
UNIT 5 DESCRIPTIVE RESEARCH

Structure

- 5.1 Introduction
- 5.2 Objectives
- 5.3 Meaning and Nature of Descriptive Survey Research
- 5.4 Types of Descriptive Survey Studies
 - 5.4.1 Census Survey
 - 5.4.2 Sample Survey
 - 5.4.3 Cross Sectional Survey
 - 5.4.4 Longitudinal Survey
 - 5.4.5 Comparative Survey
 - 5.4.6 Evaluative Survey
 - 5.4.7 Documentary Survey
- 5.5 Steps of Conducting Descriptive Research
- 5.6 Context and Relevance of Descriptive Studies in Educational Research
- 5.7 Let Us Sum Up
- 5.8 Unit-end Activities
- 5.9 Points for Discussion
- 5.10 Suggested Readings
- 5.11 Answers to Check Your Progress

5.1 INTRODUCTION

One of the basic functions of research is to understand the nature of the problem and to identify various factors that contribute towards the occurrence of events. Descriptive Surveys are prominent methods of conducting exploratory research in the area of social sciences. Moreover, in the field of education you will come across a large majority of descriptive studies / surveys conducted all over the world. This unit will be devoted to the conceptual clarity of descriptive surveys and procedural details of conducting different kinds of surveys in education viz., census survey, sample survey, cross section survey, longitudinal survey, comparative survey, evaluation studies and document analysis.

5.2 OBJECTIVES

After going through this unit you will be able to:

- define descriptive survey research
- discuss significance of different types of descriptive surveys
- identify main features of different types of surveys
- prepare outline of any type of surveys
- analyse strengths and precautions in conducting survey studies in education.

5.3 MEANING AND NATURE OF DESCRIPTIVE SURVEY RESEARCH

The terminology of descriptive survey research is designed to obtain pertinent and precise information concerning the existing status of phenomena and, whenever possible, to draw valid generalisations for the facts discovered without making any interference or control over the situation. Such type of studies are restricted not only to fact finding but may often result in the formulation of important principles of knowledge and solution of significant problems concerning local, state, national and international issues. Descriptive surveys collect and provide three types of information: (i) of what exists with respect to variables or conditions in a situation; (ii) of what we want by identifying standards or norms with which to compare the present conditions or what experts consider to be desirable; and (iii) of how to achieve a goal, by exploring possible ways and means on the basis of the experience of others or opinions of experts.

Descriptive surveys investigate phenomena in their natural setting. Their purpose is both immediate and long range. They constitute a primitive type research, and do not aspire to develop an organized body of scientific laws. Such surveys, however, provide information useful to the solution of problems and at times provide data to form the basis of research of a more fundamental nature.

Descriptive research survey is most popular in educational research. It provides a sound database for other kinds of research. As discussed, in any kind of inquiry the researcher must have a clear understanding of the situation. Such understanding is based on data based evidences on its present status, the trend of its development, perception of affected population about the situation or event, associated events concerned with the situation etc. We conduct an exploratory survey of the present status of a phenomenon on different components, with a particular perspective and given context of events. For example, you may come across the problem of intense absenteeism in your village school. In the process of arriving at a solution of the problem you will have to understand who are the absentees? What are their family backgrounds? What are the different causes for their absenteeism? What do their parents opine about solving the problem? What is the opinion of community members about it? etc. Such type of problems need to be understood with supportive empirical evidences. Hence, understanding of complex problems concerning the education system through surveys are helpful in generating an information data base, which can form the basis for identifying significant factors, variables and trends. Further, such an information base helps us to formulate hypotheses about relationships of different variables there by leading to the theorization process. It may be pointed out that descriptive surveys vary greatly in complexity. At one extreme, they constitute nothing more than a frequency count of events to the study of local problems without any significant purpose. At the other extreme, they attempt to ascertain significant relationships among phenomena.

5.4 TYPES OF DESCRIPTIVE SURVEY STUDIES

There are different types of descriptive survey studies which can be classified from different angles such as

- Coverage of population and units of respondents
- Time of events or stages of events studied
- Nature of data and methods and involved
- Purpose of the study.

The most prominent type of survey can be identified as census survey and sample survey. Such classification is done according to population of the study and its coverage. Another classification may be noticed with regard to coverage of time or stages of

events studied i.e., in terms of longitudinal and cross-sectional surveys. A third category of survey may be on the basis of methods of conducting empirical studies i.e., by administering questionnaires, interviews or observations and doing document analysis. Another way of classifying surveys is according to purpose of study. For example, status surveys, comparative surveys and evaluation surveys. In the following discussion, you will study the nature of surveys, relevance and procedural details of various types of surveys which include: Census survey; Sample survey; Longitudinal survey; Cross sectional survey; Comparative survey; Evaluation survey and Documentary survey.

5.4.1 Census Survey

Census survey means gathering pertinent information about all the units of population viz., people, institutions, householders, etc. As you know, population may consist of persons, institutions, objects, attributes, qualities, families, etc. A population is a well defined group of many of these. For instance, the census survey of India, which takes place once in ten years gathers bench mark data about each and every household of India. Since it concentrates on each and every household it restricts its scope to certain surface level demographic data like age, sex, income, education, lands possessed, cattle, nature of house, domestic facilities available, etc. The studies are conducted through quick survey in a stipulated period. However, coverage of units are very exhaustive.

The census survey as a method of research in education can be employed to understand educational problems and make policy decisions. For instance, attaining the goal of 'education for all' through 'Sarv Siksha Abhiyan' you will have to stress on grass root level planning where the issues concerning accessibility of schooling, retention in classes and success in examinations of every child are to be dealt with systematically. In this context, gathering information about each child enrolled in a primary school would mean a census survey. Let us take another example. In a district, the base line data concerning each primary school on different dimensions like physical facilities, teachers, students, working days, hours of school, curricular practices, examinations and achievement of students can be gathered through a census survey. Gathering detailed information about each unit of population on a continuous basis can constitute a huge database. Such kind of database facilities on school education are encouraged through Education Management Information System (EMIS) at every district level in India. On the basis of hand database, one can establish trends of different events, rate of success or failure of certain programmes over a period of time, intensity of a problem, coverage of target group learners in a school system etc. Such analysis can be useful to frame broad research questions concerning different factors of educational developments, which may be answered through further research.

Strength of Census Survey

The strength of census survey is associated with generalized characteristics of data. Description of population data acts as a major source of identifying several pertinent issues and questions for research. It is very useful in making trend analysis of different events. Moreover, hard data base system of the entire population is very useful in development of strategic planning and policy making of education at the micro level as well as at the macro level.

Limitations of Census Survey

As discussed, each and every unit of population is covered under census survey. However, data are gathered on limited headings. Also, these data are of surface level. Through census survey one can go for gathering nominal data. Thus the researcher cannot inquire on questions in depth. Many a time such data are gathered mechanically where the investigators are not well trained about cross examining the evidence at field level. In such cases, the probability of getting valid data is also minimised. Census surveys involve employment of huge manpower and monetary resources. It is time

consuming too. Getting co-operation of each respondent/unit of study for data collection sometimes create many problems in the study. Hence, feasibility of conducting census studies is very limited. Moreover, because of sample surveys many questions can be well answered by saving time, money and human resources hence, one may look for census studies with limited focus of research.

5.4.2 Sample Survey

Sample survey means gathering relevant information about a smaller representation of the population under study. The data gathered through sample survey are generalized to the population of the study. For example, opinion of a sample of distance learners drawn from a particular district towards usefulness of media in open and distance education can be generalized as opinion of all the distance learners of that district. Educational research invariably makes use of sample surveys.

Reasons for Conducting Sample Surveys

Sample surveys are preferred to census surveys on the following grounds:

- i) **Reduced Cost:** Data collected from a small fraction of population involves lesser expense than that of census survey.
- ii) **Greater Speed:** Since the size of respondents is smaller than the whole population, the volume of data are smaller. Hence, it is economical in terms of gathering evidence, tabulating them and processing them quickly.
- iii) **Greater Scope:** Unlike census studies where limited information is gathered from the whole population the sample surveys cover a wide range of data on different dimensions of the study.
- iv) **Greater Accuracy:** With reduced volume of work using expert and trained personnel, and application of appropriate monitoring mechanism of data collection and analysis there is a greater chance of gathering valid data and its appropriate processing. Moreover, sampling is particularly more important in obtaining accurate results about phenomena which are undergoing rapid changes such as opinions about political and social issues and their impact on education.

Characteristics of Sample Surveys

Sample surveys have specific characteristics viz., application of appropriate sampling techniques with a view to ascertaining representativeness of units under investigation; use of appropriate data gathering tools, mainly, questionnaires, interview schedules, observation schedules and checklists/proforma for record surveys; and use of appropriate techniques of data analysis for drawing inferences about population.

You will study about the nature of sampling, data gathering tools and data analysis techniques separately in Block 3 and 4 respectively. However, you are required to keep in mind the following things while undertaking sample surveys:

- Whether the sample drawn from the population represents the same with high probability or not?
- Whether the tools employed for data collection are specifically designed to gather evidence from identified group of sample units or not?
- Whether appropriate analysis techniques are applied or not in the context of specific objectives or not?
- With what probability the findings are generally stable to the population?

Examples of Sample Surveys

You may come across a number of studies in education, which are of status survey nature like:

1. Attitude of parents towards mid day meal scheme in primary schools.
2. Causes of dropouts among distance learners as perceived by teachers of IGNOU.
3. Attitude of university students towards Information and Communication Technology based education.
4. Teaching competencies of Primary school teachers.
5. Physical facilities of primary schools in backward districts of a state.

5.4.3 Cross Sectional Survey

Cross sectional survey can be understood as a kind of sample survey where standardized information is gathered from a sample drawn from a cross section of pre-determined population at one point of time. Hence, the sample respondents must represent different distinct segments of population or stages of development of events.

The segments may indicate different stages of school education like primary, secondary and higher or different modes of education like face to face mode and distance mode. It may cover the schools covered under a specific scheme like mid day meals and the schools yet to be covered under the scheme. It may also cover a sample of trained teachers and in-service teachers yet to be trained etc.

The sampling techniques like random, stratified and cluster sampling are used in identifying cross sectional representation of population of the study. Hence the basic feature of cross sectional survey is associated with varieties of respondents covering different stages/status in the study. Another main feature of cross sectional study is that the information is collected at one point of time. Here one point of time refers to single slot of data collection stretching over a few days or months or more.

Types of Cross Sectional Surveys

Cross sectional surveys are classified into two types. These include:

- (i) Description of status of **single variables**
- (ii) exploring relationships between **two or more variables**.

Single Variable Study

In such kind of studies the researcher is interested in describing the status of any one variable as explored through investigation of sample respondents. For example, in an academic assessment study the researcher explores needs of secondary and higher secondary students towards pursuing various kinds of academic programmes. Data may be gathered through questionnaires or interview techniques. Data may be analysed descriptively highlighting the degree of different academic needs of students background-wise at the secondary and higher levels.

Such kind of studies are conducted to describe the characteristics of a cross section of a population. It may include the opinion of people, attitude of students, and teacher competencies etc., of samples representing a cross section of the population. The analysis of data in such kind of study will indicate how characteristics of one sample group is different from that of another sample group.

Many Variables Study

As a researcher, you may be interested in studying relationships between different variables in the context of different segments of population. In such studies, you will have to pick up at least two variables for investigation. It may also be more than two variables. For example, you may be interested in exploring the relationship between achievement and academic interest of students at different stages of education. Hence you go one step ahead of describing the achievement level of a group of students and academic interest of the same group of students respectively. In exploring relationships

of two variables you are to plot two sets of data i.e. achievement scores and academic interest scores of the same group of sample respondents. Then you will have to use appropriate statistical techniques for measuring the level of relationships or co-efficient of correlation, multiple correlation etc.

There can be two types of associations between different variables, which may be explored through surveys. One is “**time bound association**” and another is “**time-ordered association**” In the case of “**time-bound association**” study you can explore the present status of two variables at one point of time. For example in a study you wish to explore the present status of academic achievement of students and explore their level of academic interest. You can analyse the co-efficient of correlation between two variables through such a study. In the case of “**time ordered association**” the status of one variable is studied on a temporal basis. In other words, at one point of time the sample respondents are requested to report the past and present status of one variable as per their perceptions. Then the variable measures of past and present as studied at one point of time are correlated. This is known as time ordered association study. For example, in a sample of + 2 level students respondents are requested to report about their present academic interest and as well as academic interest they used to have at secondary (10th class) stage by recalling the two year back status. Through administration of a questionnaire at one point of time, you can explore time ordered data and subsequently you can study the association between status of one variable as noticed at two stages. The details of such kind of analysis are reported in Block 4. In dealing with time ordered data collection you will have to be careful about memory level of respondents. The data may not be stretched to the long past which may not be remembered with accuracy by respondents. Many a time factual information about the past like achievement level, income of past etc., can be easily gathered from documentary studies without much difficulty. However, recollecting past experiences, past attitudes or opinions may be influenced by present status of experiences or attitudes. Hence, time ordered data lose their validity for such purpose of research.

5.4.4 Longitudinal Survey

Through longitudinal surveys one explores the status of variables as investigated on different points in time in order. Through such studies the changes in the status of the variables over a period of time are explored. Time-ordered associations of one variable's status at different period of time are also studied.

Unlike cross sectional study where past data are recollected by the respondents at one point in time, the longitudinal study deals with gathering actual evidences at different points in time in order. Hence, it is assumed that accuracy of data is ascertained to a higher level in longitudinal studies than that of cross sectional time-ordered study.

There are three kinds of longitudinal surveys viz.

- i) **Trend studies**
- ii) **Panel studies**
- iii) **Cohort Studies**

● **Trend studies**

In such kind of studies data collection takes place at different phases. Different groups of sample respondents drawn from the general population are contacted for different phases of data collection. For instance, in the case of the impact study of the midday meal scheme at the primary stage the researcher may collect evidences from a fresh batch of primary school students on an annual basis for a few years. The researcher identifies the trend of response pattern of each batch of fresh students over a period of time.

● Panel studies

In such studies the same group of sample respondents is studied over a period of time. For example, the attitude of a particular group of students towards school education is studied over a period of time. In another case the attendance rate and the achievement level of students enrolled in class I can be studied longitudinally till the same group of students clear the class V examination in a school. The problem of retention of sample respondents is associated with absentism or non-availability/non-cooperation of the same group of sample respondents in different phases of data collection.

● Cohort studies

In the cohort study method a specific population is taken for study over a period of time. Different samples are drawn from a specific population over different phases of data collection corresponding to different phases/stages of development of events. For example, in a district prior to introduction of decentralized management system of primary education, the teachers' attitude towards management of the school system was studied. In the second phase, immediately after introduction of the new management system the attitude of teachers was studied. In the third phase, the attitude of the teachers was studied after completion of 5 years of introduction of the new management system.

In this case the teacher population was restricted to all the primary schools of a district covered under District Primary Education Project. (DPEP) Even though the population of the study was specific the sample respondents representing the population varied from one phase of study to another.

Comparison between Cross Cultural Survey and Longitudinal Survey

The major difference between Cross Cultural Survey and Longitudinal Survey is associated with the conditions of studying change or development over a period of time. In the case of cross sectional survey the data of such development or change is gathered at one point in time by incorporating the sample representing different stages or segments of population whereas in the case of longitudinal study data is collected at different points in time from the same population. For instance, in the case of a cross sectional survey of the study habits of school students you may collect data at one point of time from a sample drawn from the primary stage and the secondary stage. Where as in the case of longitudinal survey the study habits of a group of sample students of primary school is studied and again the study habit of the same group of students is studied when they reach the secondary stage. The longitudinal studies may be of a short term or a long term duration depending on the span of change to be witnessed at different phases. The longitudinal studies are time consuming whereas cross sectional studies are economical from the time perspective. The longitudinal studies may not involve complicated sampling technique as it is in the case of cross sectional surveys. In the case of longitudinal studies the problem's relevance may be lost since the study is stretched over a long period in time. On the other hand, quick and timely action can be taken on the basis of cross sectional surveys. Moreover, the sample respondents may not be available for repeated data collection in longitudinal studies. In the case of cross sectional surveys such a problem does not occur. On the contrary, in the case of cross-section surveys the conditions necessary for making projections about different stages of development or progress from a cross section of respondents may not be similar to the real conditions of different stages of development of a sample as noticed in longitudinal studies. Hence, longitudinal studies may give more valid base for generalisation about the development process in comparison to that of cross sectional studies

Check Your Progress

Notes: a) Space is given below for writing your answers.

b) Compare your answers with those given at the end of the unit.

1. What is the main point of difference between census study and sample study.

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2. Why is sample survey preferred to census survey

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3. What do you mean by:

i) Cross section study

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ii) Longitudinal study

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4. What are the purposes of:

i) Cross section study

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ii) Longitudinal study

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5. Name different kinds of:

i) Cross section study

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ii) Longitudinal study

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5.4.5 Comparative Survey

In comparative survey the purpose is to compare the status of two or more number of variables, institutions, strategies adopted or groups of respondents etc. In other words, you may be interested in comparing the achievement level of students enrolled in two different institutions assuming that the students of the two different institutions belong to the same population. In another study, you may like to compare the reaction of teachers serving in government and private management schools towards the leadership behaviour of their principals. Moreover, you may be interested to determine the superior nature of an innovative teaching-learning strategy adopted in certain schools with a traditional approach of teaching adopted in the same institutions in terms of achievement of learners. In such type of studies you will have to keep three points in mind.

i) Comparison Points

Comparative survey involves sensitivity with regard to identification of worthwhile things to compare. Hence, worthwhileness of focus of the study must be identified through review of literature and experiences of experts. For example, in the case of comparing the attitude of teachers serving in government and private management schools towards behaviour of principals, leadership must be well justified keeping in view the research needs and theoretical framework of study.

ii) Assumption of Similarities

The researcher must be serious about the comparability of situations under investigation. For instance, for comparing teacher training programmes of two types of teacher education institutions you will have to proceed with establishing commonness of the student population, admission criteria, faculty norms of institutions etc. Moreover, comparability of institutional setting, curricular requirements, time schedule, working hours etc., would lead towards exploring differentiate practices related to teacher training programmes of different institutions.

iii) Criteria of Comparison

The third point to be kept in mind is identifying the criteria of comparison. As a researcher you will have to delineate criterion variables. The criterion variables must be equally fair to different research situations under investigation. In other words, the criteria of comparison should not have a bias to a particular kind of institution under investigation with a motive to project strong points or to defame with negative points. Fairness and objectivity in identification of criteria must have its roots in the thorough understanding of the researcher. Appropriate tools will have to be identified for measurement of criterion variables. Hence, selection of appropriate and valid tools for assessing criterion variables is very much essential in comparative surveys.

