic by sharing the knowledge that exists in your area of interest and evaluating this knowledge. It will help you identify important theorists, research groups and writing in your area of interest as well as the vocabulary, methods, history, and key variables used in the field of study.

The Literature Review

One of the most important early steps in a research project is the conducting of the literature review. A literature review is designed to identify related research, to set the current research project within a conceptual and

theoretical context. When looked at that way, there is almost no topic that is so new or unique that we can't locate relevant and informative related research.

Some tips about conducting the literature review. First, concentrate your efforts on the scientific literature. Try to determine what the most credible research journals are in your topical area and start with those. Put the greatest emphasis on research journals that use a blind review system. In a blind review, authors submit potential articles to a journal editor who solicits several reviewers who agree to give a critical review of the paper. The paper is sent to these reviewers with no identification of the author so that there will be no personal bias (either for or against the author). Based on the reviewers' recommendations, the editor can accept the article, reject it, or recommend that the author revise and resubmit it. Articles in journals with blind review processes can be expected to have a fairly high level of credibility. Second, do the review early in the research process. You are likely to learn a lot in the literature review that will help you in making the tradeoffs you'll need to face. After all, previous researchers also had to face trade-off decisions.

What should you look for in the literature review? First, you might be able to find a study that is quite similar to the one you are thinking of doing. Since all credible research studies have to review the literature themselves, you can check their literature review to get a quick-start on your own. Second, prior research will help assure that you include all of the major relevant constructs in your study. You may find that other similar studies routinely look at an outcome that you might not have included. If you did your study without that construct, it would not be judged credible if it ignored a major construct. Third, the literature review will help you to find and select appropriate measurement instruments. You will readily see what measurement instruments researchers use themselves in contexts similar to yours. Finally, the literature review will help you to anticipate common problems in your research context. You can use the prior experiences of others to avoid common traps and pitfalls.

As part of the planning process you should have done a literature review, which is a survey of important articles, books and other sources pertaining to your research topic. Now, for the second main section of your research report you need to write a summary of the main studies and research related to your topic. This review of the professional literature relevant to your research question will help to contextualize, or frame, your research. It will also give readers the necessary background to understand your research.

Evaluating other studies : In a review of the literature, you do not merely summarize the research findings that others have reported. You must also evaluate and comment on each study's worth and validity. You may find that some published research is not valid. If it also runs counter to your

hypothesis, you may want to critique it in your review. Don't just ignore it. Tell how your research will be better/overcome the flaws. Doing this can strengthen the rationale for conducting your research.

Selecting the studies to include in the review : You do not need to report on every published study in the area of your research topic. Choose those studies which are most relevant and most important.

Organizing the review: After you have decided which studies to review, you must decide how to order them. In making your selection, keep your research question in mind. It should be your most important guide in determining what other studies are relevant. Many people simply create a list of one-paragraph summaries in chronological order. This is not always the most effective way to organize your review. You should consider other ways, such as :

1. By topic
2. Problem → solution
3. Cause → effect

Another approach is to organize your review by argument and counter argument. For example : You may write about those studies that disagree with your hypothesis, and then discuss those that agree with it. Yet another way to organize the studies in your review is to group them according to a particular variable, such as age level of the subjects (child studies, adult studies, etc.) or research method (case studies, experiments, etc.).

The end of the review : The purpose of your review of the literature was to set the stage for your own research. Therefore, you should conclude the review with a statement of your hypothesis, or focused research question. When this is done, you are ready to proceed with part three of your research report, in which you explain the methods you used.

The Literature Review as a Process

The first step in the process of reviewing the literature is to identify a useful set of materials to explore: Where should you begin? There are two ways to approach the identification of appropriate materials.

You can use the "citation pearl searching" approach. In this process, you begin with an article of particular interest in the topic you are exploring. This could be a reading from a class, a mention in a textbook or something you have found searching the library catalog or databases. Look at the references found in that work and begin to build a body of literature that is relevant for your topic. Using citation tracking tools like the Web of Science or Scopus you should be able to amass a number of writings related to the original work including articles cited by the original author and articles that cite the original

author. Once you have digested these articles, go back to the databases and catalogs and see if you can find more material by searching the names of the authors you have collected, or search using the vocabulary you have developed.

The second way to approach your information gathering phase is the standard hierarchical search. Here you might begin with an essay in an encyclopedia and explore the references found at the end of the essay. Again, taking the terms and authors you find there explore your topic using a variety of catalogs and databases. There are literally hundreds of resources you can use to explore your topic including journal articles, books, government documents, statistical databases, newspapers, archives, and more. There are also handbooks, dictionaries, and annual reviews that will provide you with additional sources for your work whichever method you choose for your search.

Conducting a Literature Review

Evaluating the credibility of sources is one of the most difficult aspects, especially with the ease of finding information on the internet.

The only real way to evaluate is through experience, but there are a few tricks for evaluating information quickly, yet accurately.

There is such a thing as 'too much information,' and Google does not distinguish or judge the quality of results, only how search engine friendly a paper is. This is why it is still good practice to begin research in an academic library. Any journals found there can be regarded as safe and credible.

The next stage is to use the internet, and this is where the difficulties start. It is very difficult to judge the credibility of an online paper. The main thing is to structure the internet research as if it were on paper. Bookmark papers, which may be relevant, in one folder and make another subfolder for a 'shortlist.'

The easiest way is to scan the work, using the abstract and introduction as guides. This helps to eliminate the non-relevant work and also some of the lower quality research.

If it sets off alarm bells, there may be something wrong, and the paper is probably of a low quality. Be very careful not to fall into the trap of rejecting research just because it conflicts with your hypothesis. Failure to do this will completely invalidate the literature review and potentially undermine the research project. Any research that may be relevant should be moved to the shortlist folder.

The next stage is to critically evaluate the paper and decide if the research is sufficient quality. Think about it this way: The temptation is to try to include as many sources as possible, because it is easy to fall into the trap of thinking

that a long bibliography equates to a good paper. A smaller number of quality sources is far preferable than a long list of irrelevance.

Check into the credentials of any source upon which you rely heavily for the literature review. The reputation of the University or organization is a factor, as is the experience of the researcher. If their name keeps cropping up, and they have written many papers, the source is usually OK.

Look for agreements. Good research should have been replicated by other independent researchers, with similar results, showing that the information is usually fairly safe to use.

If the process is proving to be difficult, and in some fields, like medicine and environmental research, there is a lot of poor science, do not be afraid to ask a supervisor for a few tips. They should know some good and reputable sources to look at. It may be a little extra work for them, but there will be even more work if they have to tear apart a review because it is built upon shaky evidence.

Conducting a good literature review is a matter of experience, and even the best scientists have fallen into the trap of using poor evidence. This is not a problem, and is part of the scientific process; if a research program is well constructed, it will not affect the results.

Defining Aims and Objectives

Aims and Objectives

It is often useful to consider your research questions in terms of aim(s) and objectives.

The aim of the work, *i.e.*, the overall purpose of the study, should be clearly and concisely defined.

Aims :

1. Are broad statements of desired outcomes, or the general intentions of the research, which 'paint a picture' of your research project
2. Emphasize what is to be accomplished (not how it is to be accomplished)
3. Address the long-term project outcomes, *i.e.*, they should reflect the aspirations and expectations of the research topic.

Once aims have been established, the next task is to formulate the objectives. Generally, a project should have no more than two or three aims statements, while it may include a number of objectives consistent with them.

Objectives are subsidiary to aims :

1. Are the steps you are going to take to answer your research questions or a specific list of tasks needed to accomplish the goals of the project
2. Emphasize how aims are to be accomplished

3. Must be highly focused and feasible
4. Address the more immediate project outcomes
5. Make accurate use of concepts
6. Must be sensible and precisely described
7. Should read as an 'individual' statement to convey your intentions

Here is an example of a project aim and subsidiary objectives :

Aim : To critically assess the collection and disposal operations for bulky household waste in order to identify factors, which contribute to performance and technical efficiency.

Objectives :

1. To critically assess bulky waste operations by local authorities, including volumes/ types of materials arising and current disposal/recovery routes.
2. To classify and evaluate the operation of furniture recovery schemes nationally.
3. To make recommendations to improve the operational effectiveness of, and to maximise recovery opportunities of bulky waste collection.

Aims and Objectives should :

1. Be concise and brief.
2. Be interrelated; the aim is what you want to achieve, and the objective describes how you are going to achieve that aim.
3. Be realistic about what you can accomplish in the duration of the project and the other commitments you have.
4. Provide you and your supervisor(s) with indicators of how you intend to.
5. Approach the literature and theoretical issues related to your project.
6. Access your chosen subjects, respondents, units, goods or services.
7. Develop a sampling frame and strategy or a rationale for their selection.
8. Develop a strategy and design for data collection and analysis.
9. Deal with ethical and practical problems in your research.

Aims and Objectives should not :

1. Be too vague, ambitious or broad in scope.
2. Just repeat each other in different terms.
3. Just be a list of things related to your research topic.
4. Contradict your methods *i.e.*, they should not imply methodological goals or standards of measurement, proof or generalis ability of findings that the methods cannot sustain.

At the conclusion of your project you will need to assess whether or not you have met your objectives and if not, why not. However, you may not always meet your aims in full, since your research may reveal that your questions were inappropriate, that there are intervening variables you could not account for or that the circumstances of the study have changed, etc. Whatever the case, your conclusion will still have to reflect on how well the research design, which was guided by your objectives has contributed to addressing your aims.

What is the difference between an aim and an objective in an academic context?

Aim :

1. An intention or aspiration; what you hope to achieve
2. Aims are statements of intent, written in broad terms.
3. Aims set out what you hope to achieve at the end of the project.

Objectives :

1. A goal or a step on the way to meeting the aim; how you will achieve it.
2. Objectives use specific statements which define measurable outcomes.

For example : what steps will you take to achieve the desired outcome?

Objectives should be S.M.A.R.T. :

Specific : be precise about what you are going to do

Measureable : you will know when you have reached your goal

Achievable : Don't attempt too much. A less ambitious but completed objective is better than an over-ambitious one that you cannot possibly achieve.

Realistic : do you have the necessary resources to achieve the objective?
For example: time, money, skills, etc.

Time constrained : determine when each stage needs to be completed. Is there time in your schedule to allow for unexpected delays?

Remember : Use strong positive statements which use strong verbs. Avoid weaker verbs.

Strong verbs : collect, construct, classify, develop, devise, measure, produce, revise, select, synthesize.

Weak verbs : appreciate, consider, enquire, learn, know, understand, be aware of, appreciate, listen, perceive.

How many aims or objectives should there be?

1. There are no fixed number of aims or objectives.
2. Some tutors are happy with one clear strong aim, whilst others like to see a main aim supported by at least two subsidiary aims.

3. You will be required to produce sufficient objectives to be able to measure progress towards meeting the aim/s.

Remember : Aims describe what you want to achieve. Objectives describe how you are going to achieve those aims. *e.g.*,

Aim : To investigate the relationship between tectonic-plate movement and the gravitational effect of the alignment of the major planets.

Objectives :

1. Data sets will be extracted from the known historical record of tectonic-plate movement.
2. Data sets will be extracted from astronomical tables detailing the various alignments of the major planets covering the same period as data from the geological record.
3. The data from both sets will be synthesized to establish if correlation points exist between major geological events and planetary alignments.

How many aims or objectives should there be?

There is no fixed number of objectives but you will be required to produce sufficient objectives to be able to measure progress towards meeting the aim/s.

To review : Aims describe what you want to achieve, and objectives describe how you are going to achieve those aims.

Developing Hypothesis

Hypothesis

The derivation of a suitable hypothesis goes hand in hand with the selection of a research problem. Hypothesis is a statement temporarily accepted as true in the light of what is, at the time, known about the phenomenon, and it is employed as a basis for action in the search of new truth. A hypothesis is a tentative assumption drawn from knowledge and theory which is used as a guide in the investigation of other facts and theories that are yet unknown. It is a guide, supposition or tentative inference as to the existence of some fact condition or relationship relative to some phenomenon which serves to explain such facts as ready are known to exist in a given area of research and to guide the search for new truth. A hypothesis is a tentative supposition or provisional guess which seems to explain the situation under observation. A hypothesis states what we are looking for. A hypothesis looks forward. It is a proposition which can be put to a test to determine its validity.

Importance of Hypothesis

1. It provides direction to research. It defines what is relevant and what is irrelevant. Thus it prevents the review of irrelevant literature and the collection of useless or excess data.

2. It sensitizes the investigator to certain aspects of situations which are relevant from the stand point of the problem in hand. It spells the difference between precision and haphazardness, between fruitful and fruitless research.
3. It is a guide to thinking process and the process of discovery. It is the investigators eye a sort of guiding light in the world of darkness.
4. It focuses research without it research would be like a random and aimless wandering.
5. It places clear and specific goals before us. These clear and specific goals provide the investigator with a basis for selecting samples and research procedures to meet these goals.

Characteristics of a Usable Hypothesis

The criteria for judging the usability of the hypothesis are none else than those that help the hypothesis perform their designated functions vis-a-vis research and the growth of knowledge. Hence, a good useable hypothesis is the one which satisfies many of the following criteria :

1. A hypothesis should be empirically testable.
2. A good hypothesis in agreement with the observed facts.
3. A good hypothesis does not conflict with any law of nature which is known to be true.
4. A good hypothesis is expert.
5. It should be so designed that its test will provide an answer to original problems which forms primary purpose of the investigation.
6. It must be stated in final form early in the experiment before any attempt at verification is made.
7. The hypothesis must be conceptually clear.
8. The hypothesis must be specific

Advisedly, the hypothesis should be related to a body of theory or some theoretical orientation.

Difficulties in the Formulation of Hypothesis

1. Lack of knowledge and clarity of the theoretical frame work of the area in which the investigator chooses to work.
2. Lack of ability to make use of the theoretical frame work logically.
3. Lack of acquaintance with available research techniques. This result in failure of phrasing the hypothesis properly.
4. Vagueness of the statement

5. Often, one of the trickiest parts of designing and writing up any research paper is how to write a hypothesis.
6. The entire experiment and research revolves around the research hypothesis (H_1) and the null hypothesis (H_0), so making a mistake here could ruin the whole design.
7. Needless to say, it can all be a little intimidating, and many students find this to be the most difficult stage of the scientific method.
8. In fact, it is not as difficult as it looks, and if you have followed the steps of the scientific process and found an area of research and potential research problem, then you may already have a few ideas.
9. It is just about making sure that you are asking the right questions and wording your hypothesis statements correctly.

The Three-Step Process

Often, it is still quite difficult to isolate a testable hypothesis after all of the research and study. The best way is to adopt a three-step hypothesis; this will help you to narrow things down, and is the most fool proof guide to how to write a hypothesis.

Step one is to think of a general hypothesis, including everything that you have observed and reviewed during the information gathering stage of any research design. This stage is often called developing the research problem.

How to Write a Hypothesis?

A worker on a fish-farm notices that his trout seem to have more fish lice in the summer, when the water levels are low, and wants to find out why. His research leads him to believe that the amount of oxygen is the reason - fish that are oxygen stressed tend to be more susceptible to disease and parasites.

He proposes a general hypothesis.

"Water levels affect the amount of lice suffered by rainbow trout."

This is a good general hypothesis, but it gives no guide to how to design the research or experiment. The hypothesis must be refined to give a little direction.

"Rainbow trout suffer more lice when water levels are low."

Now there is some directionality, but the hypothesis is not really testable, so the final stage is to design an experiment around which research can be designed, a testable hypothesis.

"Rainbow trout suffer more lice in low water conditions because there is less oxygen in the water."

This is a testable hypothesis - he has established variables, and by measuring the amount of oxygen in the water, eliminating other controlled variables, such as temperature, he can see if there is a correlation against the number of lice on the fish.

This is an example of how a gradual focusing of research helps to define how to write a hypothesis.

What to Do with the Hypothesis?

Once you have your hypothesis, the next stage is to design the experiment, allowing a statistical analysis of data, and allowing you to test your hypothesis.

The statistical analysis will allow you to reject either the null or the alternative hypothesis. If the alternative is rejected, then you need to go back and refine the initial hypothesis or design a completely new research program.

This is part of the scientific process, striving for greater accuracy and developing ever more refined hypotheses.

Deciding the Scope and Limitations

The limitations of the study are those characteristics of design or methodology that impacted or influenced the interpretation of the findings from your research. They are the constraints on generalizability, applications to practice, and/or utility of findings that are the result of the ways in which you initially chose to design the study and/or the method used to establish internal and external validity.

Importance of Scope and Limitations

Always acknowledge a study's limitations. It is far better for you to identify and acknowledge your study's limitations than to have them pointed out by your professor and be graded down because you appear to have ignored them.

Keep in mind that acknowledgement of a study's limitations is an opportunity to make suggestions for further research. If you do connect your study's limitations to suggestions for further research, be sure to explain the ways in which these unanswered questions may become more focused because of your study.

Acknowledgement of a study's limitations also provides you with an opportunity to demonstrate that you have thought critically about the research problem, understood the relevant literature published about it, and correctly assessed the methods chosen for studying the problem. A key objective of the research process is not only discovering new knowledge but to also confront assumptions and explore what we don't know.

Claiming limitations is a subjective process because you must evaluate the impact of those limitations. Don't just list key weaknesses and the magnitude of a study's limitations. To do so diminishes the validity of your research because it leaves the reader wondering whether, or in what ways, limitation(s) in your study may have impacted the results and conclusions. Limitations require a critical, overall appraisal and interpretation of their impact. You should answer the question: do these problems with errors, methods, validity, etc., eventually matter and, if so, to what extent?

Descriptions of Possible Limitations

All studies have limitations. However, it is important that you restrict your discussion to limitations related to the research problem under investigation. For example, if a meta-analysis of existing literature is not a stated purpose of your research, it should not be discussed as a limitation. Do not apologize for not addressing issues that you did not promise to investigate in the introduction of your paper.

Here are examples of limitations related to methodology and the research process you may need to describe and to discuss how they possibly impacted your results. Descriptions of limitations should be stated in the past tense because they were discovered after you completed your research.

Possible Methodological Limitations

Sample size : The number of the units of analysis you use in your study is dictated by the type of research problem you are investigating. Note that, if your sample size is too small, it will be difficult to find significant relationships from the data, as statistical tests normally require a larger sample size to ensure a representative distribution of the population and to be considered representative of groups of people to whom results will be generalized or transferred. Note that sample size is less relevant in qualitative research.

Lack of available and/or reliable data : A lack of data or of reliable data will likely require you to limit the scope of your analysis, the size of your sample, or it can be a significant obstacle in finding a trend and a meaningful relationship. You need to not only describe these limitations but to offer reasons why you believe data is missing or is unreliable. However, don't just throw up your hands in frustration; use this as an opportunity to describe the need for future research.

Lack of prior research studies on the topic : Citing prior research studies forms the basis of your literature review and helps lay a foundation for understanding the research problem you are investigating. Depending on the currency or scope of your research topic, there may be little, if any, prior research on your topic. Before assuming this to be true, consult with a

librarian. In cases when a librarian has confirmed that there is a lack of prior research, you may be required to develop an entirely new research typology [for example, using an exploratory rather than an explanatory research design]. Note again that this limitation can serve as an important opportunity to describe the need for further research.

Measure used to collect the data : Sometimes it is the case that, after completing your interpretation of the findings, you discover that the way in which you gathered data inhibited your ability to conduct a thorough analysis of the results. For example, you regret not including a specific question in a survey that, in retrospect, could have helped address a particular issue that emerged later in the study. Acknowledge the deficiency by stating a need for future researchers to revise the specific method for gathering data.

Self-reported data : Whether you are relying on pre-existing data or you are conducting a qualitative research study and gathering the data yourself, self-reported data is limited by the fact that it rarely can be independently verified. In other words, you have to take what people say, whether in interviews, focus groups, or on questionnaires, at face value. However, self-reported data can contain several potential sources of bias that you should be alert to and note as limitations. These biases become apparent if they are incongruent with data from other sources. These are :

- (1) Selective memory [remembering or not remembering experiences or events that occurred at some point in the past];
- (2) Telescoping [recalling events that occurred at one time as if they occurred at another time];
- (3) Attribution [the act of attributing positive events and outcomes to one's own agency but attributing negative events and outcomes to external forces]; and,
- (4) Exaggeration [the act of representing outcomes or embellishing events as more significant than is actually suggested from other data].

Possible Limitations of the Researcher

Access : If your study depends on having access to people, organizations, or documents and, for whatever reason, access is denied or limited in some way, the reasons for this need to be described.

Longitudinal effects : The time available to investigate a research problem and to measure change or stability over time is pretty much constrained by the due date of your assignment. Be sure to choose a problem that does not require an excessive amount of time to complete the literature review, apply the methodology, and gather and interpret the results. If you're

unsure whether you can complete your research within the confines of the assignment's due date, talk to your professor.

Cultural and other type of bias : We all have biases; whether we are conscience of them or not. Bias is when a person, place, or thing is viewed or shown in a consistently inaccurate way. Bias is usually negative, though one can have a positive bias as well, especially if that bias reflects your reliance on research that only support for your hypothesis. When proof-reading your paper, be especially critical in reviewing how you have stated a problem, selected the data to be studied, what may have been omitted, the manner in which you have ordered events, people, or places, how you have chosen to represent a person, place, or thing, to name a phenomenon, or to use possible words with a positive or negative connotation.

Note : If you detect bias in prior research, it must be acknowledged and you should explain what measures were taken to avoid perpetuating that bias.

Fluency in a language : If your research focuses on measuring the perceived value of after-school tutoring among Mexican-American ESL [English as a Second Language] students, for example, and you are not fluent in Spanish, you are limited in being able to read and interpret Spanish language research studies on the topic. This deficiency should be acknowledged.

Structure and Writing Style

Information about the limitations of your study are generally placed either at the beginning of the discussion section of your paper so the reader knows and understands the limitations before reading the rest of your analysis of the findings, or, the limitations are outlined at the conclusion of the discussion section as an acknowledgement of the need for further study. Statements about a study's limitations should not be buried in the body [middle] of the discussion section unless a limitation is specific to something covered in that part of the paper. If this is the case, though, the limitation should be reiterated at the conclusion of the section.

If you determine that your study is seriously flawed due to important limitations, such as, an inability to acquire critical data, consider reframing it as a pilot study intended to lay the groundwork for a more complete research study in the future. Be sure, though, to specifically explain the ways that these flaws can be successfully overcome in a new study.

But, do not use this as an excuse for not developing a thorough research paper. Review the tab in this guide for developing a research topic. If serious limitations exist, it generally indicates a likelihood that your research problem is too narrowly defined or that the issue or event under study is too recent and,

thus, very little research has been written about it. If serious limitations do emerge, consult with your professor about possible ways to overcome them or how to reframe your study.

When discussing the limitations of your research, be sure to :

1. Describe each limitation in detailed but concise terms;
2. Explain why each limitation exists;
3. Provide the reasons why each limitation could not be overcome using the method(s) chosen to acquire or gather the data [cite to other studies that had similar problems when possible];
4. Assess the impact of each limitation in relation to the overall findings and conclusions of your study; and,
5. If appropriate, describe how these limitations could point to the need for further research.

Remember that the method you chose may be the source of a significant limitation that has emerged during your interpretation of the results [for example, you didn't interview a group of people that you later wish you had]. If this is the case, don't panic. Acknowledge it, and explain how applying a different or more robust methodology might address the research problem more effectively in a future study. A underlying goal of scholarly research is not only to show what works, but to demonstrate what doesn't work or what needs further clarification.

Adopting Appropriate Research Methodology

Adopting Qualitative and Quantitative Research Methods

Introduction

Baker (2003) describes methodology as the critical evaluation of alternative research strategies and methods. Methodology is a combination of techniques used to enquire into specific situation.

Methodology is the analysis of, and the rationale for, the particular method or methods used in a given study, and in that type of study in general (Jankowicz, 2000).

Research approaches

The extent to which the theory is clear at the beginning of the research is important in the design of the research project. The researcher can use the deductive approach and/or the inductive approach.

Deductive approach

In this approach, a theory and hypothesis is developed and a research strategy is designed to test the hypothesis. The theory allows examining the specific outcome of the inquiry, which will tend to confirm the theory or indicate modifications.

Inductive approach

In this approach, first the data is collected and theory is developed from the result of the data analysed. The result of this analysis would be the formulation of a theory. This approach is concerned with the context in which the events are taking place. Therefore, the study of a small sample of subjects might be more appropriate than a large number as with the deductive approach.

Followers of the inductive approach would criticise the deductive approach because of its tendency to construct a methodology that is not flexible and that does not allow alternative explanations of what is going on. On the other hand, the deductive approach emphasises scientific principles, moving from theory to data, the need to explain underlying relationships between variables, collection of quantitative data, the application of controls to ensure validity of data, the working of concepts to ensure clarity of definition, a highly structured approach, researcher independence of what is being researched and the necessity to select samples of sufficient size in order to generalise conclusions.

The inductive approach also emphasises gaining an understanding of the meanings humans attach to events, a close understanding of the research context, the collection of qualitative data, a more flexible structure that allows room for changes as the research progresses, a realisation that the researcher is part of the research process and less concern with the need to generalise.

This approach to research also gives room for alternative theories to be put forth. Deductive research can be quicker to complete. However, time must be devoted to setting up the study prior to data collection and analysis. On the other hand, inductive research can be more prolonged. While the deductive approach to research can be a lower risk strategy, inductive research poses the risk that no useful data patterns and theory may emerge.

Research Design

Research design is about organising research activity, including the collection of data, in ways that are most likely to achieve the research aim. A research design needs to consider the extent to which you should collect data from a research population.

Vogt (1993) defines research design as the science of planning procedures for conducting studies so as to get the most valid findings. Research design is an overall plan for relating the conceptual research problem to relevant and practicable empirical research which provides a plan or a framework for data collection and its analysis.

Adopting Qualitative and Quantitative Research Methods

Research method is that section of research report that describes the research methods used in conducting the research. Research method is a systematic and orderly approach taken towards the collection and analysis of data so that information can be obtained from data. The quantitative approach is collecting and analysing of numerical data and applying statistical test, while qualitative approach is more subjective in nature and involves examining and reflecting on perceptions in order to gain an understanding of social and human activities.

Qualitative approach is the nature and content of what is said while quantitative approach determines the number of who said it. Quantitative methods are usually regarded as more robust, leading to actionable results and recommendations, whereas qualitative methods are seen as lacking in rigour, resulting in indecisive outcomes. Van Maanen (1983) defines qualitative techniques as an array of interpretative techniques which seek to describe, decode, translate and otherwise come to terms with the meaning, not the frequency, of certain more or less naturally occurring phenomena in the social world. Collis and Hussey (2003) argue that quantitative approach to data collection provides relative ease and speed with which research can be conducted. Ghuari and Granhaug (2005) describe qualitative method of data analysis as the interactive way where collected data are analysed initiating new question and further data collection.

Qualitative research is thus common in social and behavioural sciences and among practitioners who want to understand human behaviour and functions.

Since this research has to do with social sciences, it makes qualitative analysis relevant to the research. The rationale of using quantitative methods for this study was in order to obtain the opinion of the management, staff and students rather than seek only statistical data which can eliminate the human aspect and only seek to measure a predetermined variable (Black, 2003).

The quantitative data analysis gives the research more direction, and viable to readers by numeric interpretation of responses to the questionnaires given out, apart from this using quantitative method of analysing is rational. The quantitative data analysis has been used in the research by quantifying

responses from the management, staff and students of the organisation via questionnaires

Questionnaires

Questionnaire is a list of carefully structured questions, chosen after considerable testing, with a view to eliciting reliable responses from chosen sample. The aim of a questionnaire is to find out what a selected group of participants do, think or feel (Collin and Hussey, 2003). Questionnaires are used to collect data by asking the sample/participants to respond to exactly the same set of questions.

The questionnaire method will facilitate this research due to time constraint on the part of both the researcher and the respondents. To justify this, other methods used in collecting primary data are semi structured and in depth interviews.

The questions in the questionnaire will be a combination of Yes/No questions, questions that will give the respondent an option to add comments/justification further to his/her answer. Open questions are also used to allow the respondents free to express his/her view, so that it helps in critical analysis.

Interviews

Interviews are a method of collecting data in which selected participants are asked questions in order to find out what they think or feel. Interviews make it easier to gather the necessary information and opinions, maybe face to face, voice to voice or screen to screen; conducted with individuals or group of individuals (Hussey and Hussey, 1997). For the purpose of this research, conducting interviews, a qualitative method of data collection is used. According to Saunders et al. (2003) interviews are categorised as follows :

Structured interviews

1. Semi-structured interviews
2. Un-structured interviews

Structured interviews are based on a pre-determined set of questions that are asked by the interviewer in a particular order with no room for flexibility. There is no much room for interaction between the interviewer and the interviewee. A semi-structured interview also involves a pre-determined set of questions, but gives the interviewer scope to change the order of questions asked, query certain areas of interest based on the answers given. However, unstructured interviews are informal. This method of interviewing allows the interviewer to ask any questions without being bound to a pre-determined set

of questions. It looks more like a casual chat which allows the interviewer to talk about the issues pertaining to the research (Saunders et al., 2003).