Comparative survey studies are employed when a researcher cannot manipulate the independent variable and establish the controls that are required in experiments. In an experimental study, the researcher controls all the variables except the independent variable or variables which he manipulates to see what happens. But because of the complexity and nature of the social phenomena, a researcher while studying educational phenomena cannot always select, control and manipulate the factors necessary to study cause-effect relationships. If a researcher, for example, wants to study the academic achievement of students enrolled with two types of institutions (regular and distance open mode), he cannot manipulate the home background, socio-economic status, or intelligence of children and cannot place children in a situation where all factors are kept constant except one variable, i.e. the type of mode (regular or distance) which causes the difference in academic achievement of children.

Though comparative survey studies have many limitations, and they often do not produce the precise and reliable knowledge that can be gained through rigorous experimental studies, they provide means of tackling problems that cannot be probed in laboratory situations. Furthermore, such studies yield valuable information and clues concerning the nature of the phenomena and are admirably suited to many types of field studies seeking to establish causal relationships.

5.4.6 Evaluative Survey

Evaluative survey is conducted with the purpose of evaluating a programme, a curriculum, policy etc. As you know evaluation means making judgment using terms like "Effective", "Fruitful", "Appropriateness", "Suitability" etc. Hence, when you intend to conduct empirical studies on identifying effectiveness of any programme functioning or programme output you may undertake an evaluative survey. Evaluation studies lead towards arriving at a value judgment about the worthwhileness of a programme or policy or institution. Two purposes can be served in the evaluation of programmes through surveys: (i) judging the effectiveness of the programme and (ii) taking decision for future course of action.

As a researcher you may be interested in studying judgment about the effectiveness of a programme or you want to undertake a decision-oriented study. You may present relevant facts about the status and functioning of a programme through evaluative survey. On the basis of such a study, policy makers or decision-making bodies may

identify the strength and loopholes of a programme and take an appropriate decision to improve the situation.

You may come across a number of evaluative surveys conducted in the field of education. For example, "Impact study of children's radio broadcast programme on development of general awareness of primary students", "Effectiveness of adult literacy programmes in a district", "Impact of mid-day meal programme on enrolment, retention and achievement of primary schools" etc.

You may note that evaluation is done with the help of criterion measures. When we are interested to answer the question "how effective is it?", we come to a criterion issue: "effective" in terms of what? For example, effectiveness of adult literacy programme needs to be judged on the basis of a set criteria. The criteria may include the rate of participation of adult illiterates in a programme, reaching a minimum level of achievement by adult learners, satisfaction of participants about the functioning of a programme etc. Hence, you must take note of identification of appropriate criteria of evaluation which is followed by the selection of appropriate measures of criterion variables.

Difference Between Evaluation Survey and Experiment-based Evaluation

- (i) Unlike an experiment based evaluation study where the effectiveness of an input is studied in a controlled situation, the evaluative survey does not adopt any controlled measure. The evaluative survey describes the situation where intervention is being made or has already been made without making any control, it assesses the performance or effect in terms of measures adopted by the researcher.
- (ii) Another difference between experimental approach and survey approach is linked with the group under study. Evaluative survey is conducted with only one group where the outcome of the programme is matched with the criterion measure. In the case of experimental or quasi-experimental studies comparison is made between groups exposed to treatment under the controlled conditions. Hence, in evaluative survey research the validity of evaluation rests in a large part on the validity of criterion measure or measures used. These measures should not only be valid in the technical measurement sense, but also should be valid in the sense that the practitioners involved will accept them as relevant criteria against which the research situation is being evaluated. The researcher must take care of identifying appropriate tools to be used as criterion measures. You will learn about further details about the experimental study in Units 6 and 7.

5.4.7 Documentary Survey

Various research questions need to be answered through analysis of data already available in the form of printed text viz., books, official records, research reports, review articles, research papers, information bulletins, handouts, prospectus, annual reports, periodicals, progress reports, experience of individuals, news items etc. For instance, the researcher is interested in comparing the existing status of teacher education programmes in SAARC countries. The researcher makes an analysis of available literature on teacher education programmes of countries under investigation like policy documents on education in general, and teacher education in specific, curriculum frameworks of teacher education, role and functions of quality control bodies on education, planning documents on teacher education, researches conducted on existing practices of teacher education, evaluation reports on teacher education programmes, committee reports, minutes of meetings, recommendations of education commissions, guidelines and norms prescribed by statutory bodies in education, recommendations of professional organizations and forums, seminar reports and proceedings on teacher education etc. There can be innumerable sources of obtaining documentary evidences and conducting relevant studies.

Difference Between Documentary Survey and Historical Survey

You may be curious to know how documentary survey is different from historical research since a historian makes a similar kind of analysis. The difference is simple and is seen in the context of time of occurrence of events under investigation. As a documentary surveyor you are interested in analysing present events from available records whereas as a historical researcher you may analyze past records to explore the incidences which occurred in the distant past. The similarity of both the approaches exists in the context of analysis procedure adopted in historical documents and present documents. For instance, the surveyor as well as the historian follow similar approaches of identifying relevant records for investigation, judging authenticity of documents, doing content analysis of evidence, codifying and organizing contents/information, reviewing the content, making interpretations etc.

Purpose of Documentary Studies

The documentary surveys serve different purposes having a lot of significance for educational research.

- i) **To describe the existing structure and functions of educational system or conditions that exists in the educational field:**

For example the existing practices of primary education in view of achieving the goals of universalisation of elementary education or the status of distance education programme in teacher preparation can be included in such a category of documentary surveys.

- ii) **To discover the relative importance of certain problems and identifying futures trends of different developments in the field of education:**

The trend analysis of growing demand for certain areas of education, and analysing the corresponding need for expansion of education can best fit in with such a kind of documentary study. Another example is **Survey of Research in Education**. You will come across different Surveys of Research in Education conducted chronologically by the late Professor M.B. Buch. In such surveys researches conducted in different areas of education have been presented in the form of abstracts. Such Studies have been analysed by experts. Projections have been made about the future. Developments and priorities of research have also been analyzed areawise. In a closer sense review of research studies conducted by a research student in identifying his problem of investigation also comes under the category of documentary survey study.

- iii) **To analyze curriculum of different stages of education or to compare curriculum of different states or countries:**

For example, you may be interested in analyzing the curriculum of secondary education adopted by boards of secondary education of different states vis-à-vis the central board of secondary education. Similarly, you may be interested in pointing out the logical flow of curriculum of primary education, secondary education and higher secondary education of a particular state or country.

- iv) **To analyze and review study materials/evaluation items:**

Analysis, review and evaluation of text books, study materials, reference books, examination question papers, assessment of assignments, internal assessment of students performance, evaluation of answer books etc. fall under this category of research. You will come across a number of studies where the researcher may be interested in content analysis and evaluation of self study materials of an open university, examination papers of a board of secondary education, nature of assignments of distance education programme, nature of feedback given by tutors, marking procedure of assignments etc. Such kind of analysis depend on availability of original documents, adoption of standard parameter of evaluation

and researcher's judgment capacity. On many occasions such kind of evaluation studies are treated as part of formative research which have major potentials for programme development.

v) To analyze the literacy style, concepts, beliefs and ideology of a writer:

In the case of research in the field of literature, and social science such analysis is given importance. Moreover, in the area of philosophy of education, analysis of original text prepared by an author and ideas/comments of others about the author are analysed for drawing inferences which have significance for education.

Limitations of Documentary Survey Studies

While conducting documentary analysis you may find certain limitations inherent in the method itself.

- i) First, your analysis solely depends on documentary evidences. Conclusions drawn on the basis of documentary data may not give a complete picture of the phenomenon under investigation. For example, while analyzing curriculum you may depend on text materials. However, the curricular practices as presented in textual form may not reveal the complete picture of the process dimensions. The investigation remains incomplete without incorporating observation-based evidence.
- ii) Second, data presented in the form of records or publications may not be available in a particular order. It may be available in an incomplete form. Moreover, evidence gathered through available documents may not represent the population of the study. The views, opinions or reactions of people already available in published documents may not be representative in nature. A particular segment of the population who may be expressing their views on certain incidences may not be a true sample of the population under study. Hence, generalisations of documentary evidences have major limitations.
- iii) Third you may doubt the authenticity of data available in printed text. You may cross-examine the information available through one source with that of the other. Moreover, you will have to be careful about the trustworthiness of sources of data. Unless you become careful about the objectives of your study and try to trace necessary documentary evidence many a time documentary evidence, creates confusion and leads to complicating the process of investigation. Different records may use different parameters of present data. Unless you trace these parameters of classification of such data you will find it difficult to find a meaningful base of data analysis. For example, the boundary of some units of analysis, e.g., school districts, age cohorts, dropout ratio, etc, can also change from document to document. Different records pertaining to these data may not have used a common parameter of classifications or definition of terms. Hence, it is always advisable to adopt documentary analysis with caution of internal and external criticism of data, meaningfulness of information and correlating documentary data with other methods of data collection procedures with a view to getting the total picture of the reality. For details of authenticity of data, you will learn more in Unit 9.

Check Your Progress

Notes: a) Space is given below for writing your answers.

b) Compare your answers with those given at the end of the unit.

6. What points will you keep in mind while conducting comparative surveys?

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7. What is the purpose of evaluative survey?

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8. What are the different purposes of documentary survey studies?

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Combining Different Types of Surveys

In the foregoing sections you have been exposed to different types of surveys in the context of purposes they serve and conditions in which they are conducted. However, it is not a single approach that determines an investigation. Rather it is the objective (s) of an investigation that determine (s) the approaches of surveys to be adopted in the study. Hence, keeping in view the research problem and its objectives you may combine different types of surveys in one study. For example, in the case of conducting a study on existing practices and utility of the evaluation system adopted by an university you may do documentary analysis of existing practices, its genesis and development as reported in different records like minutes of committees, ordinances, annual reports etc. In addition to this, you may incorporate reaction study of students, teachers and parents about the utility of this system. You may also explore the problems and difficulties faced by administrators and functionaries. You may study the credibility of the evaluation system in the context of fulfilling needs and demands of the employment sector etc. In another project, you may be interested in conducting a comparative study of the existing practices and the utility of the evaluation system of central universities and state universities. Here, you will have to combine different approaches like documentary survey, opinion survey and comparative survey. Particularly, in the context of doctoral level studies and major research projects you can notice a combination of different approaches of surveys in one study.

5.5 STEPS OF CONDUCTING DESCRIPTIVE RESEARCH

You have been exposed to different types of surveys. Despite the differences which exist with regard to the purposes and the situations of data collection, the following steps involved in conducting survey studies are more or less similar as other forms of research:

- i) Selection and Statement of research problem and its significance.
- ii) Identification of objectives and their translation into criteria.
- iii) Determination of tools and techniques for data collection.
- iv) Identification of population of research situations and sample groups of the population.
- v) Method and procedure of data collection.
- vi) Analysis and interpretation of data.
- vii) Writing of the report.

Though these steps are similar to those involved in scientific research, you will have to take special care on certain points which are very much contextual to the nature of surveys.

- i) The first step involved in survey research is the statement of the research problem. Here, you will have to ensure that in view of solving a problem the situations from where data can be gathered exist at present so that you can gather evidence about current situations from different sources. At this stage you may determine specific type or types of surveys most appropriate to the problem under investigation. For instance, the nature of the problem will dictate whether you will go for simply describing the status of situations, comparing the status of one situation with the other or to evaluate or assess the worthiness of development. Hence, you may pick up one or other kind of surveys like descriptive, comparative and evaluative studies. From the time perspective, you can determine whether data will be gathered through longitudinal observations or cross-sectional surveys. From coverage of population you will have to determine whether your study will be of the census type or sample survey type. Another dimension of research which is very common in surveys is a study of concomitant relationship between different variables. This is known as correlational survey about which you will study in unit 7. At the initial stage of conducting the survey study you must be clear about the nature of the problem and concerning approach of survey to be adopted in it.
- ii) The second step of survey research is identification of objectives and its translation into criteria of investigation. Survey research in education is not similar to the kind of opinion polls you may witness in daily newspapers where the readers are asked to agree or disagree to any one point of view. The respondents are requested to e-mail their views and the same appears in the next day's newspapers as a headline with how many agreed or disagreed with the point of view raised for the survey. Unlike such kind of one shot popular surveys, educational research involves complicated questions for investigation. As a researcher you must identify the issues and questions in the context of which the required knowledge of the situation is to be surveyed. Hence, you will have to specify them in the form of objectives. For example you may intend to study the reasons of school dropouts as perceived by school teachers; the relevant issues and problems concerning dropout phenomenon must be highlighted. The criterion measures of objectives may be stated clearly, in the case of evaluation study. For instance, for a study of the mid day meal scheme your objective may be stated as to study the impact of mid day meal scheme in terms of enhancement of enrolment of target group learner and their retention in schools. Hence, the criteria of success of mid day meal programme is specified. Once the objective and criteria are stated specifically you will have to specify the nature of data to be gathered.
- iii) The third step involved in a survey involves identification of tools for concerned data collection. The tools may be of different types like questionnaires, interview schedules, checklists, rating scales, reaction scales, observation schedules, attitude scales, etc. You will have to identify whether relevant, valid and relevant tools are already available for your study or not. If appropriate and relevant tools are not available you will have to develop the required tools for investigation within the time frame of your study. The details of tool and techniques have been discussed in Block 3.
- iv) The fourth step of a survey involves identification of population of research situations or respondents needed for a particular survey. In other words, the researcher must identify the universe of the study and specific population (the techniques of selection of a population and sampling are stated in Block 3). The study may be of such a type where data may be collected from the whole population i.e., census study; or from a representative sample of population i.e., sample survey. Here, you will have to be sure of accessibility of population or sample for investigation. Moreover, you will have to ensure appropriateness of sampling keeping in view the scope of the study, its objectives and nature of data. Once you are clear about the nature of study, its objectives, nature of tools to be

employed and their availability, and population and sample situations or respondents you will proceed for the next step of research i.e., data collection.

- v) The data collection stage must have a sound base of planning of what data to be gathered? How will the tools be used for data collection? Training of researcher to use the tools for data collection, time required for field work or data collection etc. Hence, the success of a survey depends upon the appropriate design and adequate preparation for data collection from the situations. Data collection techniques involve many facets like observation records, administration of questionnaires in face to face situations or postal communication, face to face interviews or telephone interviews, locating respondents individually at their places of residence or work place or locating them in group in class room situations or workshops/meetings conducting observations directly or indirectly through participant forms etc. As a researcher, you will have to proceed with data collection keeping in view the research questions in mind, gathering of authentic and trust worthy data and reporting them objectively or without personal bias. Survey research may involve data collection through application of more than one approach. Moreover, more than one researcher or investigator may be required to gather extensive data. In this context, you will have to ensure proper training of field workers/investigators for maintaining uniformity in approach, corroboration of evidence gathered through different approaches on different dimensions of data and appropriate recording of data.
- vi) The sixth stage of survey research involves data analysis. Here you will have to take care of data collected from different sources, quantify and qualify them and categorise them component wise. Qualitative and quantitative techniques of analysis can be employed for data analysis keeping in view the objectives of the study.
- vii) The last stage of survey research involves reporting of research. Survey research involves extensive data. In this context you will have to be careful about the focus of investigation i.e., descriptive, comparative or evaluative. For instance, a descriptive survey will require both description and interpretation of data in presentation. The comparative and evaluative surveys will require description, comparison or evaluation, and conclusions. The reporting must be pinpointed and objective oriented.

5.6 CONTEXT AND RELEVANCE OF DESCRIPTIVE STUDIES IN EDUCATIONAL RESEARCH

Relevance of survey method can be seen from different angles of educational research i.e., exploring the existing status of phenomena, identifying relevant questions for theorization, exploring concomitant relationships between different variables, making judgment on interventions made in educational system and formulation of planning and policies at different levels.

- (i) The preliminary function of educational research is to understand the nature of the phenomena. In other words, the researcher is interested in knowing the nature of different variables and their interactions constituting the functioning of a system. Unless you identify the nature of variables or factors and describe their intensity in the context of an event you may not proceed further to explain why the events occurred and how to intervene with events with a view to getting desired results. In the initial stage of inquiry you must have a wide data base and observations about day to day functioning of a system. In the education system many events occur because of its dynamism. However, without having base line data on the incidents and corresponding factors you can not arrive at any conclusions about

the cause of the incident. Since in many instances preliminary data are not available you proceed to explore baseline data from current situations/ settings through surveys.

You will come across a huge number of survey studies in almost all areas of educational research viz., educational psychology, sociology of education, comparative education, educational planning and management, curriculum, teacher education, educational technology, examination reforms, adult education, tribal education, women's education, special education etc. The problems like exploring value systems of college students, studying the achievement pattern of rural students, analysing budgetary provision of school education, identifying coverage of the primary education system, identifying coverage of adult literacy programmes, exploring needs of distance education learners etc. are covered under survey research.