The interviewer conducted semi-structured interviews, as it is more flexible and helpful in this research.

Interviews Procedure

Prior to the interview, each respondent will be met personally to provide him or her with details about the topic, time and details about the topic. All the respondents were issued a consent form, which mentioned that participation will be voluntary, without coercion and they could withdraw from the study at anytime. Interviews will be physically constructed in the organisation rooms, with prior permission.

Samples and Procedures

Jankowicz (2000) describes sampling as a deliberate choice of a number of people, the sample who are to provide data from which you will draw conclusions about some larger group, the population whom this represents. Sample is a subset of a population, while population is a body or any collection of items under consideration (Collis and Hussey, 2003). Ghauri, et al. 1995 defines sampling as saving work, examining the sample instead of whole population.

Sampling saves time; this is evident when you have tight deadlines. Occasionally, to save time, surveys collect data from the entire population but analyse only a sample of the data collected. For reasons of economy this procedure has sometimes been adopted for hard-to-code questions, such as occupation and industry, in the United Kingdom 1991 census. Data were collected from the total population for all questions but, for the hard-to-code questions, only 10 per cent were entered into the computer and subsequently analysed, although it should be noted that, for the 2001 census, advances in automated and computer assisted coding software meant all these were coded (Teague, 2000).

Many researchers, for example Henry (1990), argue that using sampling makes possible a higher accuracy than a census. The smaller number of cases for which the data is collected means that more time can be spent designing and piloting the means of collecting these data. Collecting data from fewer cases also means that the collected information will be more detailed. For the purpose of this research, the sampling method has been used because it is practically impossible to reach the entire population due to time constraints on the part of the researcher.

Sampling Techniques

Sampling techniques are a range of methods that enable the researcher to reduce the amount of data to be collected by considering only data from a subgroup rather than possible cases or element (Saunders, et al. 2003).

Two types SVR of sampling techniques are identified as follows :

1. Probability or Representative sampling
2. Non-probability or Judgmental sampling (Saunders, et al. 2003).

Probability sampling is the selection of elements based on random sample procedure that gives a known and non-zero chance of being selected, thereby minimizing selection. It involves taking large samples considered to be representative of target population from which they are drawn (Saunders, et al. 2003).

In **non-probability sampling**, the probability of each case being selected from the total population is unknown. Non-probability sampling is more frequently used for case study research. In this sampling the researcher uses subjective methods such as personal experience, convenience, and expert judgement to select elements in the sample (Saunders, et al. 2003).

Designing a research protocol

Use of case study approach, research questionnaires to sample views and opinions about the project topic, subjective selection of sample based on the researcher's judgement, disregarding response questionnaires, which were incomplete.

What if I want to find out about social trends, or the measurable effects of particular policies?

You will probably want to use large data sets and undertake quantitative data analysis, and you will be adopting a realist approach to the topic studied. Quantitative dissertations are likely to be nearer to the lower end of the range of approved lengths for the dissertation (*e.g.*, if the length is to be 5,000-8,000 words, dissertations based on quantitative analysis are likely to be closer to 5,000 words in length). They will also include tables and figures giving your important findings. Remember that all tables must be carefully titled and labelled and that sources of your data must be acknowledged.

What if I want to record people's views on an issue, and give them a 'voice'?

You will probably want to use in-depth qualitative data, and you may wish to adopt a realist, a phenomenologist, or a constructionist approach to the topic.

Qualitative dissertations will include descriptive material, usually extracts from interviews, conversations, documents or field notes, and are therefore likely to be nearer to the upper limit of your word range (*e.g.*, 8,000

words). The types of method suitable for a dissertation could include content analysis, a small scale ethnographic study, small scale in-depth qualitative interviewing.

Whether you choose qualitative or quantitative analysis will depend on several things :

1. Your preferred philosophical approach (realist, phenomenologist or constructionist).
2. Your skills and abilities with methods of data collection (if needed) and analysis.
3. The topic or issue you are interested in. How you frame your research question.

Can I combine qualitative and quantitative methods?

There are many ways in which qualitative and quantitative data and analysis can be combined. Here are two examples.

You may be interested in doing an analysis that is primarily quantitative, looking at social trends, or policy implications. However, you also want to introduce a 'human touch' by conducting one or several interviews asking what these trends mean to people or how particular individuals experience events. After doing your quantitative analysis, you should include a chapter or section on the qualitative data you have collected. In your discussion of findings, you can use the qualitative data to help you understand the patterns in the quantitative analysis.

You may be interested in doing an evaluative case study of a process or policy. You will have a particular focus - a 'case' that you are looking at. You will triangulate methods *i.e.*, collect data in several different ways, and some of these data may be quantitative. You will analyse each type of data and describe this, and then write a discussion that shows how each piece of analysis contributes to the overall picture of what is going on.

Your supervisor or research methods tutor may be able to give you detailed examples of these or other ways to combine methods.

What is secondary analysis?

Secondary analysis is when you analyse data which was collected by another researcher. It allows the researcher to explore areas of interest without having to go through the process of collecting data themselves in the field. The problem with using fieldwork methods in an undergraduate dissertation, however, is that they are costly in terms of time (which is relatively scarce in your final year?) and possibly your own financial resources too. You may choose, therefore, to undertake secondary research, analysing existing data.

Where do I find existing research data?

There are a range of documents that already contain research data that you can analyse. You may, for example, be interested in exploring whether gender stereotypes in the media are changing. This might entail content analysis of newspapers, magazines, video or other media over different time periods. Here you would not be collecting your own data but instead would be analysing existing documents.

There are some advantages of doing secondary analysis, particularly if you are doing a quantitative study. You will be able to work with much larger data sets than you could have collected yourself. This has the following advantages :

1. They allow you to discuss trends and social changes.
 2. The data are often collected through a random sample, which allows you to generalise to the population under consideration.
 3. They may also allow you to make comparisons over time, as some data sets are products of longitudinal studies. Examples of large data sets include the British Crime Survey, and the Youth Cohort Study.
- Smaller, more targeted data sets may also be available.

Secondary analysis has disadvantages also, the data were collected for a purpose different from yours. You have to find out something about that purpose, as well as the methods of collection, in order to justify your use of a secondary data set.

Collecting you own data - primary research : Quantitative data may also result from non-participant observations or other measurements (*e.g.*, in an experimental design). Also, sometimes data that are collected through qualitative processes (participant observation, interviews) are coded and quantified.

Self-completion questionnaires : A series of questions that the respondent answers on their own. Self-completion questionnaires are good for collecting data on relatively simple topics, and for gaining a general overview of an issue. Questionnaires need to have clear questions, an easy to follow design, and not be too long.

Structured observation

Watching people and recording systematically their behaviour. Prior to the observation, an observation schedule will be produced which details what exactly the researcher should look for and how those observations should be recorded. If you are conducting a qualitative analysis you are likely to wish to use at least some original material. This may be collected through in-depth

interviews, participant observation recordings and field notes, non-participant observation, or some combination of these.

In-depth Interviews

A way of asking questions which allows the interviewee to have more control of the interview. The interview could be semi-structured, which uses an interview schedule to keep some control of the interview, but also allows for some flexibility in terms of the interviewee's responses. The interview could be unstructured, here the aim is to explore the interviewee's feelings about the issue being explored and the style of questioning is very informal. Or the interview could be a life history where the interviewer tries to find out about the whole life, or a portion of the person's life.

Focus groups

A form of interviewing where there are several participants; there is an emphasis in the questioning on a tightly defined topic; the accent is on interaction within the group and the joint construction of meaning. The moderator tries to provide a relatively free rein to the discussion.

Participant observation

This involves studying people in naturally occurring settings. The researcher participates directly in the setting and collects data in a systematic manner. The researcher will observe behaviour, listen to conversations, and ask questions. Spend some time looking at general books about research - they will give you an overview of the data collection methods available and help you to make the best choice for your project. Bryman (2004) would be a useful starting point. For any piece of research, you conduct, be it empirically based (quantitative or qualitative) or library based, its methods must be justified. You need to show in the final dissertation how you have given consideration to different methods, and why you have chosen and eliminated these.

Conclusion

This chapter deals with the research process. It prepares the background for research like preparing bibliography for background reading and formulating research problem. It helps in making a review of literature, defining aims and objectives and deciding the scope and limitations. It guides in adopting a suitable research methodology.

Summary

A good research question should be relevant, manageable in terms of research and in terms of your own academic abilities, substantial and with original dimensions, consistent with the requirements of the assessment, clear and simple and interesting.

Following are the conditions that need to be considered while formulating a research problem :

1. Systematic Immersion in the Subject matter through first hand observation.
2. Study of Relevant Literature on the Subject and discussions with person having rich practical experience in the field of study.

The research problem may be selected from the following sources :

1. Theory of one's own interest, daily problems, technological changes, unexplored areas, and discussions with other people.
2. The ultimate purpose of the literature review is to bring together and analyze significant writings on a topic.

The purpose of the literature review is to show your intellectual grasp of a topic by sharing the knowledge that exists in your area of interest and evaluating this knowledge. It will help you identify important theorists, research groups and writing in your area of interest as well as the vocabulary, methods, history, and key variables used in the field of study.

A hypothesis is a tentative assumption drawn from knowledge and theory which is used as a guide in the investigation of other facts and theories that are yet unknown. It is a guide, supposition or tentative inference as to the existence of some fact condition or relationship relative to some phenomenon which serves to explain such facts as ready are known to exist in a given area of research and to guide the search for new truth. A hypothesis is a tentative supposition or provisional guess which seems to explain the situation under observation. A hypothesis states what we are looking for.

QUESTIONNAIRES

■ Multiple Choice Questions

1. Literature is a :
 - (a) Written Record
 - (b) Published Record
 - (c) Unpublished Record
 - (d) All of these
2. Which method of literature review involves a non-statistical method to present data having the feature of systematic Method too?
 - (a) Narrative Method (b) Systematic Method
 - (c) Meta-Analysis Method of Literature Review
 - (d) Meta-Synthesis Method of Literature Review
3. Comparisons of non-statistical variables are performed under which method of literature review?

- (a) Narrative Method
 - (b) Systematic Method
 - (c) Meta-Analysis Method of Literature Review
 - (d) Meta-Synthesis Method of Literature Review
4. Literature review is not similar to :
- (a) Annotated Bibliography
 - (b) Abstract
 - (c) Survey
 - (d) All of these
5. APA Style, MLA Style, Chicago Manual, Blue Book, OSCOLA are famously known as :
- (a) Citation Manuals
 - (b) Directories
 - (c) Abbreviation Manuals
 - (d) Handbooks
6. Literature collected is reviewed and preferably arranged :
- (a) Alphabetically
 - (b) Chronologically
 - (c) Randomly
 - (d) None of these
7. Literature collected for review includes :
- (a) Primary and Secondary Sources
 - (b) Secondary and Tertiary Sources
 - (c) Primary and Tertiary Sources
 - (d) None of these
8. Literature includes :
- (a) Previous Studies
 - (b) Scholarly publications
 - (c) Research Findings
 - (d) All of these
9. No time frame is set to collect literature in which of the following method of compiling reviews?
- (a) Traditional Method
 - (b) Systematic Method
 - (c) Meta-Analysis Method of Literature Review
 - (d) Meta-Synthesis Method of Literature Review

10. Which method of the literature review is more reliable for drawing conclusions of each individual researcher for new conceptualizations and interpretations?
 - (a) Narrative Method.
 - (b) Systematic Method
 - (c) Meta-Analysis Method of Literature Review
 - (d) Meta-Synthesis Method of Literature Review
11. The main purpose of finalization of research topics and sub-topics is :
 - (a) Collection of Literature
 - (b) Collection of Questions
 - (c) Collection of Statistics
 - (d) Collection of Responses
12. Literature review is basically to bridge the gap between :
 - (a) Newly established facts
 - (b) Previously established facts
 - (c) Facts established time to time
 - (d) Previous to current established facts
13. The last step in writing the literature review is :
 - (a) Developing a Final Essay
 - (b) Developing a Coherent Essay
 - (c) Developing a Collaborated Essay
 - (d) Developing a Coordinated Essay
14. The primary purpose of literature review is to facilitate detailed background of :
 - (a) Present Studies
 - (b) Previous studies
 - (c) Future Studies
 - (d) None of these
15. Narrative Literature Review method is also known as :
 - (a) Advanced Method
 - (b) Scientific Method
 - (c) Traditional Method
 - (d) Systematic Method
16. Which method of literature review starts with formulating research questions?
 - (a) Narrative Method
 - (b) Systematic Method

- (c) Meta-Analysis Method of Literature Review
 - (d) Meta-Synthesis Method of Literature Review
17. Which method of literature review involves application of clinical approach based on a specific subject?
- (a) Narrative Method
 - (b) Systematic Method
 - (c) Meta-Analysis Method of Literature Review
 - (d) Meta-Synthesis Method of Literature Review
18. Which literature review involves timeline based collection of literature for review :
- (a) Narrative Method
 - (b) Systematic Method
 - (c) Meta-Analysis Method of Literature Review
 - (d) Meta-Synthesis Method of Literature Review
19. Which method of literature review involves application of statistical approach?
- (a) Narrative Method
 - (b) Systematic Method
 - (c) Meta-Analysis Method of Literature Review
 - (d) Meta-Synthesis Method of Literature Review
20. Which literature review method involves conclusions in numeric/statistical form?
- (a) Narrative Method
 - (b) Systematic Method
 - (c) Meta-Analysis Method of Literature Review
 - (d) Meta-Synthesis Method of Literature Review
21. When planning to do social research, it is better to :
- (a) Approach the topic with an open mind
 - (b) Do a pilot study before getting stuck into it
 - (c) Be familiar with the literature on the topic
 - (d) Forget about theory because this is a very practical undertaking can't have one without the other
22. We review the relevant literature to know :
- (a) What is already known about the topic
 - (b) What concepts and theories have been applied to the topic
 - (c) Who are the key contributors to the topic
 - (d) All of the above

23. A deductive theory is one that :
- (a) Allows theory to emerge out of the data
 - (b) Involves testing an explicitly defined hypothesis
 - (c) Allows for findings to feed back into the stock of knowledge
 - (d) Uses qualitative methods whenever possible
24. What does 'sampling cases' mean?
- (a) Sampling using a sampling frame
 - (b) Identifying people who are suitable for research
 - (c) Literally, the researcher's brief-case
 - (d) Sampling people, newspapers, television programmes etc. :
25. Which of the following is not a data-collection method?
- (a) Research questions
 - (b) Unstructured interviewing
 - (c) Postal survey questionnaires
 - (d) Participant observation
26. Why is data analysis concerned with data reduction?
- (a) Because far too much data is collected than is required
 - (b) Because we need to make sense of the data
 - (c) Because of the repetitions in answers to questionnaires
 - (d) Because the sample size has been exceeded
27. The core ingredients of a dissertation are :
- (a) Introduction; Data collection; Data analysis; Conclusions and recommendations.
 - (b) Executive summary; Literature review; Data gathered; Conclusions; Bibliography.
 - (c) Research plan; Research data; Analysis; References.
 - (d) Introduction; Literature review; Research methods; Results; Discussion; Conclusion.
28. Which of the following is a component of ethnographic research?
- (a) Being immersed in a social group or setting
 - (b) Participant observation, interviews, and/or documentary analysis
 - (c) A written account of an ethnographic study
 - (d) All of the above
29. What is a research design?
- (a) A way of conducting research that is not grounded in theory
 - (b) The choice between using qualitative or quantitative methods
 - (c) The style in which you present your research findings, *e.g.*, a graph
 - (d) A framework for every stage of the collection and analysis of data

30. Which of the following is not an advantage of secondary analysis?
- (a) It immerses the researcher in the field they are studying
 - (b) It tends to be based on high quality data
 - (c) It provides an opportunity for longitudinal analysis
 - (d) It allows you to study patterns and social trends over time

■ **Short Answers Type Questions**

1. What are the characteristics of a good research problem?
2. What are the features of a good research question?
3. Why should a research question be clear and simple?
4. What factors need to be considered when actual research action has to take place?
5. What are the conditions of formulating a research problem?
6. What are the criterion of a good research problem?
7. What are the common errors in formulating a research problem?
8. What is the advantage of background information?
9. How encyclopedias help in searching information?
10. How to use internet as source of information?

■ **Long Answers Type Questions**

1. What is the purpose of literature review? What are the advantages of literature review? How to organize literature review?
2. What is citation pearl searching method of literature review? What is standard hierarchical search method of literature review?
3. What are the do's and don'ts in constructing aims and objectives?
4. What is hypothesis? Elaborate the importance of hypothesis. What are the prerequisites of a good hypothesis? What are the difficulties in formulating a hypothesis?
5. Elaborate the importance of scope and limitations. What are the possible methodological limitations in research?
6. What limitations are possible for a researcher while conducting research? What are the possible research approaches for the researcher?
7. What is research design?
8. What are the types of sampling techniques?

Answers

➤ **Multiple Choice Questions**

- | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|
| 1. (d) | 2. (d) | 3. (d) | 4. (d) | 5. (a) | 6. (b) | 7. (a) | 8. (d) |
| 9. (a) | 10. (d) | 11. (a) | 12. (d) | 13. (c) | 14. (b) | 15. (c) | 16. (b) |
| 17. (b) | 18. (b) | 19. (c) | 20. (c) | 21. (c) | 22. (d) | 23. (b) | 24. (d) |
| 25. (a) | 26. (b) | 27. (d) | 28. (d) | 29. (d) | 30. (a) | | |

4

BASIC OF RESEARCH**Objectives**

Friends, this chapter will introduce you to dimensions of research in English language and English literature. After studying this chapter, you will be able to :

1. To know the kinds of research possible in English literature
2. To know the kinds of research possible in English language
3. To know the areas of qualitative research in linguistics
4. To know the areas of quantitative research in linguistics

Introduction

In the previous chapter we have studied the research process. In this chapter we will study the various areas of research possible in English Language and Literature. Also we will study the areas of qualitative and quantitative research in English language and literature.

Dimensions of Research in English Language

English language education in India is an impressively large and highly complex phenomenon endowed with major strengths along with equally large failures and limitations. This complex situation can be traced in research themes, findings, and policy statements during the last five decades as scholars have attempted to find empirical evidences in the way English as a second language has shaped itself. The change in the status (the role and place) of English language from a colonial legacy to the prominence that it has gained today is another development, which has attracted research over the last three decades, besides language policy and medium of instruction. Researchers have also concentrated on the effectiveness of various methods and approaches to second language teaching-learning and language learning/acquisition, attempting to understand its different dimensions. Research on continuous professional development (CPD) of teachers, use of ICT in English language teaching, teaching English to young learners, teacher research, classroom research and English for professional and specific purposes are the emerging areas of research, which this review discusses.

Earlier surveys of research in education in India revealed the trends for further research and action. Of the six research surveys conducted so far, fourth and sixth surveys contained a separate section for language education and language learning research. Other surveys saw the language education research subsumed in curriculum, materials and methodology research. A closer look at the survey informs that not much research was available in Indian language(s) education, while English language teaching-learning research was well documented. All the surveys in their analysis brought to the notice that language education in general and English language education in particular could not meet the system related demands such as expansion, provisions and quality dimensions and learner related (individualised learning) issues. The demand for English language and English medium was well traced in the researches three decades ago. Language policy, development of materials and individual skills were also explored. Most of the observations of this review are in consonance with the inferences of the previous surveys and have implications for policy and curriculum planning and implementation.

A. General Introduction

'Language Teaching' (known as LT) is specialized skill or science of providing the learning of language features to trainee by utilizing several dimensions, methodologies, tools, etc. English Language Teaching (known as ELT) has multiple aspects usually at the time of teaching as secondary or tertiary language or as a global language in nations differ from those which are communicating in English. In India, English is adopted as a secondary language (Koul, 2004).

ELT in India has crossed various levels of progress to acquire good outputs in English language learning. Also, it can't be opposed that it is however in demand of new concepts and skills to bear to the upcoming requirements of the trainee. In short LT is not a new and current action: there is a regular inspection and checking for inventing novel strategies to advance the training action of several categories of individuals.

B. First language

The language obtained by a teenager by the fellows of his group and by the nearby areas is known as 'first language' (known as L1) to that teenager. Talking about the first language learning, the teenager pass nearly low work in comparison to the measure of work that needs to pass for the action of grasping a 'second language' (known as SL). Each of the common teenagers obtains its first language in its initial period of existence and language possession is closely linked to the teenager's intelligence and societal growth

C. Global and secondary language

Various term differences are sketched out in the area of LT. An individual's native language L1 differs from other several languages that can be received by the person [(L2). (L3)], etc.]

The term 1 'global language' is commonly defined to tell about some language which is not the mother tongue of a nation, and the term 'secondary language' is too usually termed in this manner. Yet several interpreter differentiate amid 'global' and secondary language finding huge distinctions in particular of the acquiring targets, educating strategies and accomplishment rank etc.

'Foreign language' (hereafter FL), in a much limited means is a not mother tongue language which is educated in schools and it has no position as a regular means of conversation in that nation. An SL is not a mother tongue language which is mainly utilized for means of conversation, commonly as a means of learning, and as a medium of conversation in gov or incorporates. English, for *e.g.*, has the position of FL in Japan, where as SL ranks in Nigeria and India.

D. Language Acquisition and Language Learning

Language acquisition is an insensible method and it begins at the initial stage. Native language or L1 is not provided through education but captured. Acquisition varies from learning. Learning method needs best means education and participation.

Language acquisition is primarily attainment of language purposely since early age and through a specific language domain and learning is a strategic method which arises from systematic learning.

Language acquisition defines that a language is obtained as a consequence of organic and hugely casual display to a specific language buyer. The phrase 'language learning' is utilized where the display is assembled through language learning. Acquisition is an underlying method through which verbal skills are evolved due to the outcome of utilizing language for actual conversation. Learning is the strategic method through which learning of a language is thrived by education.

E. Language Expertise

Mostly four primary abilities of language fall below language learning. These are, specifically, listening, speaking, reading and writing (LSRW). Listening and speaking are the primary language which is learnt via built-in methods and reading and writing expertise are learnt knowingly. Also, at the time of student going to college then that individual might be educated about the reading and writing in a language (learning).

The usage of language as an instrument for conversation for diverse methods and in diverse sectors needs complete four expertise. The provider of information utilizes the communicated or writing method for communicating the views and the recipient of the information uses the listening and reading expertise for interpreting the Information. The expertise utilized by the provider is dynamic and lively, and the expertise utilized by the recipient is received or illustrative and submissive.

We used the four language expertise in diverse reference. The usage of every expertise is controlled by the usage of several constituents of language. Every expertise requires a particular means of requisition. The hearing expertise for *e.g.*, needs note distinction; communicating expertise requires the skills of noise making studying expertise needs the techniques of reading and writing expertise needs the technique of writing'

F. Language expertise in social reference

Language is through and hugely a global developmental process. It is utilized as a medium by which message can be transferred via source to destination and from an individual to another. The interpretation feature linked hearing and studying and the making linked to communicating and writing is the deciding components beyond an individual's speaking skills. In present societal reference, every expertise of language has few particular parts to perform. Few expertises are reference Whereas Particular ^expertise are not. Though every expertise rewards few results in some domain. A progressed group uses entire four expertises. Actually, merely an advanced language manipulates entire four expertise of language for the performance of the societal proceedings, whereas the undeveloped languages use merely two expertise.

G. The function of language expertise in the pedagogy

The current Indian structure of language learning acquires much novel steps to educate language expertise in a productive mode. The current ELT in India has not succeeded a consistent process of educating/studying/checking for the entire four primary expertises. Language command of a scholar is decided through the four primary expertises (Jessa, 2009). Thus, the studying/educating process should acquire a specific structure which will actually enable language learning.

The current ELT course is not designed in a proper manner. The language assignments and study matter are not made keeping in mind to help the students to grow entire language expertise. It is highly important in LT to make the process in a manner that a single language expertise affects the other one at the time of learning phase. This is seen absent in the current LT process.

The below mentioned features will display the correlation between the language expertise in accomplishment.

S.N.	Exercise	Data Given	Result
1.	Enquire queries	Hearing	Talking/writing
2.	Reciting information	Recitation	Recitation aloud/speech
3.	Writing from information/ making copy	Recitation	Writing
4.	Notes	Hearing	Writing
5.	Taking dictation from oral conversation	Hearing	Writing

The upper mentioned five exercises are usually utilized in ELT process. Many of the tasks provided in the language-learning case do not depend on the entire expertise or these do not enable the learning of few other expertise of language. If language is memorized for talking, the whole accomplishment of the entire expertise is crucial.

Language education via the language skills (LSRW)

It is considered that by giving the understanding for the primary difficulties of a language skill and if the connection between diverse expertise is defined to the scholars, the learning results will increase and will be systematic. The LT process that assist the students to obtain good grade of language proficiency and language usage, are :

1. Audio-visual process.
2. Audio-lingual process
3. Language teaching via systems
4. Language teaching via gaming
5. Function play process
6. Communication process
7. Productive process (giving chance to display the spoken expertise in all the aspects).

Kind of research possible in English literature

Types of research methods and disciplines

A dissertation is an extended piece of writing based on comprehensive reading and research, written by an academic scholar at an undergraduate, masters or post graduate level. In some cases, a dissertation is referred to an academic research document written at PhD level, while a Thesis may be one which is written by an academic at Masters or Undergraduate level.

However, the opposite is also true in other cases. However, in British English it is the other way round, a dissertation is usually written for a master's degree and a thesis is written at PhD level.

Types of Research

There are two types of research which can be done to develop a thesis or dissertation :

(1) Practical Research : The practical approach consists of the empirical study of the topic under research and chiefly consists of hands on approach. This involves first hand research in the form of questionnaires, surveys, interviews, observations and discussion groups.

(2) Theoretical Research : A non-empirical approach to research, this usually involves perusal of mostly published works like researching through archives of public libraries, court rooms and published academic journals.

Types of Research Methods

Qualitative

This type of research methods involves describing in details specific situation using research tools like interviews, surveys, and Observations. Qualitative Research is primarily exploratory research. It is used to gain an understanding of underlying reasons, opinions, and motivations. It provides insights into the problem or helps to develop ideas or hypotheses for potential quantitative research. Qualitative Research is also used to uncover trends in thought and opinions, and dive deeper into the problem. Qualitative data collection methods vary using unstructured or semi-structured techniques. Some common methods include focus groups (group discussions), individual interviews, and participation/observations. The sample size is typically small, and respondents are selected to fulfill a given quota.

Quantitative

This type of research methods requires quantifiable data involving numerical and statistical explanations. Quantitative Research is used to quantify the problem by way of generating numerical data or data that can be transformed into useable statistics. It is used to quantify attitudes, opinions, behaviors, and other defined variables - and generalize results from a larger sample population. Quantitative Research uses measurable data to formulate facts and uncover patterns in research. Quantitative data collection methods are much more structured than Qualitative data collection methods. Quantitative data collection methods include various forms of surveys - online surveys, paper surveys, mobile surveys and kiosk surveys, face-to-face interviews, telephone interviews, longitudinal studies, website interceptors, online polls, and systematic observations.

Criteria	Qualitative research	Quantitative research
Purpose	To understand and interpret social interactions.	To test hypotheses, look at cause and effect, and make predictions.
Group studied	Smaller and not randomly selected.	Larger and randomly selected.
Variables	Study of the whole, not variables.	Specific variables studied.
Type of data collected	Words, images or objects.	Numbers and statistics.
Form of data collected	Qualitative data such as open-ended responses, interviews, participant observations, field notes and reflections.	Quantitative data based on precise measurements using structured and validated data collection instruments.
Type of data analysis	Identify patterns, features and themes.	Identify statistical relationships.
Objectivity and subjectivity	Subjectivity is expected.	Objectivity is critical.
Role of the researcher	Researcher and their biases may be known to participants in the study, and participant characteristics may be known to the researcher.	Researcher and their biases are not known to participants in the study, and participant characteristics are deliberately hidden from the researcher (double blind studies).
Results	Particular or specialised findings that are less generalisable.	Generalisable findings that can be applied to other populations.
Scientific method	Exploratory or bottom-up : the researcher generates a new hypothesis and theory from the data collected.	Confirmatory or top-down : the researcher tests the hypothesis and theory with the data.
View of human behaviour	Dynamic, situational, social and personal.	Regular and predictable.
Most common research objectives	Explore, discover and construct.	Describe, explain and predict.
Focus	Wide-angle lens; examines the breadth and depth of phenomena.	Narrow-angle lens; tests a specific hypotheses.
Nature of observation	Study behaviour in a natural environment.	Study behaviour under controlled conditions; isolate causal effects.