- (ii) Survey research prepares a ground for exploring the concomitant relationship between different pertinent variables. The intensity of certain variables is stressed through benchmark investigations. After identifying significant variables and their measurement you may study their correlations with a view to developing empirical grounds for explaining the significant role of such variables in prediction of future events. You will come across a number of correlation surveys in different areas of research mainly concerning psychological aspects of teaching learning system, achievement, correlates and management of the education system. For example, plotting benchmark data concerning two variables in a matrix can indicate whether you can proceed further for studying their relationships or not or whether you can go for linear relationship study or non-linear study etc. Moreover, the trend data helps you identify the path of dynamics of certain variables.
- (iii) In planning and management of the education system you must develop a data base system. Unless you understand the complexity of a system with its component analysis you cannot ascertain the significance of its components and sub-components in functioning of a system. Hence, you must be vigilant about the dynamics of a system in terms of behaviour or status of various components on a continuous basis. Hence, description of a system with factual data on each and every unit and sub units facilitates the decision-making process. A survey of the different stages of the education system focuses on gathering benchmark data about the characteristics of a target group of learners, demand for expansion system, expectations of stakeholders like learners, parents, employers, teachers, policy makers, available physical and man power resources, existing strategies adopted in tackling teaching-learning problems, dynamics of class room based teaching-learning practices, coverage of media and technology in the education system, achievement level of learners, utilization of financial resources, evaluation system etc. Such data based inquiries help policy makers, administrators and practitioners develop suitable policies, appropriate models/strategies and decision making procedures, etc.
- (iv) The relevance of survey research can also be noticed with regard to development and standardisation of a varieties of tools for research. More specifically, the behavioural science has been enriched with the contribution of varieties of tools aiming at gathering evidence from different populations. Exploratory studies on identification of status of different variables like intelligence, creativity, motivation, needs, achievement, attitude, aptitude, leadership behaviour, teaching competencies, class room climate, group dynamics etc, prompted researchers to construct and standardize suitable and relevant tools with technical accuracy concerning a specific population. Over a period of time we come across emergence of a number of readymade research tools having utility for mass based utilization for gathering data on different variables.

- (v) A survey of the current structure and functioning of the education system can help us develop a comparative look at the system at the national and international level. Different parameters like geographic background, culture, economic development, linguistic background, political philosophy are treated as the referent of comparative analysis of the education system. The cross-sectional and longitudinal surveys contribute a lot towards the development of a holistic picture of the education system.
- (vi) As you know descriptive surveys contribute significantly towards improvement of administrative functions of education. The contribution of evaluation surveys towards policy research and decision making can also be valued with much more significance. Evaluation surveys help the policy makers, administrators and teachers make judgments about the merit, value, or worth of educational programmes products, and techniques. Evaluation studies are usually conducted to improve decision-making. A few examples of decision type questions that generate the need for evaluative surveys may read as: Which of the portions of existing textbooks need further improvement or modifications? What are the areas in which in-service teachers fail to perform competently? Should we maintain our existing set of curriculum objectives or revise them? Is there any need for enhancing financial support to a programme? If so, how to generate alternative funding systems? etc. Evaluation research involves the systematic collection of data with a view to helping decision makers. Moreover, it is assumed that the results of evaluation surveys can enable educators to make better judgments and decisions than they could make without having such results available.

You will come across a number of sponsored research projects which are of evaluation survey nature. The research projects like curriculum evaluation, evaluation of national adult education programme, evaluation of District Institutes of Education and Training (DIETS), Evaluation of Academic Staff Colleges (ASCs), evaluation of comprehensive access to primary education project (CAPE), evaluation of semester system, evaluation of special education programmes etc. can be conducted at micro level as well as, at macro level depending on the intensity and scope of the programme evaluation. Besides sponsored projects, researches at masters and doctoral level may also incorporate evaluation researches. Of course such studies may put stress on theoretical orientation and making use of evaluation data for generation of knowledge in the concerned field.

- (vii) Descriptive surveys may form the basis of testing a theory. With the help of a descriptive survey you can examine whether a situation described by some theory exists in reality or not? For instance, in Piaget's development theory, the characteristics of each stage of development are described with certain functions of cognitive development. A number of surveys have been conducted abroad and in India with the help of specific tools for measuring specific development tasks of different stages. Such studies have been conducted in different populations and culture with a view to verifying certain theoretical questions. However, descriptive surveys have limitations with regard to explaining cause and effect relationships as stated in a theory. The experimental studies may be more relevant to explain causal relationships.

Check Your Progress

Notes: a) Space is given below for writing your answers.

b) Compare your answers with those given at the end of the unit.

9. What considerations are kept in view in integrating different kinds of surveys in a study ?

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10. What are the different steps of conducting survey research?

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.....

11. Write any four key points of relevance of survey methods in educational research.

.....
.....

5.7 LET US SUM UP

You have noticed varieties of approaches of descriptive studies conducted in the area of education. The surveys have been classified in different categories like census and sample surveys; cross sectional and longitudinal surveys; comparative and evaluation surveys; and documentary surveys. The main focus of these studies remain on exploring existing facts and identifying relationship of different variables in a control free situation. Moreover, generalisation of facts is another focus of the descriptive studies. Different steps, starting from statement of problems to writing of report has been described with a view to helping you for designing any survey on your part.

5.8 UNIT-END ACTIVITIES

1. Write different problems/topics in the area of education belonging to each of the categories of descriptive research.
2. Census
3. Sample survey
4. Cross sectional survey
5. Longitudinal survey
6. Comparative survey
7. Evaluation survey
8. Documentary survey
9. Identify a research problem where more than one method of descriptive research can be combined.
10. Prepare a step wise research proposal for conducting a study belonging to:
 - (i) Any single category of survey and
 - (ii) Combined approach of survey method.

5.9 POINTS FOR DISCUSSION

1. Why should we conduct descriptive studies in education?
2. Does it qualify for the criteria of scientific method?
3. How does descriptive research contribute towards generation of knowledge?
4. What is the role of survey research in solution of problems of education?
5. How can we combine different methods of survey research in tackling complex problem of education?

5.10 SUGGESTED READINGS

- Ary D., Lucy C. Jacobs, and Asghar Razavieh (1972): *Introduction to Research in Education*. New York: Holt, Rinehart and Winston Inc.
- Koul, Lokesh (1997): *The Science of Educational Research*. New Delhi: Eurasia Publishing House Private Limited.
- Moul, Y., George J. (1963): *The Science of Educational Researcher*. New Delhi: Eurasia Publishing House Private Limited.
- Van Dalen, Deobold B. (1973): *Understanding Educational Research*. New York: McGraw-Hill Book Company.

5.11 ANSWERS TO CHECK YOUR PROGRESS

1. Coverage of respondents/data.
2.
 - i) Reduced cost
 - ii) Greater speed
 - iii) Greater scope
 - iv) Greater Accuracy.
3.
 - i) Sample drawn from distinct segments of population or stages of development and studied at one point of time.
 - ii) Exploring status of a variable (s) as studied at different points in time in an order.
4.
 - i) To study developments of different stages/groups at one point of time
 - ii) To study developments as they occur at different points in time in order.
5.
 - i)
 - a) Description of status of single variable.
 - b) Exploring relationships between two or more variables.
 - ii)
 - a) Trend b) Panel c) Cohort
6.
 - i) Comparison point.
 - ii) Assumption of similarities
 - iii. Criteria of Comparison.
7.
 - i) Judgment of effectiveness.
 - ii) See different titles as stated in the concerned paragraph.
8.
 - i) Description of structure and function
 - ii) Discovery of importance of problems
 - iii) Curriculum analysis
 - iv) Analysis of study materials
 - v) Analysis of literary style.
9. Different purposes of a research problem.
10.
 - i) Statement of problem
 - ii) Objective statement
 - iii) Tools and techniques determination
 - iv) Identification of population and sample
 - v) Design of data collection and collection of data
 - vi) Analysis of data
 - v) Preparation of report
11.
 - i) Exploring present status of variable(s)
 - ii) Relationship of different variables
 - iii) Planning & management
 - iv) Evaluation of projects
 - v) Comparison of events
 - vi) Hypothesis building theorization.

UNIT 6 EXPERIMENTAL RESEARCH-I

Structure

- 6.1 Introduction
- 6.2 Objectives
- 6.3 Characteristics of Experimental Research
- 6.4 Experimental Design
- 6.5 Validity of Experimental Design
 - 6.5.1 Internal Validity
 - 6.5.2 External Validity
- 6.6 Controls in an Experiment
 - 6.6.1 Purpose of Control
 - 6.6.2 Methods of Control
- 6.7 Let Us Sum Up
- 6.8 Unit-end Activities
- 6.9 Points for Discussion
- 6.10 Suggested Readings
- 6.11 Answers to Check Your Progress

6.1 INTRODUCTION

In the previous Unit, you have learnt about various types of descriptive studies, where a researcher is expected to find out how differently the variables are related so as to understand the educational phenomena. But all these types may not help the researcher to establish a stable relationship among various variables in education. It is only through causal relationships that such relationships can be meaningfully understood. In order to study the causal relationship between the chosen variables, the researcher has to keep a check on other variables which may affect the relationship so studied. The way of checking the influence of other variables is known as Control. By applying controls a systematic and logical association between manipulated factors and observed effects can be established. How the hypotheses are retained or rejected in the light of the controlled variables –the answers to these questions can be found by understanding experimental research which provides for much control and therefore, establishes a systematic and logical association between manipulated variables and observed effects. In this unit, we shall discuss the concept of experimental design, how to ensure validity of experimental design and the role of controls in experimental design. In the next unit, we shall focus on different types of experimental design.

6.2 OBJECTIVES

After studying this unit, you should be able to:

- identify the characteristics of experimental research;
- define the concept of experimental design;
- find out different sources of error under any experimental research situation; and
- discuss different ways of bringing control in experimental research.

6.3 CHARACTERISTICS OF EXPERIMENTAL RESEARCH

Experimentation helps in establishing causal relationships among different events in educational situation under controlled conditions. Suppose a researcher wants to study the effect of the discussion method on the achievement of students. Here the main objective of the researcher is to know how the discussion method brings about a change in the achievement of students. This means that change in achievements is dependent on the discussion method. Hence achievement of students is the 'dependent variable' and 'discussion method' is the independent variable. In this example, there is only one identified dependent variable. It may, therefore, be inferred that during experimentation, the presence of both the independent variable and dependent variable is necessary. The number of dependent or independent variables may vary from problem to problem.

In the example given above, the researcher intends to study the effect of discussion method on the achievement of students. The discussion method is a deliberate operation of the conditions by the researcher. In the process of manipulation, a pre-determined set of varied conditions are imposed on the subjects selected for the experiment. The set of conditions is referred to as the independent variable, the experimental variable, or the treatment variable. In this problem achievement is not only influenced by the method of teaching but also by many other factors like intelligence, motivation, study habits, etc. All these variables may also influence the achievement of the students and interfere with the effect of discussion method on achievement. These variables are called as 'intervening variables'. When the effect of such intervening variables is checked, this is termed as controlling of variables. The number of variables to be controlled differs from problem to problem. During experimentation it is necessary to control the variables in order to study the effect of independent variables on the dependent variables. Various methods are used to control intervening variables which will be explained to you in the later part of this unit.

Again in the example, where the researcher is interested in studying the effect of discussion method on the achievement of students, the achievement is dependent variable. In other words, the dependent variable (a learning task) cannot be measured directly. The researcher can only estimate it through such measures as scores on a test. Strictly speaking, dependent variable (achievement of students), therefore, is scores on a test or observations with respect to some characteristics of the behaviour of the subjects used in the experiment. These, in other words, are called observations. Thus, during experimentation, observations (dependent variable) are taken as effect of the experimental or independent variable.

Moreover, no matter how objectively and carefully a researcher attempts to control the extraneous variables, still some discrepancy invariably remains and influences the results of the experiment. The researcher can take care of such discrepancies through the 'replication' of the study. For this, the same experiment has to be repeated several times at different places under similar conditions. Through the replications, the findings of an experiment conducted at different places under similar conditions are verified. If there is consistency in the findings of these replications, the generalizations are drawn. In other words, it may be said that experiments need to be repeated so as to verify the results, the consistency of which leads to generalizations.

To sum up it may be said that there are four essential characteristics of experimental research: i) control ii) manipulation iii) observation and iv) replication.

Control is the essential ingredient of experimental research as it refers to the extent to which different factors in an experiment are accounted for. Manipulation of variable is another distinguishing characteristic of experimentation. Observation and replication are the other characteristics of experimental studies.

Check Your Progress

Notes: a) Space is given below for writing your answers.

b) Compare your answers with those given at the end of the unit.

1. What is an experiment?

.....
.....

2. Why do we need to control intervening variables?

.....
.....

6.4 EXPERIMENTAL DESIGN

Suppose a researcher wants to find out the 'effect of reward on the achievement of students of grade VII'. To start with, the researcher will select a group of subjects on whom the experiment is to be conducted. This group may be taken, as it is, from the school setting or may be formed by an appropriate sampling procedure. Sometimes the researcher may like to have more than one group. This he can achieve by first selecting a group from the population and then forming two groups by randomly assigning the subjects to each of the group. From this exercise, the researcher has to take a decision beforehand as to how he selects the group or groups.

You know that the reward already exists in the classroom situation but not to the extent that its effect can be observed. So in the experimental setting, the researcher has to bring the reward in the classroom by increasing the intensity or frequency of the reward so that the subjects can feel its presence. Further rewards can be given in different ways like material reward, praise, and special remarks by the teacher etc. The way researcher wants to bring the reward in the classrooms needs to be specified in detail.

In a problem like this, the researcher starts with a hypothesis that there is a causal relationship between the reward and the achievement of the students. The researcher also knows that the achievement is also related with other variables like intelligence, achievement, motivation, extra coaching at home etc. These variables interfere during the experimentation and are termed as 'intervening variables'. Under such circumstances, the researcher would like to control the influence of such variables. There can be various ways of controlling the influence of such variables and the researcher decides about the ways to minimize or keep a check (control) over operation of variables which interfere during experimentation.

Sometimes, in order to control the intervening variables the researcher may have to identify and measure them. Apart from the measurement of intervening variables, the dependent variable (variable under investigation) has also to be measured so as to see what changes have been brought about by the treatment. The researcher has also to decide which instrument he is going to use to measure a particular variable. He must know which measuring instrument is available and which he will be constructing. The gathered data from measurements of dependent and independent variables are of a particular nature which are to be analyzed, keeping in mind the research questions.

From the above illustration it is clear that the researcher draws an outline or blueprint from the statement of hypothesis to the analyses of data for the experiment to be conducted. This outline constitutes the planning of the experiment. The planning of an experiment is called 'experimental design' encompassing aspects of strategy and structure. An experimental design is to the researcher what a blueprint is to an architect.

In the experiment of 'effect of reward on achievement of students' the researcher introduces a reward in the classroom for a specified period. At the beginning and at the end of the period the researcher may measure the achievement of the students. When the scores of the subjects obtained before and after the treatment are compared, one may find some shift in the scores of each subject. This shift may not be to the same degree in all the subjects within that group. The larger the shift from the initial standing, the more pronounced will be the effect of the treatment. The shift of the individual's position on dependent variable within the group is termed as 'variance'. The shift that can be mainly attributed to the treatment is termed as 'Treatment Variance'.

As already stated, during the treatment, factors like intelligence, extra coaching at home, achievement motivation etc. may also operate and change the scores of students on an achievement test administered at different points of time. The shift in position of each subject within the group will take place not because of the treatment alone but because of the other factors also. But the researcher may attribute this entire shift to the treatment. Under such circumstances, one may say that the researcher has, by mistake, attributed the entire shift in positions to the treatment. Thus, whenever the effect of intervening variable is mistaken to be that of treatment, then such a mistake or error is termed as 'Error-Variance'.

In the example under discussion, if the researcher continues his experiment under the influence of intervening variables, the shift in position of subjects within the group will reflect the combined effect of treatment and intervening variables. Since the researcher is interested in finding out the effect of treatment (reward) on the dependent variable (achievement), he has to check that the intervening variables do not operate during the process of experimentation. In short, it may be said that the researcher is trying to reduce the effect of intervening variables or minimizing the error variance. When the error variance is reduced, the finding will reflect the shift in position of the subjects mainly because of treatment i.e., treatment effect will be more prominent leading to the maximization of treatment variance. The researcher therefore, has to plan the experiment in such a way that treatment variance is maximized and error variance is minimized.

The main objective of planning an experiment is to maximize the treatment variance and minimize the error variance. This, in other words, is termed as 'Validity' of experimental design.

The purpose of experimental design therefore is to find out true effect of the treatment. Any experimental design, when it measures what it purports to measure (true effect of treatment) is a valid design. Its validity is hindered by various factors during the experimentation. By putting a check over the effect of such factors, the researcher can increase validity of a design i.e., a researcher tries to make certain, through putting checks that these variables have not produced any such effect that can be mistaken for the effect of treatment.

6.5 VALIDITY OF EXPERIMENTAL DESIGN

Putting a check or control on the factors that give rise to error can minimize error variance. In order to control these factors the researcher ought to know these at the time of designing an experiment. In other words, he should know the factors or the sources that are responsible for error. Campbell and Stanley (1963) have identified some such sources of error. These have been listed as – History, Maturation, Testing, Instrumentation, Regression, Selection, Mortality, Interaction of selection and maturation, Interaction of testing and treatment, Interaction of selection and treatment, Reactive arrangements, and Multiple treatment interference. All these sources of error are related to the internal validity of the experimental design. In the proceeding frame the sources of error have been dealt with in detail.

In order to explain sources of error, let us take an example. Suppose a researcher wants to study the effect of a remedial programme on the achievement of tenth grade students in mathematics. At the beginning of the session he selects a group of 100 students. All these students have got low scores in mathematics in their school examination. These students are given the remedial programme for a period of six months. Before and after participation in the remedial programme these students are given an achievement test in mathematics developed by the researcher. On analysis the researcher finds that there is a great shift in the scores of students from the initial scores in mathematics. He may attribute this shift in scores to the treatment. Let us try to understand on the basis of error variance if the conclusions drawn by the researcher are right.