Nature of reality	Multiple realities; subjective	Single reality; objective.
Final report	Narrative report with contextual description and direct quotations from research participants.	Statistical report with correlations, comparisons of means and statistical significance of findings.

Correlation/Regression Analysis

This research method involves determining the strength of the relationship between two or more variables (e.g., are violent video games correlated with aggression in children).

Meta-Analysis

This research method is useful for finding out the average impact of several different studies on a hypothesis.

Methodologies

The way you approach your question will have a profound effect upon the way you construct your dissertation, so this section discusses the types of research you might undertake for your dissertation. The use of literature and case studies is considered and the merits of primary research are debated and advice is given on the use of existing research data. You may not be fond of statistics, but the potential relevance of a quantitative approach should be considered and similarly, the idea of qualitative analysis and conducting your own research may yield valuable data. The possibilities of using quantitative and qualitative data are also discussed.

What approach should I take - qualitative or quantitative?

What approach should I take - qualitative or quantitative?

Your approach, research design, and research question are all connected. 'Approach' means something more than the type of data you use - it refers to your overall orientation to research and the type of claims you will make for your study. Dissertations can be based on either quantitative or qualitative data, or on a combination of both. How you choose this may depend on your preferences and abilities, and the suitability of particular approaches to your topic? You need to be able to justify why you have chosen to use such data? Quantitative data is particularly useful when you wish to discover how common particular forms of behaviour such as illegal drug use are for a particular age group? Qualitative data is particularly useful when you wish to find out why people engage in such behaviour?

Think about the Research Methods modules you have taken so far. Think about the different kinds of studies you have read for other modules. There is plenty of scope to use the approaches and methods that you are most

comfortable with. You need to justify your approach and methods and to cite appropriate literature to help you do this.

What if I want to find out about social trends, or the measurable effects of particular policies?

You will probably want to use large data sets and undertake quantitative data analysis, and you will be adopting a realist approach to the topic studied. Quantitative dissertations are likely to be nearer to the lower end of the range of approved lengths for the dissertation (*e.g.*, if the length is to be 5,000-8,000 words, dissertations based on quantitative analysis are likely to be closer to 5,000 words in length). They will also include tables and figures giving your important findings. Remember that all tables must be carefully titled and labelled and that sources of your data must be acknowledged.

What if I want to record people's views on an issue, and give them a 'voice'?

You will probably want to use in-depth qualitative data, and you may wish to adopt a realist, a phenomenologist, or a constructionist approach to the topic. Qualitative dissertations will include descriptive material, usually extracts from interviews, conversations, documents or field notes, and are therefore likely to be nearer to the upper limit of your word range (*e.g.*, 8,000 words). The types of method suitable for a dissertation could include content analysis, a small scale ethnographic study, small scale in-depth qualitative interviewing.

Whether you choose qualitative or quantitative analysis will depend on several things :

1. Your preferred philosophical approach (realist, phenomenologist or constructionist).
2. Your skills and abilities with methods of data collection (if needed) and analysis.
3. The topic or issue you are interested in.
4. How you frame your research question?

Can I combine qualitative and quantitative methods?

There are many ways in which qualitative and quantitative data and analysis can be combined. Here are two examples :

1. You may be interested in doing an analysis that is primarily quantitative, looking at social trends, or policy implications. However you also want to introduce a 'human touch' by conducting one or several interviews asking what these trends mean to people or how particular individuals experience events. After doing your quantitative analysis, you should include a chapter or section on the qualitative data you have collected. In your discussion

of findings, you can use the qualitative data to help you understand the patterns in the quantitative analysis.

2. You may be interested in doing an evaluative case study of a process or policy. You will have a particular focus - a 'case' that you are looking at. You will triangulate methods *i.e.*, collect data in several different ways, and some of these data may be quantitative. You will analyse each type of data and describe this, and then write a discussion that shows how each piece of analysis contributes to the overall picture of what is going on.

Your supervisor or research methods tutor may be able to give you detailed examples of these or other ways to combine methods.

Can my dissertation be entirely literature-based?

Yes. If you decide to do a primarily theoretical dissertation, it is almost certain that your dissertation will be entirely literature-based. This is likely to be the methodology of theoretical analysis : selection and discussion of theoretical material and descriptive material, in context, and detailed comparison of theories in terms of their applicability. You might ask how useful certain concepts or theories are for understanding particular patterns of behaviour. How useful is the concept of institutional racism? Is objectivity in the media possible? How useful is sub-cultural theory for understanding virtual communities? Here, the focus of attention is not so much to discover something about the social world, for example virtual communities, as to reach a judgement about the value of key concepts or theories in understanding that world. How the study is approached and how contrasting approaches are drawn upon needs to be stated very clearly?

A library-based or theoretical study is not necessarily 'easier' than an empirical study, indeed, it may well be harder. Remember that theoretical studies, like data-based studies, need to have their research design spelled out from the start. But even if your dissertation is more empirically focused, it could still be entirely literature-based. You might choose to conduct a review of a field of work. What does the research literature in this field tell us about x? While all dissertations will include a literature review, it is possible to produce a dissertation that is entirely based on a review of the literature. If you do this, it is important to review the literature from an explicit angle and identify some themes to make the review distinctive. You might, for example, explore empirical debates in your chosen field across different countries or time periods.

What is case study research?

Whilst it is possible for dissertations to be entirely literature-based, the most common form of dissertation takes the form of a case study. Here the focus of attention is on a particular community, organisation or set of documents

The attraction of this kind of dissertation is that it stems from empirical curiosity but is at the same time practical. You may be interested in a wider question but a case study enables you to focus on a specific example. A major challenge in case study dissertations is connecting your own primary research or re-analysis with the broader theoretical themes and empirical concerns of the existing literature.

What's an empirical study?

Most dissertations demand either primary or secondary research. In other words, you usually have to analyse data that you have either collected yourself or data that is already available. The reason for this is that the questions dissertations usually address take the following form: Is x happening? Is x changing? Why is x happening? Why is x changing? These questions demand primary or secondary analysis of data.

What is secondary analysis?

Secondary analysis is when you analyse data which was collected by another researcher. It allows the researcher to explore areas of interest without having to go through the process of collecting data themselves in the field. The problem with using fieldwork methods in an undergraduate dissertation, however, is that they are costly in terms of time (which is relatively scarce in your final year?) and possibly your own financial resources too. You may choose, therefore, to undertake secondary research, analysing existing data.

Where do I find existing research data?

There are a range of documents that already contain research data that you can analyse. You may, for example, be interested in exploring whether gender stereotypes in the media are changing. This might entail content analysis of newspapers, magazines, video or other media over different time periods. Here you would not be collecting your own data but instead would be analysing existing documents.

Definition of Research

When you say that you are undertaking a research study to find answers to a question, you are implying that the process;

1. is being undertaken within a framework of a set of philosophies (approaches);
2. uses procedures, methods and techniques that have been tested for their validity and reliability;
3. is designed to be unbiased and objective.

Philosophies means approaches *e.g.*, qualitative, quantitative and the academic discipline in which you have been trained. Validity means that correct procedures have been applied to find answers to a question. Reliability refers to the quality of a measurement procedure that provides repeatability and accuracy. Unbiased and objective means that you have taken each step in an unbiased manner and drawn each conclusion to the best of your ability and without introducing your own vested interest. (Bias is a deliberate attempt to either conceal or highlight something). Adherence to the three criteria mentioned above enables the process to be called 'research.' However, the degree to which these criteria are expected to be fulfilled varies from discipline to discipline and so the meaning of 'research' differs from one academic discipline to another.

The difference between research and non-research activity is, in the way we find answers : the process must meet certain requirements to be called research. We can identify these requirements by examining some definitions of research. The word research is composed of two syllables, *re* and *search*. *Re-* is a prefix meaning again, a new or over again search is a verb meaning to examine closely and carefully, to test and try, or to probe.

Together they form a noun describing a careful, systematic, patient study and investigation in some field of knowledge, undertaken to establish facts or principles. Research is a structured enquiry that utilizes acceptable scientific methodology to solve problems and create new knowledge that is generally applicable. Scientific methods consist of systematic observation, classification and interpretation of data. Although we engage in such process in our daily life, the difference between our casual day- to-day generalisation and the conclusions usually recognized as scientific method lies in the degree of formality, rigor, verifiability and general validity of latter.

Characteristics of Research

Research is a process of collecting, analyzing and interpreting information to answer questions. But to qualify as research, the process must have certain characteristics : it must, as far as possible, be controlled, rigorous, systematic, valid and verifiable, empirical and critical. Controlled- in real life there are many factors that affect an outcome. The concept of control implies that, in exploring causality in relation to two variables (factors), you set up your study in a way that minimizes the effects of other factors affecting the relationship. This can be achieved to a large extent in the physical sciences (cooking, baking), as most of the research is done in a laboratory. However, in the social sciences (Hospitality and Tourism) it is extremely difficult as research is carried out on issues related to human beings living in society, where such

controls are not possible. Therefore, in Hospitality and Tourism, as you cannot control external factors, you attempt to quantify their impact.

Rigorous

You must be scrupulous in ensuring that the procedures followed to find answers to questions are relevant, appropriate and justified. Again, the degree of rigor varies markedly between the physical and social sciences and within the social sciences.

Systematic

This implies that the procedure adopted to undertake an investigation follow a certain logical sequence. The different steps cannot be taken in a haphazard way. Some procedures must follow others.

Valid and verifiable

This concept implies that whatever you conclude on the basis of your findings is correct and can be verified by you and others.

Empirical

This means that any conclusion drawn is based upon hard evidence gathered from information collected from real life experiences or observations.

Critical

Critical scrutiny of the procedures used and the methods employed is crucial to a research enquiry. The process of investigation must be fool proof and free from drawbacks. The process adopted and the procedures used must be able to withstand critical scrutiny. For a process to be called research, it is imperative that it has the above characteristics.

Types of Research

Research can be classified from three perspectives :

1. Application of research study
2. Objectives in undertaking the research Inquiry Mode employed

Application

From the point of view of application, there are two broad categories of research :

1. Pure research and
2. Applied research

1. **Pure research** involves developing and testing theories and hypotheses that are intellectually challenging to the researcher but may or may not have practical application at the present time or in the future. The knowledge produced through pure research is sought in order to add to the

existing body of research methods. Applied research is done to solve specific, practical questions; for policy formulation, administration and understanding of a phenomenon. It can be exploratory, but is usually descriptive. It is almost always done on the basis of basic research.

2. Applied research can be carried out by academic or industrial institutions. Often, an academic institution such as a university will have a specific applied research program funded by an industrial partner interested in that program.

Objectives

From the viewpoint of objectives, a research can be classified as :

1. Descriptive
2. Correlational
3. Explanatory
4. Exploratory

1. Descriptive research attempts to describe systematically a situation, problem, phenomenon, service or programme, or provides information about, say, living condition of a community, or describes attitudes towards an issue.

2. Correlational research attempts to discover or establish the existence of a relationship/ interdependence between two or more aspects of a situation.

3. Explanatory research attempts to clarify why and how there is a relationship between two or more aspects of a situation or phenomenon.

4. Exploratory research is undertaken to explore an area where little is known or to investigate the possibilities of undertaking a particular research study (feasibility study/pilot study). In practice most studies are a combination of the first three categories.

Inquiry Mode

From the process adopted to find answer to research questions - the two approaches are :

1. Structured approach
2. Unstructured approach

1. Structured approach : The structured approach to inquiry is usually classified as quantitative research. Here everything that forms the research process- objectives, design, sample, and the questions that you plan to ask of respondents- is predetermined. It is more appropriate to determine the extent of a problem, issue or phenomenon by quantifying the variation *e.g.*, how many people have a particular problem? How many people hold a particular attitude?

2. Unstructured approach : The unstructured approach to inquiry is usually classified as qualitative research. This approach allows flexibility in all aspects of the research process. It is more appropriate to explore the nature of a problem, issue or phenomenon without quantifying it. Main objective is to describe the variation in a phenomenon, situation or attitude *e.g.*, description of an observed situation, the historical enumeration of events, an account of different opinions different people have about an issue, description of working condition in a particular industry.

Both approaches have their place in research. Both have their strengths and weaknesses. In many studies you have to combine both qualitative and quantitative approaches. For example, suppose you have to find the types of cuisine / accommodation available in a city and the extent of their popularity.

Types of cuisine are the qualitative aspect of the study as finding out about them entails description of the culture and cuisine. The extent of their popularity is the quantitative aspect as it involves estimating the number of people who visit restaurant serving such cuisine and calculating the other indicators that reflect the extent of popularity.

Kinds of research possible in English linguistics

Research in Linguistics and Applied Linguistics

1. About Applied Linguistics Research
2. About Linguistics Research
3. Classroom Based Research
4. Cognitive Linguistics
5. Corpus Linguistics
6. Discourse Analysis
7. Learner Autonomy
8. Morphology
9. Prosody
10. Psycholinguistics
11. Second Language Acquisition
12. Sociolinguistics
13. Syntax
14. Testing and Assessment
15. Vocabulary

1.About Applied Linguistics Research : Applied Linguistics links the study of language (Linguistics) with the teaching and learning of languages. Applied Linguistics covers a wide range of areas, including :

1. investigating language in classrooms (classroom-based research)
2. different kinds of written and spoken texts (corpus linguistics)
3. how learners approach language learning (learner autonomy)
4. testing and assessment of language learning, and
5. Vocabulary (including multi word expressions).

Various Definitions of Applied Linguistics

- A. Applied linguistics is a branch of linguistics that addresses language problems in real-world context.
- B. Applied linguistics is the utilization of the knowledge about the nurture of language achieved by linguistics research for the improvement of the efficiency of some practical task in which language is a central component.
- C. Applied linguistics is the academic discipline concerned with the relation of knowledge about language to decision making in the real world.

2. About Linguistics Research : Linguistics is the systematic study of the structure of language and the way it is used. Researching the structure of language involves several areas. Phonetics and Phonology focuses on the sounds of human languages and the ways they pattern in particular languages, including global sound patterns that make up the prosody and intonation of different languages.

Morphology examines the internal structure of words, and Syntax is concerned with describing and accounting for the ways words are grouped into larger structure. Sociolinguistic researches the uses of language. It examines the relationship between language, its users and its uses. Studying language use also involves Discourse Analysis which focuses on extended written and spoken texts to identify how language is used to convey social meaning. Research into the cognitive implications of the analysis of language structure, learning and use are the concern of Psycholinguistics.