6.5.1 Internal Validity

History

From the example presented in the block above, it is evident that the treatment is extended over a period of six months. You know that the remedial programme (treatment) is not a regular feature of the school teaching programme. During the treatment period it may happen that extra lectures are arranged by some person in the school or students or staff members may go on strike, or some activities are organized by the school mathematics club, or an excursion trip is arranged by the school, etc. All these special events may directly or indirectly affect the achievement of students in mathematics. The researcher never wanted to study the effect of such special events that counted for part of the achievement gains. The researcher may mistake the whole gain in achievement in mathematics for the effect of remedial programme. Such special events that affected the dependent variable (achievement in mathematics) and brought in error are called as 'History effect'. The researcher should try to control such special events that may occur between the first and the second measurements of the subjects that affect the dependent variable.

Maturation

While the experimental treatment is in progress, biological and psychological changes are likely to occur. The time period that elapses during the experimentation may produce certain changes in the subjects. For example, the subjects may perform differently on the dependent variable on different occasions as a result of biological or psychological processes like fatigue, age, interest or motivation. Therefore, the effect of such changes on the dependent variable along with treatment may bring in error called as 'Maturation effect'.

Pre-testing

The students in the example given in the box have been tested before and after the treatment. The testing process before the treatment is called Pre-test and after the treatment is called Post-test. The exposure of the subjects to the pre-test may serve as the learning experience and therefore it may affect their post-test performance. The shift in position may therefore be because of treatment as well as the pre-test learning experience. The experience of students gained because of pre-test affects their achievement in post-test and brings in an error called 'Testing effect'.

Measuring Instruments

Different measuring instruments, scorers, raters, interviewers or the observers used at the pre-and post-testing stages may also account for the observed differences in the scores or measures of the dependent variable. In the example under discussion, it is quite possible that the test used at the pre-test stage may be more difficult than the

test given at the post-test stage. This means that the test used in the two testing stages may differ in their difficulty levels. On analysis the researcher may find a shift in student's achievement. The shift in reality can be attributed to the measuring instrument rather than treatment. In this way error may be caused because of different natures of the measuring instrument.

Statistical Regression

In the example under discussion you have observed that only those students were selected who did poorly in school tests. So this group is chosen on the basis of extreme scores, that is, poor performance in mathematics. The mean score of this group will tend to move towards the mean of the parent population on the second test whether or not an experimental treatment is applied. It may cause a statistical regression effect. This refers to the tendency for extreme scores to regress towards the common mean on subsequent measures. Such a tendency may operate to produce an effect that could be interpreted as an effect due to experimental treatment. The shift in scores on dependent variable may be mistaken for the treatment effect. In this way error is caused due to the tendency of extreme groups to move towards the mean. This is called 'Regression effect'.

Differential Selection of Subjects

The groups may differ significantly on some important variables related to the dependent variable even before the application of the experimental treatment. If the researcher had taken two different groups instead of one in the example given in the box, there was every possibility that these groups equivalent with respect to sex, previous school achievement, socio-economic status, intelligence etc. may not be similar with respect to many other intervening variables like mathematical ability, numerical aptitude, liking for mathematics etc. In such a case, non-equivalency of groups, creeping in due to difficulty in selection procedure, may affect the variable under study. The shift in scores on dependent variable may be mistaken for treatment effect. The error like this is caused due to selection procedure. This is called 'Selection' effect.

Experimental Mortality

If, for example, some subjects in the experimental group who receive the lowest scores on the pre-test drop out after taking the test, this group will show a higher mean on the post-test than the control group, not because of the experimental treatment but because the low scoring subjects dropped out of the study. The differential loss of subjects from the comparison groups may affect the findings of the study. The dropping out of the subjects during experimentation is called 'Mortality'. Thus mortality is one of the sources of error in experimental design.

Interaction of Selection and Maturation, Selection and History

Till now you have studied various sources of error like history, maturation, pre-testing, measuring instrument, statistical regression, differential selection of subjects, and experimental mortality. But all these do not exist in isolation-rather all these occur simultaneously during experimentation. For instance in the example under study, there is every possibility that after the treatment on post-testing, the group wherein interaction of numerical aptitude and special lecture has taken place achieves high scores. Such interactions of selection and history may boost the scores on dependent variable even in the absence of treatment. In the same way, other factors may interact among themselves and influence the dependent variable. Under such circumstances, the researcher may mistake the gain or shift in scores on a dependent variable for treatment effect. Thus interaction of selection, maturity and history etc. are some of the sources of error.

From the discussion in the foregoing pages, it may be said that the internal validity of an experimental design depends on factors like history, maturation, testing, instrumentation, regression, selection, mortality and interaction of selection and maturation etc. Along with it there is another important objective of the researcher, that is, to determine whether the systematic relationships that have been identified, isolated and measured can be generalized outside the experimental setting.

6.5.2 External Validity

The extent to which the objective of the researcher is attained is a measure of the 'external validity' of the experimental design. This validity is concerned with the generalizability. Braacht and Glass (1968) have classified external validity into two types: (i) population validity and (ii) ecological validity.

Population Validity

Population validity is concerned with the identification of the population to which the result of an experiment can be generalized. For instance, in the example under discussion the researcher has studied the effectiveness of remedial teaching in mathematics on a sample of tenth grade students in Punjab and found that remedial teaching helps in gaining scores. From these results, the researcher would like to conclude that remedial teaching is helpful for the groups of tenth grade students in Punjab. In order to make valid generalizations from the experimental results to larger populations, the researcher must correctly identify populations to which the results can be generalized. For this the researcher has to make a distinction between the experimentally accessible population and the target population. The former refers to the population of subject that is within the reach of the researcher for his study. The latter is the total group of subjects to whom he wants to apply the conclusions from the results of his experiment. In the example, all the tenth grade students studying in high schools of a particular district where the experiment has been conducted may be the experimentally accessible population. The target population would be all tenth-grade students of the State. The generalizations of the study would be done in two phases: (i) from the experimental sample of tenth grade students to the experimentally accessible population (tenth grade students of all secondary schools of the concerned District), and (ii) from the accessible population to the target population (tenth-grade students of all high schools of the State).

If the researcher has strictly followed the principal of randomization in selecting the experimental sample from the experimentally accessible population (tenth grade students in the high schools of the District), he can generalize the findings to this population with no difficulty. For this the researcher has to specify the accessible population by listing and numbering its every member and then select the sample through the use of random numbers or any other random procedure.

Generalizations from the accessible population to the target population are somewhat risky and cannot be made with the same degree of confidence as the former type. For such generalization, the researcher must have a thorough knowledge of the characteristics of the accessible and target population. If the characteristics of both the populations are similar, the researcher can generalize the results with more confidence. In the example under discussion, if the researcher has randomly selected his experimental sample from all tenth grade students of a District, then the accessible population would be more like the target population (all tenth grade students of the State) and the findings could be generalized to the target population with much more confidence. When the researcher attempts to generalize from the accessible population to the target population, it is important for him to know that one is similar to the other with respect to certain significant and relevant characteristics.

The interaction as the result of “selection by treatment” also contributes to population validity. When a researcher selects two experimentally accessible populations and these are not representative of the same target population, the similar studies on two accessible populations can lead to entirely different results. In other words, an interaction that may occur between the treatment and the characteristics of one experimental sample selected from one accessible population would not occur in another experimental sample selected from the second accessible population with different characteristics. Therefore, it would not be possible for the researcher to generalize the findings from one sample to another (Koul, 1988).

Ecological Validity

In addition to population validity, the researcher should also be concerned with ecological validity. It is concerned with generalizing experimental effects to other environmental conditions. Ary et. al. (197, p. 235) suggest that “to have ecological validity, a design must provide assurance that the experimental effect is independent of the particular experimental environment”.

According to Koul (1988), the authors are of the opinion that the researcher must give increased attention to the following factors for achieving ecological validity:

- i) The researcher must furnish a complete description of the operations and the experimental setting involved in the experimental study. It helps a reader to judge to what extent the results can be generalized to other situations. In the example under discussion the researcher has studied the effectiveness of remedial teaching in mathematics on tenth grade students under certain experimental conditions. The findings would not be applicable to other subject areas of the same grade, unless the study is extended to a variety of teaching situations. One may ask if the findings of the study would be the same if a school in a rural setting was used instead of an urban school in a replication of the study, and so on.
- ii) The researcher must give due consideration to the experimental arrangements while generalizing findings of the study. There may be a reactive effect due to the experimental procedures. The presence of observers, experimental equipment and knowledge of participation of the subjects in an experiment make the subjects aware of the fact that they are receiving experimental treatments and, therefore, they may change their normal behaviour. Such a change is called ‘Hawthorne effect’. If subjects change the behaviour that is being measured, the researcher cannot claim that the effect of treatment variable for the same population will be the same for subjects who are exposed to the treatment variable in non-experimental situations.
- iii) Another concern in ecological validity is the question of the representativeness of the independent or experimental variables and dependent or criterion variables. Variable representativeness influences the generalizability of the findings of an experimental study. For example, when a researcher speaks of remedial teaching, he will have to clarify what kind of remedial activity he means.
- iv) Certain interaction effects may also influence the generalizability of experimental findings. When two or more treatments are administered to the same group within the same or different studies, it is difficult to find the cause of the experimental results or to generalize the results to the experimental settings in which only one treatment is present. In some situations, a pre-test may increase or decrease the sensitivity or responsiveness of experimental subjects to the independent or experimental variable and, therefore, findings obtained for this pre-tested population cannot be generalized for the un-pre-tested population from which the experimental subjects were selected.

- v) The tools or instruments used for the measurement of dependent variable also contribute to the ecological validity. For instance, if a researcher uses an essay type test to measure academic achievement (dependent variable), can one say that the same effect would be observed if an objective type test was used as the measure of the dependent variable?

In short it may be said that experimental design is blueprint of the experimentation in educational research. The validity of the experimental design depends upon the achievement of major objectives of the experiment. The researcher must select a design that is strong both in internal and external validity. However, in certain educational experiments, one type of validity can be obtained at the cost of another one. In such cases, the researcher should attempt to reach a compromise between two types of validity, i.e. he should choose a design, within practical limits, that provides sufficient control to make results interpretable and generalize findings to the intended settings.

Check Your Progress

- Notes:** a) Space is given below for writing your answers.
b) Compare your answers with those given at the end of the unit.

3. How can an experiment design be internally and externally valid?

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.....

4. What are the main objectives of an experimental design?

.....
.....

6.6 CONTROLS IN AN EXPERIMENT

By now you have understood different factors affecting the internal and external validity of an experimental design. In order to make experimental design both internally and externally valid, a check has to be put on the sources of error affecting dependent variable. This is called 'Control'. For example a researcher wants to compare the instructions through Programmed Learning Material (PLM) with the conventional teaching in terms of achievement of tenth grade students. You know that achievement is affected, apart from teaching methodology, by intelligence, study habits, socio-economic status, school climate etc. In order to ascertain the effect of an independent variable on the dependent variable, it is necessary to check the influence of these other or extraneous variables. This aspect of experimental design is called as 'Control'. There are various ways of instituting control. Suppose a researcher wants to put a check on or control intelligence and gender in an experiment, he can form and select the groups in such a way that each group gets equal number of male and female students. Similarly, he can have students in each group with matching intelligence. In this way groups can be made similar with respect to gender and intelligence. But if the researcher is compelled to have similarity with respect to another intervening variable say socio-economic status, it may not be that easy. Under such circumstances, the researcher may adjust the achievement of students with their socio-economic status with the help of statistical technique called 'Analysis of Covariance'. You will study about 'Analysis of Covariance' in Unit 15 of Block 4. From this example, it may be said that intervening variables can be controlled by employing different procedures. These procedures may be physical manipulations, selective manipulations or statistical methods.

6.6.1 Purpose of Control

Van Dalen (1973, pp. 263-364) has pointed out that in an experiment, the researcher seeks to control variables for the following purposes:

1. **Achieving Isolation:** To prevent a factor other than the independent variable from affecting the dependent variable, the researcher may remove the unwanted or interfering variable, or he may keep its effect constant or equalize its presence in the experimental and control groups.
2. **Achieving Changes in Magnitude:** A researcher may strive not only to isolate the independent variable but also to ascertain how much effect it contributes. To achieve this objective, he may try to vary the magnitude of the experimental variable.
3. **Achieving Quantitative Evaluation:** The ultimate goal of a researcher is to express the magnitude of the variable in quantitative terms. He may be interested to know not merely that one expression of a variable is larger or smaller than another but precisely how much larger or smaller it is. If two variables are functionally related, he may desire to state not merely that they are positively or negatively related but rather the specific degree of relationship in terms of some numerical value.

A high degree of control is much easier to achieve in the laboratory setting than in the situations outside the laboratory. In the laboratory, the researcher deals with a limited number of factors and he can manipulate the conditions at will. He can be sure of the changes that have taken place and within a limited amount of time he can measure the effects with greater precision.

6.6.2 Methods of Control

In experimental studies in education, the researcher has to direct his effort towards controlling the variables which are significantly related to the dependent variable. Such variables are responsible for any relevant pre-existing differences between the subjects used in the experiment. In addition to inter-subject differences, there are some situational variables that might operate in the experimental situation itself. If the relevant and situational variables are not controlled in an experiment, the researcher cannot be sure whether these are independent variables or incidental differences operating in the groups that are producing the difference in the dependent variable.

- a) **Random assignment of subjects to groups:** Let us say, a researcher wants to compare auto-instructional method with the conventional method of teaching mathematics in terms of achievement of tenth grade students. He takes a school where two sections of class ten are available. These groups may have initial differences with respect to intelligence, interest, achievement motivation, study habits, etc. These variables affect the achievements. If a researcher exposes one section to the auto-instructional method and other to the conventional method, the achievement of two groups is bound to differ. This difference may not be solely due to the treatment but because of other variables (already mentioned). In order to find out the true effect of the treatment (method of teaching), there is need to control the above mentioned variables. The best alternative available with the researcher in such a situation is to randomly assign objects (subjects, treatments, groups) of a universe in such a way that, for any given assignment to a subset, every member of the universe has an equal probability of being chosen for that assignment. Since, in random procedures, every member of a population has an equal chance of being selected, members with certain distinguishing characteristics — male or female, high or low intelligence, and so on will have equal probability, if selected, will probably be counterbalanced in the long-run. In

other words, the achievement of both the groups will be affected by intervening variables to the same extent because they are similar. On comparing the mean achievement of students of two groups, the effect of intervening variable will be nullified. Here it may be elaborated that randomization does not eliminate error, but only transforms constant error (bias) to random error that can be estimated through statistical estimation process. This means that assigning the subjects randomly to the groups can control the effect of intervening variables.

- b) **Matching subjects with random assignments:** Another method that is used for assigning subjects to groups is to match individual subjects on extraneous variables. For this the researcher can identify variables that might affect the dependent variable and then apply some random technique to assign one member of each matched pair to the groups. The researcher, for example, in the preceding illustration may match the subjects on the pre-achievement scores in mathematics/ or any other variables that are known to have an effect on the dependent variable, such as scores on an intelligence test or an aptitude test in mathematics, achievement motivation test, or socio-economic background. Then one member of each pair may be randomly assigned to any of the two groups.

The researcher may encounter several difficulties while matching subjects. The first and the most important of these is to determine what variable or variables are significantly related to the dependent variable and which of these to use as a basis of matching. Variables such as intelligence, socio-economic status, sex, age, achievement motivation, pretest scores on the dependent variable, etc. are commonly used as the basis for matching. The experts are of the opinion that the variables on which subjects are matched must correlate as high as 0.50 or more to the dependent variable.

Another problem that may be faced by the researcher is how closely to match the subjects on the variable or variables. If he/she matches the subjects closely, it increases the precision of the method at the cost of reducing the size of sample and increasing sampling bias into the study.

Generally three matching procedures are used in experimental studies. Keeping in view his/her situation, the researcher has to decide what matching procedure is feasible in a particular situation.

- i) **Procedure of subject-to-subject matching:** In subject-to-subject matching, the researcher seeks to locate two members from the available subjects whose scores are within the limits and then he/she decides upon matching them. For example, suppose the researcher selects socio-economic background as the matching variable, and then he may identify two subjects who are within 3 points of each other on the socio-economic background as the matching variable, then he may identify two subjects who are within 3 points of each other on the socio-economic status scale, and then randomly assigns one member of the pair to one group and the other member to the other group. It is always possible to match subjects on one variable. However, if there are two or more than two relevant variables, then it becomes extremely difficult for the researcher to find pairs who match on all such variables, and, therefore, most of the subjects are not selected for the study. This shows restrictiveness of the matched pair method as a technique of control.
- ii) **Matching for mean and standard deviation:** To overcome the problems of subject-to-subject matching, sometimes it is worthwhile to match groups rather than individuals on the relevant variable or variables. In such a situation the researcher seeks to show that the two groups do not differ significantly in terms of mean and standard deviation on the matching variable or variables. For example, if in an experimental study, intelligence, socio-economic status and achievement motivations are considered the relevant matching variables, the researcher may analyze the scores on the intelligence test, socio-economic status scale and

achievement motivation test, and try to ensure that there is no significant difference in the means and standard deviations of the scores on the selected tests. The researcher then randomly assigns the groups to two experimental conditions. Some experts are of the opinion that matching on the basis of groups is less precise in comparison to individuals matching. Moreover, the researcher may have a problem in identifying the groups that match on all of the variables that may be correlated with the dependent variable. However, it is important to note that if the two groups stand very near in respect of the indices of central tendency and variability, group equivalence seems to have been achieved. You will study on central tendency and variability in Unit 14 of Block 4.

- iii) **Ranking of subjects on the matching variable:** A third method of matching is to place all the available subjects in rank order on the basis of their scores on the matching variable. Regardless of the actual difference, the first two subjects are selected from the rank order list and these constitute the first pair. One subject of this pair is then randomly assigned to one of the groups and the other to the second group. Similarly, the next two subjects on the rank order list are chosen and again one is randomly assigned to the first group and the other to the second group. This method is also less precise than that of the subject-to-subject matching.
- c) **Holding intervening variable constant:** Another procedure that is used to make groups comparable on an extraneous variable is to hold the intervening variable constant throughout experimentation. For example, if a researcher is confident that gender is a variable that might affect the dependent variable, then he/she could select a subject of a particular gender by selecting only male students, for experimentation. This way the researcher would be able to control the effects of sex as an extraneous variable. Similarly, if socio-economic status is likely to be a variable that may affect the dependent variable of the study, the researcher could select subjects within a restricted range of the effects of socio-economic status. By this method the researcher is able to control the effects of socio-economic status. After selecting the subjects from the homogeneous population, the researcher could randomly assign subjects to two groups and be confident that the groups were comparable on the relevant variable. Although the selection of subjects from the homogeneous group is useful in eliminating the problems of subject-to-subject matching, it has the disadvantage of decreasing the extent to which the results can be generalized beyond some situation. If a researcher studies the effect of audio instructional material on the sample of English medium male students, the findings of such a study cannot be generalized for the students of the mother tongue as a medium of instruction. For such generalizations the researcher will have to repeat studies with students from another medium of instruction.
- d) **Method of using subjects as their own controls:** Another method of control is to assign the same subjects to two experimental treatments and then to obtain measurements of the subjects first under one treatment and then under the other. Although this method is an efficient method of control, it is not feasible in certain circumstances. A researcher, for example, is interested to know the difference in learning time between two different lists of nonsense syllables — one list with high association value and the other with low association value — in an experiment on retention. In such an experiment, the researcher can find the difference in learning time between two lists for each subject and then test the average difference in learning time for all subjects with the help of an appropriate statistical test for significance. But the effects of relative ease of learning the two lists, fatigue, and other interference effects cannot be partialled out completely and no reliable conclusions could be drawn. Moreover, in some studies the researcher while exposing the subjects to one experimental condition cannot use them for

the other experimental condition. In teaching some material using two different methods, for example, a researcher cannot teach the students with one method and then make them to forget the first one to expose them to another.

- e) **Method of Counterbalancing:** If the same treatment is rotated amongst various groups it is called counterbalancing. It helps in controlling sequencing and carryover effects that arise when a group is exposed to multiple treatments. The counter balancing can be achieved by three ways, namely complete counterbalancing, incomplete counterbalancing and randomized counterbalancing. When all possible combinations of treatment are given to groups, it is called complete counterbalancing. Its applicability gets limited when there are large number of treatment combinations. In case of incomplete counterbalancing only those treatment combinations are selected where each treatment appears equal number of times in each ordinal position. It requires as many groups as is the number of treatments. While applying random counterbalancing, the researcher selects randomly the number of treatment combinations as per the number of available groups. The researcher assigns treatment combinations randomly to the groups. It controls the sequential and carryover effect of treatments through assumptions underlying randomization.
- f) **Methods for Controlling Situational Variables:** In any experiment, three things are involved. These are – environment of experimental setting, subjects involved in the experiment and the treatments used in the experimental procedure. The variables related to these intervene in the process of experimentation. The intervening variables related to environment of experimental setting are controlled through physically manipulating them.

There are three methods commonly used to control situational variables. One is 'the Method of holding situational variables constant'. In this method the researcher treats all the available subjects alike except for their exposure to the independent variable. For example, in a reading experiment the researcher may take equal number of subjects in two groups, teach them by the same teacher, and use the same instructions, apparatus, and tests. The groups may be taught in the same classroom and at the same time of the day, in the same environmental conditions such as temperature, presence or absence of distracting noise, furniture in the room and the like. A second way is the 'Method of randomization'. If the situational conditions cannot be treated alike, the researcher tries to balance them by randomization. Suppose in the study mentioned above it is not possible to have the same teacher for both the groups. Then the researcher may divide the two major groups into two smaller sub-groups and randomly assign half the subjects of the first major group and half the subjects of the second major group to each teacher. The same procedure could be used to randomize other situational variables like time, apparatus and tests. The third method is systematically manipulating the situational variable. In some educational experiments, the researcher can use sequences of experimental and control conditions in order to control what Ary et. al.(1972, p. 227) have called 'progressive effects' like those of practice and fatigue. This, according to them, can be done by "controlling the order in which experimental conditions are presented through a counterbalancing; half the subjects may receive an AB order and the other half a BA order."

- g) **Applying statistical control:** Theoretically, the researcher can control the effect of variables like sex, socio-economic status, aptitude, intelligence, etc. through physical manipulation and selective manipulation. But in practice it is very difficult to control all the variables since it affects the sample size. Under such conditions it is advisable to control some intervening variables by physical manipulation, some by selective manipulation and others by statistical procedures. When the intervening variables can be held constant through the use of statistical techniques,

this is called statistical manipulation. There are two statistical techniques commonly used to hold variance constant. These are analysis of co-variance and partial correlation. You will study about analysis of co-variance and partial correlation in unit 15 of Block 4.

The technique of analysis of co-variance is used to control the variation within the groups. This technique analyses the differences between the two groups, subjects the two to different experimental treatments on the dependent variable after taking into account any initial difference between the groups on pretest measures or any other relevant independent variables. In the analysis of co-variance, one or more co-variances can be used in addition to the dependent variance. But while using analysis of covariance the researcher has to be careful that data of the experiment fulfil the assumption of homogeneity of variance. If the data do not fulfil the assumption of homogeneity, then the data can be analyzed with the help of Multiple Regression Analysis. In such cases the dependent variable scores are taken as the criterion variable and independent variable scores are taken as the predicting variable. This analysis helps in finding out whether the treatment variable significantly improves prediction. In order to understand analysis of co-variance and multiple regression equation, you are advised to study Unit 15 of Block 4.

Let us take up a case where the researcher wants to study the effect of previous teaching experience on teaching competency of teachers. The survey of research supports the theory that teachers' attitude towards teaching is related to teaching competency and teaching experience. Under such circumstances, the true relationship between previous teaching experience and teaching competency cannot be found out without partialling out the effect of attitude towards teaching. This can be accomplished by using statistical techniques known as Partial Correlation.

In short it may be said that physical manipulation, selective manipulation and statistical manipulation can control the intervening variables. Physical manipulation can be accomplished by eliminating the intervening variables. Under selective manipulation comes randomization, matching and counterbalancing. The third technique of control is statistical manipulation, where the intervening variables are held constant by statistical techniques like analysis of covariance and partial correlation.

Check Your Progress

Notes: a) Space is given below for writing your answers.

b) Compare your answers with those given at the end of the unit.

5. What is the purpose of employing controls in an experimental study?

.....

6. List the techniques used in selective manipulation.

.....

6.7 LET US SUM UP

In this Unit, we started our discussion with the concept of experimental research which primarily aims to establish causal relationship among different events in educational situation, under the controlled conditions. While conducting experimental research, different kinds of variables which play significant roles in influencing the cause-effect relationship were also discussed. In order to carry out experimental research, the researcher has to adopt an experimental design which is an outline or

blueprint from the statement of hypotheses to the analyses of data for the experiment to be conducted. Experimental design has to be validated against internal and external criteria / factors. In order to ensure internal and external validity to the experimental design, a check or control has to be put on the sources of error effecting dependent variable. We discussed different purposes and methods of controls.

6.8 UNIT-END ACTIVITIES

Identify/select any five M.A. (Education) / M.Ed. dissertations using experimental research design. Find out the following:

- i) Types of variables used in the experimentation - Independent, Dependent and Intervening variables.
- ii) Types of controls adopted by the researchers in conducting the researches.

6.9 POINTS FOR DISCUSSION

1. Is it possible to find out the true effect of the treatment in experimental research? Justify your answer.
2. Discuss the merits and demerits of experimental research in studying human behaviour in educational phenomena.

6.10 SUGGESTED READINGS

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6.11 ANSWERS TO CHECK YOUR PROGRESS

1. Experimentation is the process of establishing causal relationship among different events in educational situation under controlled conditions.
2. Alongwith independent variable, intervening variables also influence the dependent variables. In order to know the exact impact of independent variable on the dependent variable, it is necessary to control the intervening variables.

3. While conducting experimental research, a researcher has to control the factors that affect the internal validity. These factors are history, maturation, testing, instrumentation, regression, selection, mortality and interaction of selection and maturation. The experimental research is also to be externally validated. This means the result of an experiment can be generalized to a wider population, which is concerned with population validity and to other environmental conditions, which is concerned with ecological validity.
4. The main objective of experimental design is to maximize the treatment variance and minimize the error variance. In other words, it is to find out true effect of the treatment on the dependent variable.
5. The purposes of employing control variables in the experimentation are the following:
 - a) To prevent a factor other than the independent variable from affecting the independent variable.
 - b) To vary the magnitude of the experimental variable to ascertain how much effect it contributes.
 - c) To find out the degree of relationship between two variables in terms of some numerical value.
6.
 - a) Randomization
 - b) Matching
 - c) Counterbalancing.

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UNIT 7 EXPERIMENTAL RESEARCH-II

Structure

- 7.1 Introduction
- 7.2 Objectives
- 7.3 Types of Experimental Design
- 7.4 Pre-experimental Designs
 - 7.4.1 One Shot Case Study Design
 - 7.4.2 One Group Pre-test Post-test Design
 - 7.4.3 Static Group Comparison Design
- 7.5 True Experimental Designs
 - 7.5.1 Pre-test Post-test Control Group Design
 - 7.5.2 Post-test only Control Group Design
 - 7.5.3 Solomon Four Groups Design
 - 7.5.4 Factorial Designs
- 7.6 Quasi Experimental Designs
 - 7.6.1 Non-equivalent Control Group Design
 - 7.6.2 Separate Sample Pre-test Post-test Design
 - 7.6.3 Counter Balanced Design
 - 7.6.4 Time-series Designs
- 7.7 Steps in Experimental Research
- 7.8 Let Us Sum Up
- 7.9 Unit-end Activity
- 7.10 Points for Discussion
- 7.11 Suggested Readings
- 7.12 Answers to Check Your Progress

7.1 INTRODUCTION

In the previous unit, you studied that experimentation involves formation of groups by randomly assigning the subjects to the groups, equating the groups on the intervening variables and randomly assigning the treatments to the groups. The purpose of experimentation is to study the effect of manipulated independent variable on the dependent variable. In educational setting, independent variable can be manipulated in different ways. An outline has to be drawn about the way a researcher would like to manipulate independent variable. The main objective of outlining the experimentation is to find out the true effect of manipulated variable. Certain factors creep in while manipulating certain functions. These factors either come from the process of experimentation or from outside. Their presence interferes with the treatment. Under such circumstances true effect of the treatment cannot be achieved. In order to get true effect the researcher has to apply certain checks or controls so as to partial out the effect of intervening variables. Process of applying these controls is basic to the experimental design or lay out of the experimentation. These may serve as the criteria for classification of experimental designs. In this unit, we shall focus on different kinds of experimental designs and the steps of experimental research.

7.2 OBJECTIVES

After going through this unit, you shall be able to:

- classify experimental research on the basis of applying various kinds of controls;
- find out the differences among various experimental designs;
- discuss various kinds of pre-experimental designs;
- discuss various kinds of true experimental designs;
- discuss various types of quasi-experimental design;
- enumerate the steps of experimental research; and
- differentiate between experimental research and descriptive research.

7.3 TYPES OF EXPERIMENTAL DESIGN

We know that the researcher applies certain controls or checks to partial out the effect of intervening variables. In order to apply the controls the researcher may:

- Assign subjects randomly to the groups
- Assign treatments to the groups randomly
- Equate the groups to the maximum extent with respect to various intervening variables
- Have post-test of all the groups involved in the experiment.

Those designs where all the above mentioned four criteria are satisfied in toto are termed as 'True Experimental Designs'. These designs are very sophisticated involving rigorous controls and have limited practicability in educational settings. The researcher in educational settings may not be able to apply such rigorous controls. The reason being that the controls may take the researcher away from the reality and in that case the conclusions of the experiment may not be generalizable.

Under such circumstances the researcher may follow some of the above mentioned four criteria in order to apply required controls. Therefore, those experiments where some of the above mentioned four criteria are met are termed as 'Quasi Experimental Designs'. These designs have greater applicability in education.

Further the researcher may some times feel such a situation, where it is difficult to follow even one or two of these criteria. The experimental designs where criterion like post-testing is possible are designated as 'Pre-experimental Designs'. These designs have less scientific value for having inadequate controls.

According to the sophistication and the rigor of controls followed the designs may be arranged as:

1. Pre-experimental designs
2. True experimental designs
3. Quasi-experimental designs

The designs resemble one another from point of view of purpose and their adherence to the principles of experimentation. They differ in the degree of accuracy with which they attack the problem or meet the essential criteria of control, manipulation, observation, and replication. No design solves all the problems. The nature of the problem determines which type of design is most appropriate and applicable and how the design should be used to meet the requirements of the experiment.

Experimental designs are classified on the basis of following four criteria:

- Assigning the subjects to the groups randomly.
- Assigning the treatments to the groups randomly.
- Equating the groups to the maximum extent with the respect to various intervening variables.
- Having post-test of all the groups involved in experiment.

Check Your Progress

Notes: a) Space is given below for writing your answer.

b) Compare your answer with that given at the end of the unit.

1. How are the experimental designs classified into different groups?

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7.4 PRE-EXPERIMENTAL DESIGNS

Pre-experimental designs provide little or no control of extraneous or situation variables. They are, however, still being used in the study of educational problems. Suppose a researcher is interested in finding out the effect of educational television programme on the general awareness of students. The programme is launched as mass media programmes in the public sector with a view to developing general awareness of school students. This programme is available to particular region of the country. In this case, the treatment is television programme that is already operative in the field. The researcher does not have to manipulate this programme with a special objective and he has no control over this treatment. In order to achieve his research objective the researcher will take a group of students who are being exposed to this television programme. For comparing the effect of this television programme with conventional treatment, the researcher may take another group that has not been exposed to the television programme. Due to the field constraints the researcher will not be able to randomly assign the treatment to the groups. Further, he will be unable to equate the groups on intervening variables. He will be doing only one thing easily, that is he will be able to measure the general awareness (dependent variable) of subjects of both the groups after a particular period of time.

Note that in this experiment, the researcher has not formed the groups randomly, treatments have not been given to the groups randomly and the groups have not been equated on intervening variables. However, both the groups have been post-tested. Thus the experimental designs where only the criterion of 'post-testing of all the groups' is met are called as 'Pre-experimental designs'.

There are three types of Pre-experimental designs. These are One Shot Case Study, One group Pre-test Post-test Design, and Static Group Comparison Design.

7.4.1 One Shot Case Study Design

The researcher wants to study the effect of free lunch programme on disruptive classroom activity. The researcher selects a school. The free lunch programme is launched for a period of six months. At the end of this period the teachers of the school are interviewed about the disruptive classroom activities. In this case, treatment (free lunch programme) is applied to the institution. At the end of the treatment, the

dependent variable (disruptive classroom activities) is measured. When such a procedure in experimentation is followed, the design is called as One-Shot Case Study design.

Strengths

In this design —

- a) One group of subjects or a single subject or an institution is taken.
- b) The treatment is applied for a particular period of time.
- c) At the end of the treatment the dependent variable is measured.

Limitations

- a) The design is not valid against the criterion of History. For example, on the basis of observations (interview of teachers) made at the end of the treatment the researcher may conclude that disruptive classroom activities curtailed because of the free lunch programme. It is quite possible that curtailment of disruptive activities occurred because of change in administrative policy in the school or examination drawing near or school timings changed etc. In other words such changes or occurrences of events might have affected the dependent variable rather than the treatment, hence the criterion of History is not met.
- b) The design is not valid against the criterion of maturation. You know, in the example being discussed the free lunch programme continues for a period of six months. During this period some psychological and biological changes may take place amongst the students. That is students may become aware of the need to pay attention to the teachers' teaching or the students may develop positive attitude towards studying. Such types of psychological changes are called as Maturation and these may influence the dependent variable.
- c) The design is not valid against the criterion of Selection. In the example under discussion, the researcher took a school where free lunch programme was launched. It is quite possible that the students in the school were having positive attitude towards studies or they might be the wards of educated parents etc. If such types of factors were existing in the group on which the experiment was conducted, there is every possibility that the findings of the experiment are not true.
- d) The design is not valid against the criterion of Mortality. The treatment continued for a period of six months. It is quite possible that some mischievous students might have left the institution during the treatment period. Because of their leaving the institution, disruption in the classroom might have been curtailed. In such a situation if the researcher draws a conclusion on the basis of experimentation that disruption was curtailed due to treatment, it may not be true. The reason being that going away of some mischievous students from the school has affected the dependent variable.
- e) The design cannot provide an evidence of causal relationship and it cannot add to the body of knowledge with reliable and valid evidences.

Applicability: The one Shot Case Design can be applied in the following situations:

- a) The researcher has to carry out the experiment with one group of subjects or an institution.
- b) The researcher takes up a variable or experimentation that has already been launched by some agency say government or any NGO etc.

7.4.2 One Group Pre-test Post-test Design

When an experimenter uses this design, he measures dependent variable, before the independent variable X is applied or withdrawn and then takes its measurement again afterwards. The difference in the measurements of dependent variable, if any, is

computed and the amount of change is taken as a result of the application or withdrawing of independent or treatment variable.

The researcher plans a study to investigate the effect of detailed correction on writing efficiency of XII grade students. He takes up a group of students from an institution. He measures the writing efficiency of the students of the group. The scores so obtained are termed as pre-test scores. After the pre-test the researcher gives the students a treatment comprising writing programme in English on various topics and the same being corrected in detail. The treatment of detailed correction goes on for three months. At the end of this treatment, the researcher again measures the writing efficiency of students with the same instrument. The scores so obtained are termed as post-test scores. In this case a single group of students has been taken and the pre-test and post-test has been given.