3. Classroom-Based Research : Research in this area can use qualitative and/or quantitative methods, but has a common concern with describing and understanding language use and/or processes of language teaching/learning in classrooms at any level.

What is classroom-based research?

Classroom-based research is a teacher-driven activity that aims to find out what works best in our classrooms, so that we might improve our practice, and - ultimately - make learning more effective for the benefit of our students. We can learn a lot about good teaching and learning by referring to the

literature, and large-scale studies, such as the ones carried out by universities and educational authorities, which can also provide us with useful insights. However, every teaching situation is unique: what works well in one class may be completely ineffective, or even counterproductive, for a different group of learners. This places a burden on us, as teachers, to try to find out more about the teaching contexts in which we work.

Good teachers invest a lot of time in learning about themselves, their learners and the classes they teach. They do so by being attuned to what their learners say, or avoid saying, by being sensitive to their surroundings, by studying the curriculum and the literature and by reflecting on their practice. Classroom-based research is an extension of these processes, which is carried out in a more systematic way. Although it is more grounded on data than teacher reflection, it is still considerably less abstract than the kind of research that is carried out by professional educational researchers. This is its strength, because it means that the findings generated by classroom-based research are more personally relevant to teachers, and they can have a much more direct practical impact.

Benefits of doing classroom-based research

Classroom-based research can involve an investment in time and effort, but it's time and effort well-spent, for several reasons. Firstly, classroom-based research can have a direct impact on teaching, because we can use the findings of our research projects to inform our teaching decisions. For instance, we can find out more about our student's needs and aspirations, about what motivates them and what they find challenging, and more; this information can help us plan our courses more effectively, and it can also be used to inform teaching interventions whenever necessary. In addition, classroom-based research can help us to become better teachers on the long run, by highlighting our strengths and opportunities for development. By trying out new teaching methods, and then collecting data on how effective these were, we can continue to develop professionally.

Furthermore, classroom-based research can help to strengthen collaboration among teachers. While classroom-based research projects can be designed and implemented by a single teacher working on her own, they offer great opportunities to work together with colleagues who are interested in the same topic. Plus, sharing the findings from classroom-based studies can help to foster a culture of co-operation in the staff room.

Last but not least, classroom based research provides data-based evidence on the effectiveness of different teaching methods. Such evidence can be very useful, when arguing for extending or expanding successful programmes; it can

be equally helpful in deciding how effective educational policies are, for our classes.

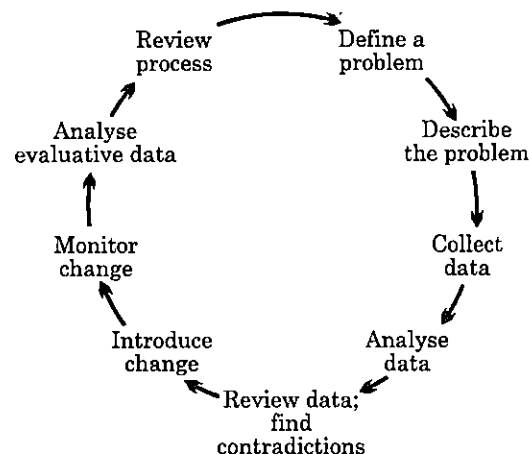
Types of classroom-based research

There are many formats of classroom-based research, and it would be impossible to provide a comprehensive listing in this handout. What follows, then, are just two examples, intended to show some of the possibilities that classroom-based research offers.

Action research

Action Research is a form of disciplined inquiry that aims to understand, improve and reform practice. It has become an umbrella term subsuming a broad range of research approaches, such as emancipatory action research, participatory action research, feminist action research etc. Central to all these approaches is the notion that research should aim to generate knowledge that can be brought to bear on specific practical problems. Some of the areas in which Action Research has been applied include : teaching methods, learning strategies, evaluative procedures, attitudes and values, Continuing Professional Development, management and control in education, and educational administration.

Action Research is methodologically eclectic. This means that any number of methods can be used in the process of doing an action research project, although qualitative methods have tended to be used more frequently. An action research project starts from a specific practical or applied problem in teaching practice. It approaches this problem using research and action components in a cyclical way : research is used, in a very applied way, to develop a better understanding of the problem, and then this knowledge is used to inform an procedure that addresses this problem (action). Then, research methods are used to evaluate the procedure, and identify possible next steps. This process, which is variably termed an action research cycle or spiral, is illustrated in Fig.



Exploratory practice

Exploratory practice is a form of classroom-based research that aims to develop understanding and the well-being of teachers and learners, by focusing on issues that are relevant to their teaching and learning. The starting point of an exploratory practice project is a local “puzzle” (the word is used deliberately to avoid the negative connotations of terms such as “problem”). A key feature of exploratory practice is that it adjusts to the regular routine of the classroom, so as to minimize the burden on the teachers (and the learners) involved in the project. This means that the data collection process will be integrated as seamlessly as possible in the normal classroom procedures (*e.g.*, speaking and writing tasks might double as data generation procedures). Another characteristic is that it is methodologically inclusive : that is to say, it is considered desirable to have students participating in the research process, both by suggesting possible research topics and by being engaged in the data generation and analysis.

4. Cognitive Linguistics : The school of thought known as Cognitive Linguistics treats language as an integral part of cognition, and linguistic phenomena as ‘motivated’ by people’s general cognitive abilities and their interaction with the physical and the social world. Regarding language acquisition, Cognitive Linguists emphasise the importance of item-based learning, such as the learning of multi word ‘chunks,’ and they explore ways of helping learners get to grips with the challenge for memory that this entails.

One of the central assumptions underlying research in cognitive linguistics is that language use reflects conceptual structure, and that therefore the study of language can inform us of the mental structures on which language is based. One of the goals of the field is therefore to properly determine what sorts of mental representations are constructed by various sorts of linguistic utterances. Initial research in the field (*e.g.*, Fauconnier 1994, 1997; Lakoff & Johnson 1980; Langacker 1987) was conducted by way of theoretical discussions, which were based on the methods of introspection and rational reasoning. These methods were used to examine diverse topics such as the mental representation of presupposition, negation, counterfactuals and metaphor, to name a few (*cf* Fauconnier 1994).

“Unfortunately, the observation of one’s mental structures via introspection may be limited in its accuracy (*e.g.*, Nisbett & Wilson 1977). As a result, investigators have come to realize that it is important to examine theoretical claims by using experimental methods...”

“The methods that we will discuss are ones that are often used in psycholinguistic research. These are :

- a. Lexical decision and naming features.
- b. Memory measures.
- c. Item recognition measures.

- d. Reading times.
- e. Self report measures.
- f. The effects of language comprehension on a subsequent task.

Each of these methods is based on observing an experimental measure to draw conclusions about the mental representations constructed by a certain linguistic unit."

5. Corpus Linguistics : A corpus is a principled collection of machine-readable authentic spoken or written texts. Corpus studies attempt to identify patterns of language use, *e.g.*, lexicon, grammar, discourse, in a relevant corpus or corpora. These patterns are relevant to a variety of research questions in both linguistics and applied linguistics. Corpus Linguistics is a multi dimensional area. It is an area with a wide spectrum for encompassing all diversities of language use in all domains of linguistic interaction, communication, and comprehension. The introduction of corpus in language study and application has incorporated a new dimension to linguistics.

In principle, Corpus Linguistics is an approach that aims at investigating language and all its properties by analysing large collections of text samples. This approach has been used in a number of research areas for ages : from descriptive study of a language, to language education, to lexicography, etc. It broadly refers to exhaustive analysis of any substantial amount of authentic, spoken and/or written text samples. In general, it covers large amount of machine-readable data of actual language use that includes the collections of literary and non-literary text samples to reflect on both the synchronic and diachronic aspects of a language.

The uniqueness corpus linguistics lies in its way of using modern computer technology in collection of language data, methods used in processing language databases, techniques used in language data and information retrieval, and strategies used in application of these in all kinds language-related research and development activities.

Electronic (digital) language corpus is a new thing. It has a history of nearly half a century. Therefore, we are yet to come to a common consensus as to what counts as corpus, and how it should be designed, developed, classified, processed and utilised. The basic philosophy behind corpus linguistics has two wings : (a) we have a cognitive drive to know how people use language in their daily communication activities, and (b) if it is possible to build up intelligent systems that can efficiently interact with human beings. With this motivation both computer scientists and linguists have come together to develop language corpus that can be used for designing intelligent systems (*e.g.*, machine translation system, language processing system, speech understanding

system, text analysis and understanding system, computer aided instruction system, etc.) for the benefit of the language community at large.

All branches of linguistics and language technology can benefit from insights obtained from analysis of corpora. Thus, description and analysis of linguistic properties collected from a corpus becomes of paramount importance in all many areas of human knowledge and application.

Salient Features of Corpus

Quantity : It should be big in size containing large amount of data either in spoken or written form. Size is virtually the sum of its components, which constitute its body.

Quality (= authenticity). All texts should be obtained from actual examples of speech and writing. The role of a linguist is very important here. He has to verify if language data is collected from ordinary communication, and not from experimental conditions or artificial circumstances.

Representation : It should include samples from a wide range of texts. It should be balanced to all areas of language use to represent maximum linguistic diversities, as future analysis devised on it needs verification and authentication of information from the corpus representing a language.

Simplicity : It should contain plain texts in simple format. This means that we expect an unbroken string of characters (or words) without any additional linguistic information marked-up within texts. A simple plain text is opposed to any kind of annotation with various types of linguistic and non-linguistic information.

Equality : Samples used in corpus should be of even size. However, this is a controversial issue and will not be adopted everywhere. Sampling model may change considerably to make a corpus more representative and multi-dimensional.

Retreavability : Data, information, examples, and references should be easily retrievable from corpus by the end-users. This pays attention to preserving techniques of language data in electronic format in computer. The present technology makes it possible to generate corpus in PC and preserve it in such way that we can easily retrieve data as and when required.

Verifiability : Corpus should be open to any kind of empirical verification. We can use data form corpus for any kind of verification. This puts corpus linguistics steps ahead of intuitive approach to language study.

Augmentation : It should be increased regularly. This will put corpus 'at par' to register linguistic changes occurring in a language in course of time. Over time, by addition of new linguistic data, a corpus achieves historical

dimension for diachronic studies, and for displaying linguistic cues to arrest changes in life and society.

Documentation : Full information of components should be kept separate from the text itself. It is always better to keep documentation information separate from the text, and include only a minimal header containing reference to documentation. In case of corpus management, this allows effective separation of plain texts from annotation with only a small amount of programming effort.

6. Discourse Analysis : Discourse analysis is the study of language in use, both in spoken and written contexts. Discourse analysis (DA) is a broad field of study that draws some of its theories and methods of analysis from disciplines such as linguistics, sociology, philosophy and psychology. More importantly, discourse analysis has provided models and methods of engaging issues that emanate from disciplines such as education, cultural studies, communication and so on. The vast nature of discourse analysis makes it impossible for us to discuss all that the reader needs to know about it in an introductory work of this nature.

What is Discourse Analysis?

The term 'discourse analysis' was first used by the sentence linguist, Zellig Harris in his 1952 article entitled 'Discourse Analysis'. According to him, discourse analysis is a method for the analysis of connected speech or writing, for continuing descriptive linguistics beyond the limit of a simple sentence at a time (Harris 1952). Meanwhile, scholars have attested to the difficulty in coming up with a comprehensive and acceptable definition for discourse analysis. However, a way to simplify the attempt to define discourse analysis is to say that discourse analysis is 'the analysis of discourse'.

7. Learner Autonomy : When we look at learner autonomy and learning strategies, we consider questions such as : 'How do language learners actively approach, manage, and control their own learning processes for the successful completion of learning tasks?' and 'How can learners develop as independent, social, and responsible individuals?'

Learner autonomy can enhance a learning strategy and act as a driver of learner engagement. With an autonomous learning approach, autonomous learners are often better prepared for their job function and life in general.

In many ways, autonomous learning (or independent learning) takes the role of the teacher, educator, or learning admin out of the picture and allows a student to create and follow their own learning process. This pedagogy is more about a learner's ability to take charge of their own learning, learning styles, and goal-setting.

Learners now have a vast array of knowledge constantly available to them. The trick is to organize that knowledge and distribute it to learners to self-access when they need it, or at least have it sorted in a way that allows the learner to know they're able to easily access the information they need when they need it most.

Why establish learner autonomy?

The autonomy of your learners to chart their own course set their own goals, and conduct appropriate self-assessments is an invaluable asset when setting out a learning strategy. Some of the benefits include :

1. The cultivation of a keen sense of life-long independence, both inside and outside of work.
2. An increased sense of intellectual curiosity and a hunger for knowledge that isn't always found to follow common instructional techniques.
3. Fostering innovation and an outside-of-the-box mentality. By providing your learners with the chance to make their own path and set their own learning goals, you are directly empowering their decision-making and allowing them to creatively embark on their own learning adventure.

Creativity also goes hand-in-hand with curiosity and forms the bedrock of what makes individuals pursue lifelong learning. As said by the writer William Arthur Ward, "curiosity is the wick of the candle of learning."

Consider Malcolm Knowles' adult learning theory, which outlines six key principles that are critical to the impact of learning :

1. Learners need to know why, what, and how.
2. Learners want to be autonomous and self-directing.
3. Learners' prior experience is an important consideration.
4. Readiness depends on the learner's needs.
5. Orientation to learning tends to be problem-centered and contextual.
6. Motivation to learn is an intrinsic value, with a personal payoff.

These principles are intended to ensure the learning method used benefits the learner.

8. Morphology : Morphology is the study of words. Morphemes are the minimal units of words that have a meaning and cannot be subdivided further. There are two main types : free and bound. Free morphemes can occur alone and bound morphemes must occur with another morpheme. An example of a free morpheme is "bad", and an example of a bound morpheme is "ly". It is

bound because although it has meaning, it cannot stand alone. It must be attached to another morpheme to produce a word.

Free morpheme : bad

Bound morpheme : ly

Word : badly

When we talk about words, there are two groups : lexical (or content) and function (or grammatical) words. Lexical words are called open class words and include nouns, verbs, adjectives and adverbs. New words can regularly be added to this group. Function words, or closed class words, are conjunctions, prepositions, articles and pronouns; and new words cannot be (or are very rarely) added to this class.