Table 7.1: One Group Pre-test Post-test Design

Pre-test	Independent Variable	Post-test
T_1	X	T_2
Mean of the criterion test	Detailed correction on students' writing	Mean of the criterion test

Strengths

- a) Only one group of subjects has been taken and they measured before and after the treatment.
- b) The design is valid against the criterion of Selection and Mortality. In the example under study the researcher measured the writing efficiency at both the pre-test and the post-test stage. Suppose the group taken for experimentation consists of highly intelligent, motivated and creative individuals. These characteristics of the subjects will equally influence the measurement at the pre-test and post-test stages. Similarly, if some students drop out during experimentation, the process will be well taken care of at the pre-test and the post-test stages, that is, at the time of analysis the pre-test scores of the drop outs will not be taken into consideration. Thus, the design is valid against the internal validity criterion of selection and mortality.

Limitations

- 1. This design does not use any control group and, therefore, the experimenter cannot assume that the difference between the pre-test mean and the post-test mean was brought about by the experimental treatment or by some extraneous variables.
- 2. History and maturation are two major extraneous variables that are not controlled in this design. History refers to the specific events that can occur between the pre-test and the post-test other than the exposure of subjects to the experimental treatment. In the illustration, for example, the increase in writing efficiency at the post-test stage could be due to the events like practicing by the students at home, or reading extra material etc. Occurrence of such events can increase student achievement in this area. Maturation variable refers to changes in the subjects themselves that occur with the passage of time. For example, it is quite possible that during the period of treatment, subjects might have gained mental maturity, accustomed to writing in English etc. Such biological and psychological factors might have affected writing efficiency along with treatment. Thus in a design like this history and maturation become potent sources of extraneous variance when the time interval between the pre-test and post-test is long.

3. This design does not provide any procedure for evaluating the effect of post-test itself. There is practice effect when the subjects take a test a second time or even take a parallel form of the test. That is, subjects perform better at the post-test stage even without any teaching.
4. There is a problem of reactivity in the design due to a teaching between the subject and pre-test measure. It is this reaction rather than the treatment variable that produces the change in the post-test measures. For example, the novel or controversial content of a pre-test may motivate the subjects to react in a particular manner and it is this reaction that brings about the observed change in subjects at the post-test stage.
5. The instruments used for measuring writing efficiency at the pretest and post-test stage are the same. Various characteristics of the instrument such as interpretation of items, subjects, item difficulty etc. will remain unaltered at both the stages (pre-test and post-test stages). The experience gained in the interpretation of items at pre-test may be carried over to the post-test stage. Thus improvement at the post-test stage may not be due to the treatment only. Therefore it can be said that the design is not valid against the criterion of instrumentation.
6. The design is not valid against the external validity criteria of testing and treatment. In the example under discussion, the exposure to pre-test may make the students aware of the criterion required in writing efficiency like continuity of ideas, use of specific words etc. During the treatment of detailed correction, the same criteria are emphasized. So the students who have been pre-tested become more attentive and responsive to the treatment of detailed correction. This in other words means that exposure of subjects to pre-test has interacted with treatment. This may ultimately affect the post-test performance. The conclusion drawn on the basis of such design therefore cannot be generalized to the group of students who have not been pre-tested.
7. The design is not valid against the external validity criterion of interaction of selection and treatment. It is quite possible that the students selected in the group are highly intelligent, motivated and creative. Because of these characteristics, they may involve themselves more during the treatment of detailed correction. Their remaining active and responsive during the treatment will affect their post-test scores. So the improvement in the post-test may be because of the interaction of selection and treatment. The findings of such a study are limited to particular type of students and these cannot be generalized to the population.
8. This design is weak and cannot provide true evidence of causal relationship among the variables.

Applicability: One group pre-test post-test design is applicable to all those situations where –

- a) The interval between pre-test and post-test is of short duration.
- b) The equated groups are not available.
- c) This design has an edge over the One Shot Case Study design as the pre-test is added to it. The addition of pre-test provides information about the selected subjects.

7.4.3 Static Group Comparison Design

In such designs two groups are selected and one of the groups is exposed to the experimental treatment and the other group is not exposed to any experimental treatment. The group not exposed to any treatment acts as the control group and the students of this group continue their usual classroom studies. The design permits the comparison that is required by a scientific investigation. The experimenter assumes

the two groups to be equivalent in all relevant aspects at the start of the experimentation. There is no pre-test and the dependent variable is measured for the two groups after the treatment and then compared (post-test), to determine the effect of independent variable or treatment variable. If the experimental group performs better on the post-test, the experimenter is more confident that the independent variable is more responsible for the change in the dependent variable.

Let us take a study, wherein the effect of supervised library study on achievement of students is investigated. To achieve this the researcher takes two groups of students studying at the same grade level from an institution. These groups are not randomly selected. The groups are comparable with respect to grade level, institution in which they study, age level etc. but do not have equivalence with respect to intelligence, aptitude, study habits, etc. One of the groups is given treatment of supervised library study. The other group is not given treatment but they continue their usual classroom studies. The treatment is not randomly assigned to the groups. The treatment continues for a period of three months. At the end of the treatment both the groups are administered the same test.

Table 7.2: Static Group Design

<i>Group</i>	<i>Independent Variable</i>	<i>Post-test</i>
Experimental	Supervised Library Study	T_2
Control	Usual Classroom Study	T_2

Strengths

- a) The design is valid against the internal validity criterion of History and Testing. Any special event occurring during the treatment will equally effect both the groups. For example, the institution may arrange some lectures by experts or arrange some debate, etc.; all these events will equally effect both the groups. Further since the students have not been exposed to the pre-test, there will be no learning experience to the students before the treatment. Thus the treatment effect will not be mistaken for testing.
- b) The design is valid against the internal validity criterion of Instrumentation. Since both the groups have been administered the same achievement test after the treatment of supervised library study, the characteristics of the measuring instrument will have a similar affect on both the groups. So the effect of type of items or difficulty level of items in the test etc. will not change the nature and extent of post-test score.
- c) The design has an edge over one group pre-test post-test design because in it control group has been introduced without the pre-test situation.

Limitations

- a) Since neither randomization nor matching is used to assign subjects to the experimental and control groups, the experimenter cannot assume that the groups as equivalent with respect to relevant extraneous variables before they are exposed to the experimental treatment. This design, therefore, is also considered to be lacking in the necessary control.
- b) The design is not valid against the internal validity criterion of selection. It is quite possible that (in the example being discussed), the subjects of one of the groups are more intelligent and creative than the subjects of the other group. Since all these variables affect the achievement, the differences between the post-test measures of the experimental and control groups may not be entirely due to the treatment.

- c) The groups, in the example under discussion, are comparable but not equivalent on the variables of intelligence, aptitude, study habits, etc. If by chance some of the intelligent students of the group remain absent in the study, the post achievement will be affected. Thus the experimental mortality may produce differences in the groups due to differential dropout of subjects from the groups. Therefore, the two groups once equivalent may differ later because of selective dropout of subjects.
- d) The design is not valid against the criterion of interaction of Selection and Maturation. In the example given in the box, if by chance one of the groups having more intelligent students is exposed to some special events like lectures by experts or arrangement of excursions etc, there is every possibility that these students will fare better in the post-test than their counterparts in the other group. This means that the design is not valid against the internal validity criterion of selection and maturation.
- e) The design is not valid against the external validity criterion of selection and treatment. In the example being discussed here, if by chance one of the groups has subjects with good study habits and this group is given treatment it is quite obvious that such subjects will benefit more from the supervised library study. In other words the characteristics of the subjects will interact with the treatment. Because of this interaction the students of treatment group are apt to achieve more on achievement test than their counterparts. The conclusions based on such a design cannot be generalized to those students who do not have good study habits.

Applicability: The Static Group Comparison Design is applicable in all those situations where:

- a) The researcher does not have control over situations and is unable to alter natural settings in an educational institution.
- b) The groups are comparable.
- c) There are chances that the pre-test will sensitize the group and affect the dependent variable.

To conclude it may be said that you have studied three types of pre-experimental designs. These are One Shot Case Study Design, One Group Pre-test Post-test Design and Static Group Comparison Design. These designs have two basic characteristics. One is that there are no matched groups. Secondly groups are not randomly selected and treatments are not randomly assigned to the groups. Because of these internal weaknesses, the designs lack in internal and external validity. However, applicability of these designs will depend upon objectives of the study and fulfillment of essential requirements of the design. If the major purpose of research is to find out cause and effect relationship, more sophisticated designs should be opted for. In the next section, we will discuss true experimental designs.

Check Your Progress

Notes: a) Space is given below for writing your answer.

b) Compare your answer with that given at the end of the unit.

2. Find out the major differences between one group pre-test and post-test design and static group comparison design.

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7.5 TRUE EXPERIMENTAL DESIGNS

True experimental designs are mostly used for experimental research in education because they seek to control the main effects of history, maturation, testing, measuring instruments, statistical regression, selection, and mortality (Koul, 1988). The researcher may be interested in comparing the self-instructional method with the conventional method in terms of achievement of IX grade students, in science. In order to pursue this objective, the researcher may form two groups of students.

Before proceeding further with the formation of groups he will try to find out those variables that may influence the achievement of students irrespective of the method of teaching. These variables can be – intelligence, motivation, sex, socio-economic status, previous achievement in science etc. The researcher will equate these groups of students on these variables and randomly assign the students to the groups. If the mean scores of students on these variables is computed, it will be found that the means of two groups will not differ significantly. That is to say, that the two groups are equated on the above mentioned intervening variables. After formation of groups, the researcher will administer the achievement test to the students of both the groups. This is termed as the pre-test. The pre-test scores will reveal initial differences, if any, with respect to achievement of students of the two groups. After this the researcher randomly exposes one of the groups to the self-instructional method and the other group to the conventional method. The group exposed to the self-instructional method is designated as the experimental group and the group exposed to the conventional method is termed as the control group. The content of teaching and the time of exposure to treatment to both the groups remain similar.

It may be mentioned here that the experiment is conducted in the same institution, therefore the environmental variables like institutional climate, schedule in the school remain the same for both the groups. At the end of the treatment (teaching) both the groups are administered the same achievement test. The scores of students on this test constitute post-test scores. In this way the dependent variable (achievement of students) has been measured before and after the treatment in randomized equivalent groups. The layout of such designs is as follows:

7.5.1 Pre-test Post-test Control Group Design

This design is also called as 'Randomized Control-group Pre-test-Post-test Design'. From the example cited above, it may be observed that the researcher has undertaken a study with the objective of comparing the self-instructional method with the conventional method for teaching science at IX grade level. In pursuance of this objective two equated groups are formed by randomly assigning subjects to the groups. Both groups are administered a similar achievement test as pre-test. The treatments are randomly assigned to the groups. The duration of the treatment has been similar. At the end of the treatment, both groups are administered the same achievement test. The scores on this test are termed as post-test scores. When a researcher follows this type of procedure during experimentation he employs Pre-test Post-test Control Group design for the research study. In this design the dependent variable (achievement test) has been measured before (pre-test) and after (post-test) the treatment (method of teaching) in the randomized equivalent groups. The difference between means of pre-test and post-test is found in order to ascertain whether the experimental treatment produced a significant effect.

The strengths and limitations of this may be enumerated as follow:

Table 7.3: Pre-test Post-test Control Group Design

<i>Randomly assigned group</i>	<i>Pre-test</i>	<i>Independent Variable</i>	<i>Post-test</i>
Experimental group	T_{1E}	Teaching through Self-instructional Method	T_{2E}
Control group	T_{1C}	Teaching through Traditional Method	T_{2C}

Strengths

The main strengths of this design may be listed as:

1. The strength of this design lies in the random assignment of subjects at the initial stage, which assures equivalence between groups prior to experimentation.
2. The experimenter's control over the pre-test provides an additional check on the equality of the two groups on the dependent variable.
3. This design, with its randomization, seeks to control most of the extraneous variables, like the main effects of history, maturation, pre-testing, differential selection of subjects, statistical regression and mortality that pose a threat to internal validity.

Limitations

The main limitation in using this design is a threat to its external validity due to the following reasons (Koul, 1988).

1. There is interaction between the pre-test and the experimental treatment. This interaction may change or sensitize the subjects in certain ways. Although the subjects of the experimental and control groups take the same pre-test and may experience the sensitizing effect, the subjects of the experimental group because of their increased sensitivity may respond to the experimental treatment in a particular way. For example, if attitudinal change were the dependent variable the problem would have been quite highlighted. When the first attitude scale is administered as the pre-test in such a study, it can sensitize both experimental and control subjects to the issues or the content included in the scale. But the subjects of the experimental group may not respond in the same way to the experimental treatment, given in the form of a lecture, film or the like, as the control group subjects. Therefore, the experimenter may only be able to generalize findings to pre-tested groups and not to pre-tested ones from which the experimental subjects were chosen.
2. There is also interaction of selection of subjects and experimental treatment. The cultural background, or some other characteristics of the subjects, who are selected to participate in an experiment, may make the experimental treatment more effective for them than it would be for the subjects elsewhere.
3. The interaction of experimental variable with other factors, such as history, also makes it impossible to generalize the findings beyond the specific conditions or situations in which the experiment was conducted. To overcome this difficulty, the experimenter should replicate the study in different time and place settings so that generalizations concerning the findings can be made with greater confidence.
4. The reactive effects of the experimental procedures on the subjects of the experimental group or who administer the treatments may also create problems in making generalizations. For example, if the subjects of the experimental group know that they are participating in an experiment, they may not react normally to the experimental treatment. Keeping the experimental group subjects unaware

of the fact that an experiment is being conducted can minimize the reactive effect of the experimental procedures.

7.5.2 Post-test only Control Group Design

In the foregoing paragraph we have studied pre-test—post-test control group design. From this design if we remove pre-test then it takes the shape of post-test only control group design. The illustration given in the box will explain that the available subjects are assigned to two groups through randomization that controls all possible relevant extraneous variables. No pre-test is used and the random assignment of subjects assures that any initial differences between the groups are attributable only to chance. The two random samples from population are obtained in two ways: (i) The subjects may be drawn individually at random and assigned alternatively to the groups; or (ii) Two different random samples may be selected first and the groups assigned randomly to the experimental or control condition. Only the experimental group is exposed to the experimental treatment. At the end of the experiment, subjects of both the groups are measured on the dependent variable. The means of the two groups are compared with the help of an appropriate statistical test of significance.

Suppose an experimenter wants to ascertain whether a new teaching method will increase reading speed of third grade students. He prepares a list of all the elementary schools of a particular city and assigns numbers to the entire third grade students. With the help of random number table he may draw a desired sample of 100 students. Then two random samples of 50 subjects each may be selected from the selected sample in two ways: the researcher may select subjects individually at random and assign them alternately to the groups, or he may first draw two random samples and then assign groups to the experimental or control condition by tossing a coin.

After assigning the subjects to two groups, the experimental group is taught through the new method and the control group through the conventional method, for a fixed period of time. In all other respects, the researcher will treat the groups alike. After the desired period of time, the subjects of both the groups will be administered a reading test. The mean scores of the two groups are compared to determine the effectiveness of new teaching method by using an appropriate statistical test. If the obtained means of the groups are significantly different, the experimenter can be reasonably confident that the use of new teaching method was responsible for the observed difference.

Table 7.4: Post-test only Control Group Design

<i>Randomly assigned group</i>	<i>Independent Variable</i>	<i>Post-test</i>
Experimental	Teaching through New Method	T ₂
Control	Teaching through Conventional Method	T ₂

The illustration given in the box shows that dependent variable reading speed has been measured at the end of the treatment (method of teaching) in randomized equivalent groups. Because of these features the design has been termed as Post-test-only Control Group Design.

Strengths

1. The main advantage of this design is randomization, which assures statistical equivalence of the groups prior to the introduction of the experimental treatment.

2. Since no pre-test is used, this design controls for the main effects of history, maturation, and pre-testing. Moreover, there can be no interaction effect of pre-test and independent, or experimental variable. Hence, this design is especially recommended for the experiments in which pre-test sensitization is likely to occur.
3. This design is useful in the experimental studies, especially at kindergarten or primary stages, in which a pre-test is either not available or not appropriate.

Limitations

In spite of all the advantages mentioned above, this design suffers from the following limitations:

1. The use of this design seriously restricts the external validity of the experiment. The experiment can partially overcome this limitation by replicating the experiment with different groups.
2. There are some situations in which it is not possible for the experimenter to select subjects at random from the population of interest. In such cases, Ary et al (1972, p. 243) suggest that the experimenter must begin with available subjects and assign them randomly to the groups.
3. The post-test only control group design can be applied in all those situations where:
 - a. A large number of subjects are available. From these subjects equivalent groups can be formed by randomly assigning the subjects to the groups.
 - b. Treatment can be randomly assigned to the groups.
 - c. The groups can be post-tested with the same instrument.

From the discussion presented in this paragraph it may be said that post test only control group design is very much similar to pre-test post-test control group design but for one difference that pre-test is not held in the post-test only control group design. The design is valid against all criteria of internal validity such as History, Maturation, Testing, Instrumentation, Regression, Selection, Mortality and Interaction of Selection and Maturation. Its findings can be generalized to the population because the design has external validity with respect to interaction of testing and treatment criterion. It has application to those situations where the researcher can afford to have rigorous controls.

7.5.3 Solomon Four Groups Design

Till now you have studied pre-test post-test control group design and post-test only control group design. The main features of these two designs are present simultaneously in the design which is discussed below. To understand this let us study the example given in the box.