Affixes are often the bound morpheme. This group includes prefixes, suffixes, infixes, and circumfixes. Prefixes are added to the beginning of another morpheme, suffixes are added to the end, infixes are inserted into other morphemes, and circumfixes are attached to another morpheme at the beginning and end. Following are examples of each of these :

Prefix : re-added to do produces redo

Suffix : -or- added to edit produces editor

Infix : -um- added to fikas (strong) produces fumikas (to be strong) in Bontoc

Circumfix : ge- and -t to lieb (love) produces geliebt (loved) in German

There are two categories of affixes : derivational and inflectional. The main difference between the two is that derivational affixes are added to morphemes to form new words that may or may not be the same part of speech and inflectional affixes are added to the end of an existing word for purely grammatical reasons. In English there are only eight total inflectional affixes :

-s	3rd person singular present	she waits
-ed	past tense	he walked
-ing	progressive	she's watching
-en	past participle	she has eaten
-s	plural	three tables
-'s	possessive	Holly's cat
-er	comparative	you are taller
-est	superlative	you are the tallest

The other type of bound morphemes are called bound roots. These are morphemes (and not affixes) that must be attached to another morpheme and do not have a meaning of their own. Some examples are ceive in perceive and mit in submit.

English Morphemes**Free**

Open Class

Closed Class

Bound

Affix

1. Derivational

2. Inflectional

Root

There are six ways to form new words. Compounds are a combination of words, acronyms are derived from the initials of words, back-formations are created from removing what is mistakenly considered to be an affix, abbreviations or clippings are shortening longer words, eponyms are created from proper nouns (names), and blending is combining parts of words into one.

Compound : doghouse

Acronym : NBA (National Basketball Association) or scuba (self-contained underwater breathing apparatus)

Back-formation : edit from editor

Abbreviation : phone from telephone

Eponym : sandwich from Earl of Sandwich

Blending : smog from smoke and fog

9. Prosody : Prosody and intonation, *i.e.*, the rhythm, timing and tune of speech, are an important part of spoken language. Prosody and intonation have a huge range of functions, including focusing attention on particular parts of a spoken message and organising discourse, signaling syntactic structure and showing the attitudes and emotions of the speaker. Research carried out by members of the School has looked at some of these functions of prosody and intonation in English and other languages, including the interaction of prosody and focus, and prosody and syntax.

10. Psycholinguistics : Psycholinguistics is the study of the mental representations and processes used in the production and comprehension of language. Psycholinguistics deals mainly with language understanding, production and acquisition. It is a part of cognitive science that comprises psychology, linguistics, anthropology, neuro-science and computer science. The neurology of language functioning is of current interest to psycho linguists, particularly to those studying sex differences, aphasia, language after congenital or acquired injury to the immature brain, and developmental disorders of language (dysphasia). Some psycho linguists have also extended

their interests to experiments in nonhuman language learning (*e.g.*, gorillas and chimpanzees) to discover if language as we know it is a uniquely human phenomenon.

The study of language science that decodes how a human brain acquires language, processes it, comprehends it and gives feedback or produces language, is a psycholinguistics. Psycholinguistics is an interdisciplinary field. Hence, it is approached from the areas of different backgrounds, such as psychology, cognitive science linguistics, and speech and language pathology. It further has subdivisions; such as Orthography, Phonology, Semantics, Syntax.

Theories in Psycholinguistics

(i) Behaviorist Theory : The behaviorist theory of language learning emphasizes that language learning is a process of habit formation. Language Learning involves a period of trial and error where the child tries and fails to use correct language until it succeeds. Infants also have human role models in their environment that provide the stimuli and rewards required for operant conditioning. For example, if a child starts babblings, which resembles appropriate words, then his or her babbling will be rewarded by a parent or loved one by positive reinforcement such as a smile or clap.

(ii) Innateness Theory : Noam Chomsky's innateness theory (or nativity theory) proposes that children have an inborn or innate faculty for language acquisition that is biologically determined. It seems that the human species has evolved a brain whose neural circuits contain linguistic information at birth and this natural predisposition to learn language is triggered by hearing speech. The child's brain is then able to interpret what she or he hears according to the underlying principles or structure it already contains.

(iii) Cognitive Theory : A child first becomes aware of a concept such as relative size and only afterward do they acquire the words and patterns to convey that concept. Essentially it is impossible for a young child to voice concepts that are unknown to them and therefore once a child learns about their environment then they can map language onto their prior experience. An infant's experience of a cat is that it meows, is furry and eats from a bowl in the kitchen; hence they develop the concept of cat first and then learn to map the word "kitty" onto that concept.

(v) Social Interactionist Theory : Children can be influenced by their environment as well as the language input children receive from their care-givers. The child is a little linguist analyzing language from randomly encountered adult utterances. The interaction theory proposes that language exists for the purpose of communication and can only be learned in the context of interaction with adults and older children.

(v) Usage Based Theory : The usage-based theory of language suggests that children initially build up their language through very concrete constructions based around individual words or frames on the basis of the speech they hear and use. The child learns language from their language experiences and a language structure emerges from language use. For instance, quotable quotes, catchy words are this category.

Constructions gradually become more general and more abstract during the third and fourth years of life and grammar emerges as the speakers of a language create linguistic constructions out of recurring sequences of symbols.

(vi) Optimality Theory : A constraint is a structural requirement that may be either satisfied or violated by an output form and a surface form. A constraint is considered optimal if it incurs the least serious violations of a set of constraints, taking into account their hierarchical ranking. In optimality theory, the essence of both language learning in general (learn ability) and language acquisition (actual development children go through) entails the rankings of constraints from an initial state of the grammar to the language specific ranking of the target grammar.

Example : Thoothukudi became Tuticorin, Thiruvananthapuram became Tiruvandram and Sozhar Temple into Chola Temple so on. Changes occurred in Tamil letters. Changes in pronunciation like Haiinto Hi from Hahoi then Hullo, Hello, Hallo.

11. Second Language Acquisition : Second Language Acquisition (SLA) is a broad research field. Its interests include the roles of task-based interaction, feedback and focus on form in language learning, socio-cultural perspectives on language learning, learner autonomy, and acquisition of inter cultural competence (including inter cultural pragmatics).

Second language acquisition, or sequential language acquisition, is learning a second language after a first language is already established. Many times this happens when a child who speaks a language other than English goes to school for the first time. Children have an easier time learning a second language, but anyone can do it at any age. It takes a lot of practice.

What is the best way to teach a second language?

There are many different things that factor into the decision about how to teach a person a second language, including the following :

1. language spoken in the home
2. amount of opportunity to practice the second language
3. internal motivation of the learner
4. reason that the second language is needed (e.g., to learn at school, to talk to a friend, or for work)

There are different ways that to introduce the second language :

1. by setting (*e.g.*, English is spoken only in the school, and Urdu is spoken only in the home)
2. by topic (*e.g.*, French is spoken only during meal time, and Spanish is spoken during school/work activities)
3. by speaker (*e.g.*, Mom will speak only in German, and Dad speaks Russian only)

The ability of a person to use a second language will depend on his or her family's ability to speak more than one language. It is important for parents/care givers to provide a strong language model. If you cannot use the language well, you should not be teaching it.

12. Sociolinguistics : Sociolinguistic research examines the way language is used in different social contexts. A term sociolinguistics is a derivational word. Two words that form it are sociology and linguistics. Sociology refers to a science of society; and linguistics refers to a science of language. A study of language from the perspective of society may be thought as linguistics plus sociology. Some investigators have found it to introduce a distinction between sociolinguistics and sociology of language. Some others regard sociolinguistics is often referred as the sociology of language.

Sociolinguistics is defined as : The study that is concerned with the relationship between language and the context in which it is used. In other words, it studies the relationship between language and society. It explains we people speak differently in different social contexts. It discusses the social functions of language and the ways it is used to convey social meaning. All of the topics provides a lot of information about the language works, as well as about the social relationships in a community, and the way people signal aspects of their social identity through their language (Holmes, 2001) Sociolinguistics is "the study that is concerned with the interaction of language and setting" (Eastman, 1975). It is the study that is concerned with investigating the relationship between language and society with the goal of a better understanding of the structure of language and of how languages function in communication (Wardhaugh, 1986).

13. Syntax : Syntax is the study of the rules governing the way words are combined to form sentences. Syntax refers to "the whole system and structure of a language or of languages in general, usually taken as consisting of syntax and morphology (including inflections) and sometimes also phonology and semantics.". It includes the syntax, but it's not limited to that. The syntax of a language is also referred as, "The arrangement of words and phrases to create well-formed sentences in a language.", "The grammatical structure of words and phrases to create coherent sentences.

Syntax is roughly about word order. Grammar has two overlapping meanings :

1. Everything about how a language works, including syntax as a subset.
2. How words are inflected, conjugated, declined according to aspect, degree, gender, mood, number, person, tense, etc.

One part of grammar is called Morphology. It has to do with the internal economy of words. So a word like bookkeepers has four morphemes (book, keep, -er, -s) and is put together with morphology. The other part is called Syntax.

It has to do with the external economy of words, including word order, agreement; like the sentence For me to call her sister would be a bad idea and its syntactic transform It would be a bad idea for me to call her sister. That's syntax. English grammar is mostly syntax.

From the other perspective, the syntax is defined as the study of arrangements of words into phrases, clauses, and sentences or syntactical constructions. The smallest units of syntax are words. When two or more words are arranged in a certain way, the result refers to syntactical construction.

In other words, it can be said that a syntactical construction is a construction in which its immediate constituents (IC-a) are words (or free morphemes). An immediate constituent (IC) refers to a constituent (or element) that directly form the construction. As has been mentioned before, the smallest units of syntax are words. Then, words will be discussed in the following.

Based on one perspective, grammarians classify the words into eight types of parts of speech in the English language : noun, pronoun, verb, adjective, adverb, preposition, conjunction, and interjection. The part of speech indicates how the word functions in meaning as well as grammatically within the sentence. An individual word can function as more than one part of speech when used in different circumstances. Understanding parts of speech is essential for determining the correct definition of a word when using the dictionary. Meanwhile, structural linguists classify words into two great classes : content and function words.

14. Testing and Assessment : The central concerns of language testing include the development, validation, and analysis of language tests. Language assessment, on the other hand, focuses more on the classroom use of language assessment for the purposes of learning and teaching.

15. Vocabulary : Vocabulary has received a great deal of attention in the literature on language learning in recent years and has been an area of strength in the School since the 1960s.

In Linguistic research, it is often a descriptive quantitative approach which is used to analyse the speech products or the texts, while the process is just superficially touched.

Meanwhile, it is through the use of qualitative research we can uncover the process and its intricate details of the phenomena which are difficult to convey with quantitative methods.

When to use Qualitative Method in Linguistic Research?

Although qualitative research methods are often referred to a non-mathematical analytic procedure that results in research findings, the notion that qualitative research is non-quantitative is true but uninformative. The choice of using qualitative methods should not downplay statistical techniques of the kinds of quantitative methods. The same reminder also applies to the use of quantitative methods over qualitative methods. The choice between different research methods should depend upon what the researcher is trying to find. In a survey of discovering how many people use standard language compared to using local language, quantitative method may seem to be the most appropriate choice.

However, if we are more concerned with exploring why in a certain area people prefer the use of a certain language uncommon to the local standard language, then qualitative method may be favoured. Hence, the choice of using qualitative research mainly depends on what it is that the researcher wants to find out.

Qualitative methods are used because they are more adaptable to dealing with multiple realities. Qualitative research is often done by researchers in the social and behavioural sciences, as well as by practitioners in fields that concern with issues related to human behaviour and functioning. Many sociolinguistic researches have been dealing with human behaviour. There is a common belief that qualitative researchers can in fact provide a deeper understanding of social phenomena than would be obtained from quantitative data. To find out why some people prefer using hints instead of using direct requests for instance, the use of qualitative methods may uncover a deeper understanding of their behavior. This is also supported by Lincoln and Guba (1985) who maintain that since qualitative researchers are used to probing for possible meanings, they are more sensitive to and adaptable to the many mutually shaping influences and value patterns that may be encountered. Eventually, it will also allow researchers to show empathy and deeper understanding of their respondents' behavior. Qualitative research does not concern with the number of sample used in the research, but on sample(s) who can provide a lot of answers to the research question. It is also not meant to

make any generalization about a certain phenomenon. Sample should be selected purposively to be able to provide rich data to the researcher. So, the choice of using qualitative may be due to the need of giving rich answer rather than for making generalization. Many qualitative researches do imply a commitment to field activities. In an observation on classroom behavior, Mehan (as quoted by Silverman, 2001) suggests that the quantitative approach to classroom observation is useful for certain purposes, namely, for providing the frequency of teacher talk by comparison with student talk. He further mentions, that this approach minimizes the contribution of students, neglects the inter-relationship of verbal to non-verbal behavior, obscures the contingent nature of interaction, and ignores the multiple functions of language. This is to say that field activities are significant in qualitative research. Therefore, linguistic research, where natural speech acts, natural settings and field activities are needed would be best carried out in qualitative methods.

How to Analyze and Report the Findings?

One noted difference between doing quantitative research and qualitative research is the amount of the gathered data. In doing qualitative research the researcher usually has piles of collected data in the forms of journal writings, transcripts of interviews, documents, results of triangulation, and field notes, which are not as easy to organize as in quantitative data findings which are often helped by the use of computer. The use of coding method as suggested by Strauss and Corbin (1990) is usually helpful to make the report more organized. Analysis of data is done during and after the field research. The working hypotheses during the field research should continuously be checked, noted and compared.

The case study reporting mode is likely to be preferred. Qualitative researchers argue that case study reporting mode is more adapted to a description of the multiple realities encountered at any given site. It is also adaptable to demonstrating the researcher's interaction with the site and consequent biases that may result. Narration is also often used in the report, because it is suited to demonstrating the variety of mutually shaping influences present, and picture the value positions of researcher, substantive theory, methodological paradigm, and local contextual values.

Qualitative analysis : Richness and Precision

The aim of qualitative analysis is a complete, detailed description. No attempt is made to assign frequencies to the linguistic features which are identified in the data, and rare phenomena receives (or should receive) the same amount of attention as more frequent phenomena. Qualitative analysis allows for fine distinctions to be drawn because it is not necessary to shoehorn the data into a finite number of classifications. Ambiguities, which are

inherent in human language, can be recognised in the analysis. For example, the word "red" could be used in a corpus to signify the colour red, or as a political categorisation (e.g., socialism or communism). In a qualitative analysis both senses of red in the phrase "the red flag" could be recognised.

The main disadvantage of qualitative approaches to corpus analysis is that their findings cannot be extended to wider populations with the same degree of certainty that quantitative analyses can. This is because the findings of the research are not tested to discover whether they are statistically significant or due to chance.

Quantitative analysis : Statistically reliable and generalizable results

In quantitative research we classify features, count them, and even construct more complex statistical models in an attempt to explain what is observed. Findings can be generalised to a larger population, and direct comparisons can be made between two corpora, so long as valid sampling and significance techniques have been used. Thus, quantitative analysis allows us to discover which phenomena are likely to be genuine reflections of the behaviour of a language or variety and which are merely chance occurrences. The more basic task of just looking at a single language variety allows one to get a precise picture of the frequency and rarity of particular phenomena and thus their relative normality or abnormality.

However, the picture of the data which emerges from quantitative analysis is less rich than that obtained from qualitative analysis. For statistical purposes, classifications have to be of the hard- and-fast (so-called "Aristotelian" type). An item either belongs to class x or it doesn't. So in the above example about the phrase "the red flag" we would have to decide whether to classify "red" as "politics" or "colour." As can be seen, many linguistic terms and phenomena do not therefore belong to simple, single categories : rather they are more consistent with the recent notion of "fuzzy sets" as in the red example. Quantitative analysis is therefore an idealisation of the data in some cases. Also, quantitative analysis tends to sideline rare occurrences. To ensure that certain statistical tests (such as chi-squared) provide reliable results, it is essential that minimum frequencies are obtained - meaning that categories may have to be collapsed into one another resulting in a loss of data richness.

Quantitative Research in linguistics

Quantitative linguistics (QL) is a sub-discipline of general linguistics and, more specifically, of mathematical linguistics. Quantitative linguistics deals with language learning, language change, and application as well as structure of natural languages. QL investigates languages using statistical methods; its most demanding objective is the formulation of language laws and, ultimately, of a general theory of language in the sense of a set of interrelated languages

laws. Synergetic linguistics was from its very beginning specifically designed for this purpose. QL is empirically based on the results of language statistics, a field which can be interpreted as statistics of languages or as statistics of any linguistic object. This field is not necessarily connected to substantial theoretical ambitions. Corpus linguistics and computational linguistics are other fields which contribute important empirical evidence.

History

The earliest QL approaches date back in the ancient Greek and Indian world. One of the historical sources consists of applications of combinatorics to linguistic matters, another one is based on elementary statistical studies, which can be found under the header colometry and stichometry.

Language laws in quantitative linguistics

In QL, the concept of law is understood as the class of law hypotheses which have been deduced from theoretical assumptions, are mathematically formulated, are interrelated with other laws in the field, and have sufficiently and successfully been tested on empirical data, *i.e.*, which could not be refuted in spite of much effort to do so. Köhler writes about QL laws: "Moreover, it can be shown that these properties of linguistic elements and of the relations among them abide by universal laws which can be formulated strictly mathematically in the same way as common in the natural sciences. One has to bear in mind in this context that these laws are of stochastic nature; they are not observed in every single case (this would be neither necessary nor possible); they rather determine the probabilities of the events or proportions under study. It is easy to find counterexamples to each of the above-mentioned examples; nevertheless, these cases do not violate the corresponding laws as variations around the statistical mean are not only admissible but even essential; they are themselves quantitatively exactly determined by the corresponding laws. This situation does not differ from that in the natural sciences, which have since long abandoned the old deterministic and causal views of the world and replaced them by statistical/probabilistic models."

Some linguistic laws

There exist quite a number of proposed language laws, among them are :

Law of diversification : If linguistic categories such as parts-of-speech or inflectional endings appear in various forms it can be shown that the frequencies of their occurrences in texts are controlled by laws.

Length (or more generally, complexity) distributions : The investigation of text or dictionary frequencies of units of any kind with regard to their lengths yields regularly a number of distributions, depending on the given kind of the unit under study. By now, the following units have been studied :

Law of the distribution of morph lengths;

Law of the distribution of the lengths of rhythmical units;

3. Law of the distribution of sentence lengths;

4. Law of the distribution of syllable lengths;

5. Law of the distribution of word lengths;

Other linguistic units which also abide by this law are *e.g.*, letters (characters) of different complexities, the lengths of the so-called herbs and of speech acts. The same holds for the distributions of sounds (phones) of different durations.

Martin's law : This law concerns lexical chains which are obtained by looking up the definition of a word in a dictionary, then looking up the definition of the definition just obtained etc. Finally, all these definitions form a hierarchy of more and more general meanings, whereby the number of definitions decreases with increasing generality. Among the levels of this kind of hierarchy, there exists a number of lawful relations.

Menzerath's law (also, in particular in linguistics, Menzerath-Altmann law) : This law states that the sizes of the constituents of a construction decrease with increasing size of the construction under study. The longer, *e.g.*, a sentence (measured in terms of the number of clauses) the shorter the clauses (measured in terms of the number of words), or : the longer a word (in syllables or morphs) the shorter the syllables or words in sounds).

Rank-frequency laws : Virtually any kind of linguistic units abides by these relations. We will give here only a few illustrative examples :

1. The words of a text are arranged according their text frequency and assigned a rank number and the corresponding frequency. Since George Kingsley Zipf (the well-known "Zipf's Law"), a large number of mathematical models of the relation between rank and frequency has been proposed.
2. A similar distribution between rank and frequency of sounds, phonemes, and letters can be observed.
3. Word associations: Rank and frequency of associations subjects react with on a (word) stimulus.

Law of language change : Growth processes in language such as vocabulary growth, the dispersion of foreign or loan words, changes in the inflectional system etc., abide by a law known in QL as Piotrowski law, and corresponds to growth models in other scientific disciplines. The Piotrowski law is a case of the so-called logistic model (cf. logistic equation). It was shown that it covers also language acquisition processes (cf. language acquisition law).

Text block law : Linguistic units (*e.g.*, words, letters, syntactic functions and constructions) show a specific frequency distribution in equally large text blocks.

Zipf's law : The frequency of words is inversely proportional to their rank in frequency lists.

Stylistics

Stylistics is a branch of applied linguistics concerned with the study of style in texts, especially, but not exclusively, in literary works. Also called literary linguistics, stylistics focuses on the figures, tropes, and other rhetorical devices used to provide variety and a distinctness to someone's writing. It is linguistic analysis plus literary criticism.

According to Katie Wales in "A Dictionary of Stylistics," the goal of "most stylistics is not simply to describe the formal features of texts for their own sake, but in order to show their functional significance for the interpretation of the text; or in order to relate literary effects to linguistic 'causes' where these are felt to be relevant."

Studying a text closely helps to unearth layers of meaning that run deeper than just the basic plot, which happens on the surface level.

Elements of Style in Literature

Elements of style studied in literary works are what is up for discussion in any literature or writing class, such as :

Big-Picture Elements

1. **Character development :** How a character changes throughout the story?
2. **Dialogue :** Lines spoken or internal thoughts.
3. **Foreshadowing :** Hints dropped about what's going to happen later.
4. **Form :** Whether something is poetry, prose, drama, a short story, a sonnet, etc.
5. **Imagery :** Scenes set or items shown with descriptive words.
6. **Irony :** An occurrence that's the opposite of what's expected.
7. **Juxtaposition :** Putting two elements together to compare or contrast them.
8. **Mood :** The atmosphere of a work, the attitude of the narrator.
9. **Pacing :** How quickly the narration unfolds?
10. **Point of view :** The narrator's perspective; first person (I) or third person (he or she).

11. Structure : How a story is told (beginning, action, climax, denouement) or how a piece is organized (introduction, main body, conclusion vs. reverse-pyramid journalistic style)?

12. Symbolism : Using an element of the story to represent something else.

13. Theme : A message delivered by or shown in a work; its central topic or big idea.

14. Tone : The writer's attitude toward the subject or manner with choosing vocabulary and presenting information, such as informal or formal.

Line-by-Line Elements

1. Alliteration : Close repetition of consonants, used for effect.

2. Assonance : Close repetition of vowels, used for effect.

3. Colloquialisms : Informal words, such as slang and regional terms.

4. Diction : The correctness of the overall grammar (big picture) or how characters speak, such as with an accent or with poor grammar.

5. Jargon : Terms specific to a certain field.

6. Metaphor : A means to compare two elements (Can also be big-picture if an entire story or scene is laid out to show a parallel with something else).

7. Repetition : Using the same words or phrases in a short amount of time for emphasis.

8. Rhyme : When the same sounds appear in two or more words.

9. Rhythm : having a musicality to the writing such as by using stressed and unstressed syllables in a line of poetry or sentence variety or repetition in a paragraph.

10. Sentence variety : Variation in the structure and length of consecutive sentences.

11. Syntax : The arrangement of words in a sentence.

Stylisticians

In many ways, stylistics is an interdisciplinary study of textual interpretations, using both language comprehension and an understanding of social dynamics. A stylistician's textual analysis is influenced by rhetoric reasoning and history.

Michael Burke describes the field in "The Routledge Handbook of Stylistics" as an empirical or forensic discourse critique, wherein the stylistician is : "a person who with his/her detailed knowledge of the workings of morphology, phonology, lexis, syntax, semantics, and various discourse and pragmatic models, goes in search of language-based evidence in order to

support or indeed challenge the subjective interpretations and evaluations of various critics and cultural commentators.”

Burke paints stylisticians, then, as a kind of Sherlock Holmes character who has expertise in grammar and rhetoric and a love of literature and other creative texts, picking apart the details on how they operate piece by piece-observing style as it informs meaning, as it informs comprehension.

There are various overlapping sub disciplines of stylistics, and a person who studies any of these is known as a stylistician :

1. **Literary stylistics** : Studying forms, such as poetry, drama, and prose.
2. **Interpretive stylistics** : How the linguistic elements work to create meaningful art?
3. **Evaluative stylistics** : How an author’s style works-or doesn’t-in the work?
4. **Corpus stylistics** : Studying the frequency of various elements in a text, such as to determine the authenticity of a manuscript.
5. **Discourse stylistics** : How language in use creates meaning, such as studying parallelism, assonance, alliteration, and rhyme?
6. **Feminist stylistics** : Commonalities among women’s writing, how writing is engendered, and how women’s writing is read differently than men’s.
7. **Computational stylistics** : Using computers to analyse a text and determine a writer’s style.
8. **Cognitive stylistics** : The study of what happens in the mind when it encounters language.

Conclusion

This chapter has dealt with the various dimensions of research in English language and English Literature. It has guided in regards of kinds of research possible in English literature and English linguistics. Also it has acquainted us with qualitative and quantitative research in Linguistics. The next chapter has dealt with development, hypothesis and preparation of research proposal.

Summary

There are two types of research which can be done to develop a thesis or dissertation :

- (1) **Practical Research** : The practical approach consists of the empirical study of the topic under research and chiefly consists of hands on approach. This involves first hand research form of questionnaires, surveys, interviews, observations and discussion groups.

(2) Theoretical Research : A non-empirical approach to research, this usually involves perusal of mostly published works like researching through archives of public libraries, court rooms and published academic journals.

(3) Qualitative research methods involve describing in details specific situation using research tools like interviews, surveys, and Observations. Qualitative Research is primarily exploratory research. It is used to gain an understanding of underlying reasons, opinions, and motivations. It provides insights into the problem or helps to develop ideas or hypotheses for potential quantitative research.

(4) Quantitative research methods require quantifiable data involving numerical and statistical explanations. Quantitative Research is used to quantify the problem by way of generating numerical data or data that can be transformed into useable statistics. It is used to quantify attitudes, opinions, behaviors, and other defined variables and generalize results from a larger sample population. Quantitative Research uses measurable data to formulate facts and uncover patterns in research.

QUESTIONNAIRES

■ Multiple Choice Questions

1. Who among these is an ancient linguist of India?
 - (a) Patanjali
 - (b) Tista Bagchi
 - (c) Noam Chomsky
 - (d) Kshetresa Chandra Chattopadhyaya
2. Which of these people perceives language as a means to interpret human experience?
 - (a) Anthropologist
 - (b) Sociologist
 - (c) Philosopher
 - (d) Students of literature
3. Language is a social phenomenon.
 - (a) True
 - (b) False
4. Which of these words is based on the phenomena, 'Onomatopoeia'?
 - (a) Cuckoo
 - (b) Book
 - (c) Door
 - (d) Blackboard

5. Which of these is not a type of linguistics?
 - (a) Historical
 - (b) Personal
 - (c) Comparative
 - (d) Synchronic
6. Which of these finds out how a certain set of people use a language at a given time?
 - (a) Diachronic Linguistics
 - (b) Comparative Linguistics
 - (c) Synchronic Linguistics
 - (d) Historical Linguistics
7. Which of these is not a level of language?
 - (a) Phonology
 - (b) Grammar
 - (c) Running
 - (d) Semantics
8. Which of these terms refers to the study of speech sounds of a given language and their function within the sound system of that language?
 - (a) Phonetics
 - (b) Phonology
 - (c) Syntax
 - (d) Morphology
9. Which of these is the study of meaning of words, and the development of the meaning of words?
 - (a) Morphemics
 - (b) Phonetics
 - (c) Semantics
 - (d) Syntax
10. The process by which children are socialized both through and to use language within a community relates to :
 - (a) enculturation
 - (b) assimilation
 - (c) accommodation
 - (d) language socialization
11. The view that language reflects rather than determines our thinking and perceptions relates to:
 - (a) the Sapir-Whorf hypothesis

- (b) linguistic relativity
- (c) language socialization
- (d) language acquisition

■ **Short Answers Type Questions**

1. What are the two types of research that can be done to develop thesis?
2. What is qualitative research method?
3. What is quantitative research method?
4. What is Correlation/ Regression analysis method?
5. What criterion is involved in selecting qualitative or quantitative analysis?
6. What is descriptive research?
7. What is co relational research?
8. What is explanatory research?
9. What is exploratory research?
10. What is Psycholinguistics?
11. What is Second Language Acquisition?
12. What is Martin's law?
13. What is Menzareth's law?

■ **Long Answers Type Questions**

1. Explain in detail Stylisticians.
2. How many kind of research possible in English Linguistics?
3. How many kind of research possible in English Language?
4. Explain dimensions of research in English Linguistics

Answers

➤ **Multiple Choice Questions**

- | | | | | | | | |
|--------|---------|---------|--------|--------|--------|--------|--------|
| 1. (a) | 2. (c) | 3. (a) | 4. (a) | 5. (b) | 6. (c) | 7. (c) | 8. (b) |
| 9. (c) | 10. (d) | 11. (b) | | | | | |

सर्वे भवन्तु सुखिनः सर्वे सन्तु निरामयाः ।
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