The researcher is interested in comparing the self-instructional method with the conventional method in terms of achievement of IX grade students in science. In order to achieve this objective, the researcher forms four equated groups by randomly assigning subjects to the groups. These groups are equated on the variables like intelligence, motivation, previous achievement in science, sex, socio-economic status, etc. Let these four groups be named as A, B, C, and D. Of these four groups any two groups are randomly selected and pre-tested by administering an achievement test. Let us say these groups are A and C. After this one pre-tested group (say A) and another un-pre-tested group (say B) receives the treatment that they are exposed to self-instructional material. The remaining two groups (say B and D) are exposed to the usual conventional method. Here it may be noted that the treatment is randomly given to the groups. The duration of treatment has been same to both the groups. At the end of the treatment all the four groups are given the same achievement test that was given at the pre-test stage. The scores on this test are termed as post-test scores.

From the illustration given in the box, it may be observed that the dependent variable (achievement test) has been measured at the pre-test stage in case of two groups. All the four groups have been measured for the dependent variable at post-test stage at the end of the treatment. The four groups were randomly formed and treatments were randomly given to the groups.

Table 7.5: Solomon Four Groups Design

<i>Randomly assigned</i>	<i>Pre-test</i>	<i>Independent Variable</i>	<i>Post-test</i>
Experimental group (E)	T_{1E}	Teaching through Self-instructional Method	T_{2E}
Control group (C_1)	T_1C_1	Teaching through Conventional Method	T_2C_1
Control group (C_2)	No pre-test	Teaching through Self-instructional Method	T_2C_2
Control group (C_3)	No pre-test	Teaching through Conventional Method	T_2C_3

Strengths

1. This design provides control over any possible contemporary effects that may occur between pre-testing and post-testing.
2. This design actually involves conducting the experiment twice, once with pre-tests and once without pre-tests. If the results of these two experiments are in agreement, the experimenter can have much greater confidence in his findings.

Limitations

1. The design is difficult to carry out in practical situations. It involves more time and effort to conduct two experiments simultaneously and there is the problem of locating the increased number of identical subjects that would be required in the experiment.
2. Since this design involves four sets of measures for four groups and the researcher has to make comparisons between the experimental and first control group (A and C) and between second and third control groups (B, and D), there is no single elementary statistical procedure that would make use of the six available measures simultaneously. In the light of this difficulty, this design is generally recommended for a more advanced level of research.

Applicability: The design can be applied in all situations where:

- a) A large number of subjects are available and from these subjects four equivalent groups can be formed by randomly assigning subjects to the groups.
- b) Of the four groups two randomly selected groups can be pre-tested.
- c) Treatment can be so assigned to the groups that one pre-tested group and one un-pre-tested group receives treatment randomly.
- d) All the four groups are post-tested.
- e) The same instrument or parallel form of the instrument can be used at pre-test and post-test stage.

In short, it may be inferred that the main features of Pre-test Post-test Control Group Design and Post-test only Control Group Design are simultaneously present in the Solomon Four Group Design. This design is valid against the criteria of internal validity like- History, Maturation, Testing, Instrumentation, Regression, Selection, Mortality and Interaction of Selection and Mortality etc. The findings obtained by applying this design can be generalized to the population, as it is externally valid against the interaction of testing and treatment criterion.

The Solomon Four Group Design is a powerful experimental design as there is inbuilt mechanism of verification of results. Its main limitation is that it requires a rather large sample, more time and much effort on the part of the researcher.

7.5.4 Factorial Designs

The discussion about the various designs thus far has been confined to classical single variable designs, which require that an experimenter manipulates one independent variable to produce an effect on the dependent variable. Human nature is complex and experimenter in educational situations cannot always fulfil these requirements. One independent variables alone may not produce the same effect as it might in interaction with another independent variable. The findings, therefore, from a one-variable design may be meaningless. For example, the effectiveness of a teaching method depends upon a number of variables such as the intelligence level of students, the type of the teacher teaching the group, and so on. In such type of experiment, a classical one-variable design would not reveal any information about the interactive effect of the method of teaching and intelligence level or any other variable. The example given in the box below will clarify further.

The researcher starts with the objective of finding out the effect of a new method of teaching, intelligence, achievement motivation and their conjoint effect on the science achievement of students of IX grade. Method of teaching, intelligence and achievement motivation are three independent variables and achievement of students in Mathematics is a dependent variable. Also there could be more than one method of teaching say Discussion, Demonstration and Lecture Method. These three types of methods of teaching are said to be three levels. Thus methods of teaching have three levels. Further, the independent variables like intelligence may be categorized by the researcher at two levels viz. high intelligence and low intelligence. So also, achievement motivation may be categorized at two levels say highly motivated and low motivated. In this there could be three levels of methods of teaching, two levels of intelligence and two levels of achievement motivation. Each of the independent variables having different levels is termed as factors.

In such a situation the researcher takes an institution and administers an intelligence test and achievement motivation test to all the IX grade students. On the basis of scores of students on intelligence test and achievement motivation test, they may be classified into four groups that is – (i.) highly intelligent and highly motivated, (ii) highly intelligent and low motivated, (iii) low intelligent and highly motivated, and (iv) low intelligent and low motivated. Students from each of these four categories are divided at random into three groups for exposure to three different methods of teaching. In this way, for each category there are three groups and in all there will be twelve groups. One group from each category is randomly allocated to each of the three treatments (methods of teaching). In other words, each treatment is being administered to group of students belonging to four categories. At the end of the treatment all the students of different groups are administered achievement test.

Thus when different factors having different levels are administered treatments randomly so as to find out the effect of each factor separately and conjointly, such designs are termed as Factorial Designs.

A factorial design enables the experimenter to evaluate or manipulate two or more variables simultaneously in order to study the effects of number of independent factors singly as well as the effects due to interactions with one another. Factorial designs vary according to the degree of complexity depending upon the nature and purpose of the experiment. They include two or more independent variables, and each one is manipulated in two or more ways to assess both their separate (main) and their combined (interaction) effects.

Strengths

- 1. The differences in the effect of different levels or categories of more than one variable can be studied with factorial designs simultaneously. An experimenter, therefore, can accomplish in one experiment what otherwise might require two or more separate experiments.
- 2. While studying the significance of the differences in the dependent variable under the effect of the levels of any of the factors the groups become alike with respect to the different levels of other factors and thus the groups get controlled as far as the levels of the other factors are concerned.
- 3. Besides studying the significance of the differences in the levels of the factors, the factorial designs provide an opportunity to study interactions between the factors.

Limitations

A factorial design may include any number of independent variables with any number of levels of each. However, when the experimenter manipulates or controls too many factors simultaneously, the experiment and the statistical analysis of the data sometimes become unmanageable. Moreover, the combinations of too many variables also become artificial (Koul, 1988).

Applicability: The factorial designs have their applicability in all those situations where:

- a) Along with the effect of each of the independent variable on dependent variable, the researcher is interested in finding out the effect of interactions of the factors (independent variables) on dependent variables.
- b) The same group of subjects is to be utilized in estimating effects of two or more dimensions of independent variables, thus helping in economizing time and money as well as personnel.
- c) The simultaneous use of independent variables makes it possible to bring out interactive effects of treatments and may have an accelerating effect on the action of some other independent variable on dependent variable.

Check Your Progress

Notes: a) Space is given below for writing your answers.

b) Compare your answers with those given at the end of the unit.

- 3. In what way is true experimental design better than pre-experimental design?

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- 4. Which true experimental design provides the scope to measure the effect of more than one independent variable?

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7.6 QUASI EXPERIMENTAL DESIGNS

The true experimental designs, as discussed earlier, provide full experimental control through the use of randomization procedures. However, in the field experiments, the researcher may have to take the whole group of subjects in an institution. It may not be possible for him to divide the group or randomly assign the subjects to the groups. He may assign the treatments to the groups randomly. Further he may try to equate these groups up to the maximum extent under the existing circumstances. In such situations, the researcher has to depend upon quasi-experimental designs, that provide as much control as possible under the existing conditions. If an experimenter uses a quasi-experimental design, it is necessary for him to know which of the variables his design may fail to control. He must also be aware of the sources that represent threats to both internal and external validity and consider them while interpreting the results of the experiment. Thus the designs that meet the criteria of random assigning of treatment to the groups, equating the groups to the maximum extent, and administration of the post-test are classified as Quasi Experimental designs or Compromise Designs.

There are a large number of Quasi-experimental Designs. A few of these are explained in the paragraphs to follow.

7.6.1 Non-equivalent Control Group Design

In a school situation, it is sometimes practically not possible to upset class schedules like reorganizing the classes in order to employ randomization procedures for getting equivalent control and experimental groups. Under these circumstances an experimenter may use pre-assembled groups, such as intact classes, for framing experimental and control groups. The pre-assembled groups are selected and are administered pretest. The pretest scores are analyzed to show that the means and standard deviations of the two groups do not differ significantly. After determining the groups the experimental treatment is administered to the experimental group and then the posttest is given to both the groups. The difference between the pre-and post-test scores are compared with the help of appropriate statistical test to ascertain the effect of the independent variable.

Let us say the researcher wants to study the effect of a new teaching method on the achievement of students of VIII grade. For this he takes two groups of students of VIII grade from a school. These groups are comparable on some variables like age, school climate etc. But these groups have not been equated on intervening variables like intelligence, attitude towards study, motivation before starting the experiment. Both these groups are given pre-test to have base line data with respect to achievement. One of these groups is taught by new teaching method and the other group by traditional method for the same duration. At the end of the treatment both the groups are post-tested. The same instrument is used at pre-test and post—test stage. Here two groups of subjects are selected non-randomly. They are non-equivalent. Both the groups are given treatment. At the end of the treatment both the groups are post-tested.

Table 7.6: Non-equivalent Control Group Design

Group	Pre-test	Independent Variable	Post-test
Experimental	T ₁	New teaching method	T ₂
Control	T ₁	Traditional teaching method	T ₂

Strengths

1. The design is valid against the internal validity criteria of History, Maturation, Testing, Instrumentation, Selection, and Mortality on the following counts:
 - a) If special events like debate, excursions, exhibitions etc. occur during the period of experimentation, these will equally effect both the groups.
 - b) The biological and psychological changes like fatigue, loss of interest etc. if any will manifest itself equally in experimental as well as control group. Thus controlling the factor of Maturation.
 - c) Both the groups will have similar learning experiences from the pre-test. This experience will affect the post-test performance in a similar manner. So, the testing effect will be controlled.
 - d) Whatever way the students respond to the items on achievement test, it will remain similar at both the stages in both the groups. The instrument being fixed, its effect is controlled.
 - e) The individual differences if any, will affect the post-test scores in both the groups. The effect due to individual differences will be balanced when the groups are compared. In this way the effect of selection is internally controlled in the design.
 - f) In this design the data of all the students who have appeared in the pre-test and post-test are analyzed. The lost cases (Mortality), if any, are not taken up for consideration.
 - g) The reactive effects of experimentation are easily controlled. When the pre-assembled groups are used, subjects are less aware of the fact that they are subjected to the experimental treatment than when the subjects are drawn from the class through randomization and put into experimental sessions.
 - h) The experiments using this design are conveniently conducted in the school situations where the researcher has no control to manipulate the variables as per his design.

Limitations

1. The selection of subjects for the experimental and control groups may result in interaction effect between selection and certain extraneous variables like selection and maturation and testing and treatment.
 - a) It is quite possible that one of the groups taken for study has higher rate of maturation than the other group. Under such circumstances, the treatment given to such a group will show boosted results that may ultimately affect the dependent variable.
 - b) When unusual test procedures like pre-test and post-test are used, these affect the mental make up of the subjects about the treatment. This perpetual change due to the pre-test in both the groups may hamper the effect of the treatment. Thus the external validity criterion is vitiated because of the interaction of the testing procedure and the treatment.

Applicability: Non-equivalent Control Group Design can be applied in all those field settings where:

- a) Subjects cannot be assigned randomly to the experimental and control groups.
- b) The control group receives a conventional or usual treatment rather than no treatment.
- c) Two groups of subjects are available.
- d) Both the groups can be pre-tested as well as post-tested.

- e) The design becomes more powerful when the experimental and control groups are similar with respect to pre-test. This makes the control more effective and provides valid effect of the treatment.

7.6.2 Separate Sample Pre-test Post-test Design

Measurement of dependent variable in two randomly selected equivalent sub-groups where one subgroup is pre-tested and the other subgroup is given the treatment and post-tested is known as separate sample pre-test post-test design.

Suppose a researcher wants to study the effect of specially developed instructional material on the creativity of the students of IX grade. For this he takes one class of IX grade from a school. This class is divided into two subgroups say 'A' and 'B' by randomly allocating the students to the subgroups. In this way two equivalent subgroups are formed. To one of the subgroups say 'A', the researcher administers the test of creativity so as to get pre-test scores on creativity. After this, the researcher administers the treatment i.e. instructional material for developing creativity to the whole group or whole class (including subgroups 'A' and 'B'). At the end of the treatment, only subgroup 'B' is post-tested. The test used for one of the groups as pre-tested and to the other group as post-tested is the same. Here one group of the students has been divided in to two subgroups. One of the subgroups is pre-tested. The treatment is given to the whole group. The other subgroup is post-tested.

Strengths

1. The separate sample pretest post-test design is valid against the internal validity criteria of Testing, Regression and Selection on the following counts:
 - a) All the subjects in the group have been exposed to the treatment. But only one subgroup has been pre-tested and the other group has been post-tested. There will not be any carry-over effect of testing, as the group that has been pre-tested has not been post-tested.
 - b) The mean pre-test scores of one sub-group and the mean post-test scores of another subgroup are compared. Thus regression effect does not exist in the design.
 - c) As only one group of student has been taken, two subgroups form the part of this group. Randomization has been used while forming the subgroups where every student has equal chance of being selected to any of the subgroups. In this way the selection effect is inherently controlled in the design.
2. The design is valid against the external validity criteria of interaction of testing and treatment, interaction of selection and treatment and reactive arrangements.
 - a) In this design one of the treatment groups does not have any knowledge of pre-test items. Thus interaction of testing and treatment will not take place.
 - b) The two subgroups in the design have random equalization. One of the subgroups is pre-tested and the other subgroup is post-tested. When the pre-test and post-test scores of these separate equivalent subgroups are compared, the effect of the characteristics of selected sub-groups will be balanced. Thus the interaction of selection and treatment will not take place.
 - c) In the design the sensitization to pre-test is absent, randomization does not disturb the classroom setting (the whole class is involved in the experimentation process) and the treatment has been given to the whole class. Thus it does not create unusual expectations in the subjects. In this way reactive arrangements do not vitiate the effect of the treatment.
3. The design is specifically useful for the large population that cannot be divided in separate groups for different types of treatments.

4. The design is more powerful than the other designs, as it moves the laboratory to the field situation to which the researcher wishes to generalize the effect of the treatment.

Limitations: The design has the following limitations:

- a) The design is not valid against the internal validity criterion of interaction of selection and maturation. It is quite possible that the group so selected is highly creative. The maturation changes like tiredness, frustration etc. may take place and affect the post-test scores. This effect of interaction of selection and maturation will not be balanced out when pre-test and post-test scores are compared because the same subjects have not been post-tested.

Applicability: The design can be applied in those field situations in which:

- a) The whole group or class has to be taken in its natural setting.
- b) Treatment has to be given to the whole group.
- c) Equivalent subgroups can be formed within the class or group.
- d) One of the two subgroups can be pre-tested and the other can be post-tested.

You have observed from the above discussion that the design is having maximum external validity. But the design is lacking with respect to internal validity criteria like History, Maturation, Mortality and Interaction of Selection and Maturation. Depending on the field settings, the separate sample pre-test post-test design can be planned in different ways to have maximum controls.

7.6.3 Counter Balanced Design

When the random assignment of subjects to experimental and control groups is not possible, the counterbalanced design may be used. This design also uses intact classes and rotates the groups at periodic intervals during the experimentation. This design is also known as rotation group design, crossover design or switchover design. In this design each group of subjects is exposed to each experimental treatment at different times during the experiment.

Let us say the researcher tries to compare the effect of three different approaches of teaching namely- Modular Approach, Radio-vision approach and Conventional approach to teaching. For this purpose the researcher selects three groups of students say 'A', 'B' and 'C' from three different schools and three chapters from general science. All three groups were taught three chapters using three different treatments. These groups are taken as such from the school. These are comparable groups but not equivalent. These three groups are exposed to three different treatments randomly at one point of time (Let us say group 'A' is exposed to treatment 'X'1', group 'B' is exposed to treatment 'X'2' and group 'C' is exposed to treatment 'X'3 at time 'T'1'). Next time group 'A' is exposed to treatment X₂ and group 'B' is exposed to treatment X₁ and group 'C' is exposed to treatment X₁. In this way the treatments are rotated in such a way that each group of subjects is exposed to each treatment at different time during the experiment. It is also important to note that each group of subjects is exposed to a treatment for once and once only. In other words there is no specific link between treatments, groups and time. At the end of each treatment, each group is observed on the dependent variable (achievement) with the help of the same instrument.

In short it can be said that in the counterbalanced experimental design the groups of subjects are taken from different institutions in their natural setting. The number of treatments could be equal to the number of groups. The selected groups are comparable but non-equivalent. The treatments are administered to the groups in such a way that each group of subjects gets each treatment once and for once only at different points of time. The treatments are administered randomly. At the end of each treatment given to each group the dependent variable is measured with the same instrument.

Table 7.7: Counter Balanced Design

<i>Replication</i>	<i>Modular approach</i>	<i>Radio-vision approach</i>	<i>Conventional approach</i>
Chapter 1	Group A	Group B	Group C
Chapter 2	Group B	Group C	Group A
Chapter 3	Group C	Group A	Group B
	Column mean	Column mean	Column mean

Strengths

This design overcomes and eliminates any differences that might exist between the groups. Since all the groups are exposed to all the treatments, the result obtained cannot be attributed to preexisting differences in the subjects.

1. The design is valid against the criteria of History, Maturation, Testing, Instrumentation, Regression, Selection and Mortality as well as Interaction of Selection and Maturation.
 - a) If some special event occurs during the treatment at one stage, then each treatment will also be exposed to the impact of that event.
 - b) If there are some biological or psychological changes in a particular group, these will be reflected in post-test and when such a group is exposed to another treatment the maturation effect will be taken care of.
 - c) Testing effect will be taken care of when different groups are compared as it will be counterbalanced.
 - d) Instrument effect, if any, will be equally present in all the groups and will be counterbalanced on comparison.
 - e) In this design the subjects are not pre-tested but only post-tested. So there is no question of Regression.
 - f) If by chance one group happens to be more intelligent than the other groups, then each treatment will profit from this superiority. The same will be balanced on comparison.
 - g) If some mortality occurs during the process of experimentation, it will equally affect all the treatments.
 - h) There is a possibility that all groups may get some fatigue when the experimentation is in progress. During replication, the factor of fatigue will affect the mean scores of each group. The counterbalance process implied in the design will take care of this factor.

Limitations

- a) The design is not valid against the external validity criteria of multiple treatment interference. There is carry-over effect of the groups from one treatment to the next. Therefore, this design should be used only when the experimental treatments are such that administration of one treatment on a group will have no effect on the next treatment.
- b) Since many replications are involved it is not always possible to have equivalent learning material during various replications.
- c) There is a possibility of boredom when students are exposed to various replications.

Applicability: This design is applicable to those field researches where-

- a) The researcher has little control over the assignment of subjects to the groups and has to use intact classes.

- b) The number of treatments is equal to the groups and treatments can be rotated amongst the groups.
- c) The interaction between the treatments, occasions and groups is not desired.
- d) There is need to achieve consistency in findings by internal replication of the experiment.

7.6.4 Time-series Designs

There are two types of time-series designs.

One-group Time-series Design

This design takes into account a series of measurement on the dependent variable before and after the group is exposed to experimental treatment. The experimenter takes a number of measurements on the independent variable, exposes the group to the experimental treatment, and then again takes additional measurements on the independent variable.

Suppose the researcher is interested in finding out the effect of 'telling important questions for examination' on the attendance of students in M.A (Education) class. For this he counts attendance for five consecutive days. Then on one day he informs the students that he will be telling important questions from the examination point of view. The attendance is again noted for following five days. The difference in attendance is attributed to the treatment.

Here in this design a single group of subjects has been taken. The subjects are measured periodically on dependent variable before and after the treatment. When such a procedure is followed, the design is called Time Series Design.

Table 7.8: One-group Time-series Design

Y				Experimental Treatment X	Y			
T ₁	T ₂	T ₃	T ₄		T ₅	T ₆	T ₇	T ₈

Strengths

1. This design is valid against the internal validity criteria of Maturation, Testing, Regression, Selection, Mortality and Interaction of Selection and Maturation.
 - a) The changes that occur due to biological and psychological changes in the subjects are easily controlled as the subjects are periodically measured before and after the treatment.
 - b) Continuous periodical measurement of the dependent variable controls the effect of testing as it is counted on different occasions.
 - c) The interval between different occasion of testing and observation is usually quite small for the regression effect to take place.
 - d) Since the testing takes place on many occasions before the treatment and the same measurement is repeated on many occasions after the treatment the effect of selection is automatically taken care of.
 - e) The drop out or mortality factor does not affect the findings as the measurement is taken on many occasions before and after the treatment. In case of the example being discussed here, it may be pointed out that the attendance of only those students will be counted who are regular. The attendance of dropouts will not matter as attendance of the students in the class has been counted for five days before the treatment and for five days after the treatment.

- f) The interaction of selection and maturation will be balanced as the periodic observations made after the treatment are to be compared with the observations made before the treatment.
- g) The multi-testing of students in this design provides more check on some sources of internal validity.

Limitations

1. This design fails to control the effects due to history. For example, the factors such as climatic changes and examinations may contribute to the observed change in the dependent variable. In the example under discussion some other teacher might have announced that the students would be given an internal assessment test and it may affect the attendance of the students.
2. Because of the repeated tests, there may be kind of interaction effect of testing that would restrict the findings to those populations, which have been subjected to repeated testing.
3. The usual statistical tests of significance may not be appropriate with a time design (Koul, 1988).

Applicability: Time series design can be applied to those field situations where:

- a) It is not feasible to form a control group.
- b) This design is useful in the school settings to study the effects of a major changes in administrative policy upon various issues concerning discipline.
- c) It is also useful in the study of attitude change in the students as a result of the effect produced by the introduction of a documentary film designed to change attitudes.
- d) There is no carry-over effect of testing.
- e) The internal and external controls are not possible during experimentation.
- f) The measuring instrument is such that it can be used many times and its repeated use does not affect the variable under study.

Time series design can provide useful information because the use of additional measurements preceding and following the experimental treatment makes the design more powerful.

Control-group Time-series Design

Control-group Time-series Design utilizes a control group. The control group is also an intact class group. The control group like the experimental group is tested on the dependent variable at the same intervals of time, but is not exposed to the experimental treatment.

The researcher is interested in studying the effect of praise on students' participation during discussion. For this purpose he takes students of X grade from two institutions of the same city. He observes student's participation during discussion in both the institutions for five times at fixed intervals. Later to one of the groups the researcher introduces praise. In another institution the discussion is organized in usual manner. Later both the groups are observed periodically for five times for their participation in discussion. In this way two groups of students are taken as intact groups from the field situation. They are non-equivalent groups. Both the groups are observed periodically for the variable under study (dependent variable). One of the groups is given treatment. At the end of the treatment both the groups are again tested on periodic intervals for dependent variable. The observation tool is the same for all the periodic observations. The observation tool is the same for both the groups.

Table 7.9: Control-group Time-series Design

Group		Independent Variable	
Experimental	T ₁ T ₂ T ₃ T ₄	Experimental treatment	T ₅ T ₆ T ₇ T ₈
Control	T ₁ T ₂ T ₃ T ₄	No experimental treatment	T ₅ T ₆ T ₇ T ₈

Strengths

1. This design is valid against the internal validity criteria of History, Maturation, Testing, Instrumentation, Regression, Selection, Mortality and Interaction of Selection and Maturation.
 - a) If any special event like students strike etc. takes place during the observation or treatment period, it will equally affect both the groups. Thus the design will overcome the effects due to history.
 - b) The maturation on the part of subjects like interest in studies, liking towards the teacher etc. if any, will be controlled by the presence of control group.
 - c) The testing effect if any, will be equally present at all the time intervals in both the groups.
 - d) The instrument effect will be controlled because of repeated measurements and the presence of control group.
 - e) The dependent variable has been measured at periodic intervals in both the groups. Even if the group comprised some specific subjects who may be more motivated or more intelligent it will be controlled as the repeated measurements have been taken.
 - f) The mortality will not affect the dependent variable because the data of only those subjects will be taken into consideration during analysis who are present during periodic observations.
 - g) If by chance, one of the groups taken has a higher rate of maturation and this group is given treatment, the effect will be balanced as in the experimental group and there will be general rate of gain that will be projected in the pre-treatment observations.
 - h) The inclusion of a control group in this design is useful for the necessary comparison.

Limitations

1. There may be interaction effect due to repeated tests and this would restrict the findings to the populations, which have been subjected to repeated testing. The design therefore is not valid against the external validity criteria of Interaction Testing and Treatment as well as interaction of Selection and Treatment.
2. The usual statistical techniques may not be applicable with such designs.

Applicability: Control Group Time Series Design can be applied to those situations where:

- a) Subjects cannot be assigned randomly to different groups.
- b) One of the groups receives treatment and the other group is exposed to the usual situation.
- c) Both the groups can be repeated measured at different time intervals before and after the treatment.
- d) Measuring instrument is such that its repeated use does not affect the dependent variable.

- e) The design is particularly useful in institutions where repeated measurements on the part of students are required. Further it is more powerful than the Time Series Design because of the presence of non-treatment group and repeated measurements.

In short it may be said that the experimental designs are basically of three types viz. Pre-experimental designs, True experimental designs and Quasi-experimental designs. They have their own strengths and limitations. It depends upon the researcher and the nature of his research problem that the design can be selected.

Check Your Progress

Notes: a) Space is given below for writing your answers.

b) Compare your answers with those given at the end of the unit.

5. What is the major focus of quasi-experimental design?

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6. What is counter balanced design?

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7.7 STEPS IN EXPERIMENTAL RESEARCH

The steps of the experimental method are not different from those of a scientific method. For the sake of clarification, the major steps as given by Koul (1997) may be described as under:

a) Selecting and Defining the Problem

Experimental research starts with the selection of the problem, which is amenable to experimentation. It needs a rigorous logical analysis and definition of the problem in precise terms. The variables to be studied should be defined in operational terms clearly and unambiguously. It helps the researcher to convert the problem precisely into a hypothesis that can be verified or refuted by the experimental data.

b) Stating of Hypotheses

The stating of problem hypotheses is one of the distinguishing characteristics of the experimental method. Hypotheses are the heart of experimental research. They suggest that an antecedent condition or phenomenon (independent variable) is related to the occurrence of another condition, phenomenon, event, or effect (dependent variable). To test a hypothesis, the researcher attempts to control all the conditions except the independent variable, which he manipulates. Then he observes the effect on the dependent variable presumably because of the exposure to the independent variable. The researcher, therefore, should not only be concerned primarily with experimental plans and statistical procedures, but should give sufficient attention to formulation of hypothesis. The experimental plans and statistical procedures merely help him in the testing of hypotheses and contribute little in the development of theories or advancement

of knowledge. The hypotheses developed or derived from existing theories, however, contribute to the development of new theories and knowledge.

c) Constructing the Experimental Design

Experimental plan refers to the conceptual framework within which the experiment is conducted. As per Van Dalen (1973, p. 260) experimental plan represents all elements, conditions or phenomena, and relations of consequences so as to:

- identify all non-experimental variables that might contaminate the experiment and determine how to control them;
- select a research design;
- select a sample of subjects to represent a given population, assign subjects to groups, and assign experimental treatments to groups;
- select or construct and validate instruments to measure the outcomes of the experiment;
- outline procedures for collecting data and possibly conduct a pilot or 'trial run' test to perfect the instruments or design; and
- state the statistical or null hypothesis.

In order to select a suitable research design for conducting the experiment and assign subjects to different experimental treatments to measure the outcomes of experiment, the researcher must be well acquainted with different types of experimental designs.

In the unit on descriptive research you have studied the nature of correlational studies so as to find out the relationship between the variables without considering the influence of intervening variables. In a study of experimental nature, the relationship between the variables is studied by controlling the significant intervening variables. Experimental studies provide for much control, therefore, establishes a systematic and logical association or relationship between the variables (dependent and independent) which is not possible in the studies of descriptive nature.

In common parlance 'correlation' means any type of relationship between phenomena. Statistically, it refers to the quantitative extent of relationship between variables. Very often the researcher in education would like to see whether relationship exists between the variables in the field, viz. between intelligence and achievement, achievement and study habits, study habit and home background, etc. The relationship may be simple and linear or complex and curvilinear.

For example you might have seen that intelligence and achievement are related and this relationship is simple and linear. That is higher the intelligence, greater the achievement. But the relationship between height and weight is not of the same nature. Up to certain age level in children height and weight are related. That is, as the height increases weight also increases. After a particular age this relationship stops. Such types of relationships are called as curvilinear relationships.

The relationship between variables may be statistically established by the use of Pearson's 'r', Spearman's 'rho', or the coefficients of partial or multiple correlation, according to the nature of data and the objective of investigation. It may be mentioned here that knowledge about the strength and direction of relationship between variables is of utmost importance in the field of education. To take an example from the teaching-learning situations, if several methods of teaching are found to be related to learning outcome of pupils, the one that shows very high positive correlation with learning outcome may be prescribed for practice.

Hypothesizing is an important component of the design of correlational studies. A well-formulated set of hypotheses ensures testing of the indices of correlation for their significance. A positive and significant correlation between two variables under

investigation indicate that the variables are directly related, that is when one increases in value, the value of the other also will increase correspondingly. Similarly, if the correlation coefficient between two variables comes out to be significantly negative, it means that they are related, that is, when one variable increases in value, the other decreases in value.

Meaningful interpretation of the index of correlation between variables under study would demand that the subjects chosen for measuring the variables are adequately sampled following some dependable technique of sample selection. Random sampling, of course, would be the best choice. But in the educational research situations random sampling is not often possible. In that case some other defensible technique of sampling should be adopted. If care is not taken in the sampling procedure, the value of the index of correlation may give wrong indication of the relationship between the variables under investigation.

Reliability and validity of the measuring instruments

Reliability and validity of the measuring instruments used in the correlational studies are the potent factors that affect the index of correlation between the variables under study. If the reliability and validity indices are not of proper degree, the relationship found out between the variables is quite likely to be mis-represented.

Correlation and causation are different

It must be remembered that the coefficient of correlation obtained in the correlational studies does not imply any cause-effect relationship between variables. It merely indicates that the variables are related or associated. It is possible that the variables are causally related, but this conclusion cannot be drawn from the correlation coefficient alone. This means that correlation obtained through correlational studies is a necessary but not a sufficient condition for causal relation between variables.

In short it may be said that correlational studies help the researcher to understand relationship between and among different variables. But correlation coefficient is not the indicator of causation.

Check Your Progress

Notes: a) Space is given below for writing your answers.

b) Compare your answers with those given at the end of the unit.

7. What is linear correlation?

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8. What is the difference between causation and correlation? Give examples.

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7.8 LET US SUM UP

In this Unit, our major focus was to discuss different types of experimental designs. There are basically three types of experimental designs based on the criteria of randomness. The experimental designs where subjects are randomly selected and treatment is randomly assigned to the groups and these groups are equated to the maximum extent and later post-tested are called True Experimental Designs. However, randomization and controls are not possible in educational research. In such cases the researcher has to depend on Pre-experimental and Quasi-experimental Designs. All these designs have their different applicability. Selection of particular design depends on the nature of the research problem, objectives of the study and manipulation of variables on the part of the researcher. Apart from causal relationship studies, the researcher can go for correlational studies. These studies help the researcher to find out the association between different types of variables for understanding the complex educational phenomenon.

7.9 UNIT-END ACTIVITY

- Plan a study based on your experience as a student or as a teacher to find out causal relationship and correlation between different variables that affect the achievement of students. Plan an experiment accordingly. List in detail the various factors that affect the external and internal validity of the experimental design planned by you.

7.10 POINTS FOR DISCUSSION

1.
 - a) How is experimental method of research different from descriptive research?
 - b) What are the important criteria that a researcher must keep in mind while selecting an experimental design for Indian classrooms?
 - c) Can an experimental design be totally internally valid and externally valid in education?
 - d) Discuss the relative merits of pre-experimental research, true experimental research and quasi-experimental research.

7.11 SUGGESTED READINGS

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7.12 ANSWERS TO CHECK YOUR PROGRESS

1. Experimental designs are defined into different groups based on the four criteria. These are:
 - a) Random assignment of the subjects to the groups.
 - b) Random assignment of the treatments to the groups.
 - c) Equating the groups to the maximum extent with respect to various intervening variables.
 - d) Having post-test of all the groups involved in the experiment.
2. In one group pre-test and post-test design the researcher measures the dependent variable before the treatment variable is applied or withdrawn and again measures after the treatment is over. The difference between the two measurements of dependent variable is due to the effect of independent variable. In static group comparison design, there are two groups, one group is exposed to experimental treatment and the other group is not. At the end of the experiment, the dependent variable is measured for the two groups and then compared to determine the effect of independent variables or treatment variables.
3. Pre-experimental design lacks in internal and external validity. But true experimental design overcomes this problem by controlling the main effects of history, maturation, testing, measuring instruments, statistical regression, selection and mortality. Therefore, true experimental design is better than pre-experimental design.
4. Factorial design.
5. The major focus of quasi experimental design is to meet the criteria of random assigning of treatment to the groups, to equate the groups to the maximum extent, and to administer the post-test at the end of the experiment.
6. The counter balanced design is used when the random assignment of subjects to experimental and control groups is not possible. This design uses intact classes and rotates the groups at periodic intervals during the experimentation.
7. Correlation means any type of relationship between variables. It refers to the quantitative extent of relationship between variables.
8. Causation refers to cause-effect relationship between and among variables, whereas correlation implies relationship between and among different variables. For example, fatigue may cause poor attention in a classroom situation. It is a case of causation. But, intelligence is highly correlated with student performance in school.

UNIT 8 QUALITATIVE RESEARCH

Structure

- 8.1 Introduction
- 8.2 Objectives
- 8.3 Definition of Qualitative Research
- 8.4 Characteristics of Qualitative Research
- 8.5 Reasons for Conducting Qualitative Research
- 8.6 Types of Qualitative Methods
 - 8.6.1 Biographical Studies
 - 8.6.2 Phenomenological Study
 - 8.6.3 Grounded Theory Study
 - 8.6.4 Ethnography
 - 8.6.5 Case Study
- 8.7 Context of Qualitative Methods
- 8.8 Common Steps of Conducting Qualitative Studies
- 8.9 Verification of Trustworthiness of Qualitative Research
- 8.10 Let Us Sum Up
- 8.11 Unit-end Activities
- 8.12 Points for Discussion
- 8.13 Suggested Readings
- 8.14 Answers to Check Your Progress

8.1 INTRODUCTION

As you know, events concerning education phenomena are very complex in nature. They involve mostly sociological and behavioral manifestations of human relations in specific contexts. The methods adopted to explore the meaning and processes of educational phenomena are basically qualitative in nature. Most of the information in education is in the form of verbal and other symbolic behaviour. The verbal data gathered through questionnaires, observation or interview are mostly qualitative in nature. These data provide depth and detail which emerge through direct quotation and careful description of phenomena.

Unlike scientific explanations to educational phenomena qualitative research concentrates on understanding the process of dynamic situations and intervenes with the reality in its natural setting. The procedures adopted are of humanistic nature. Of late, major attention has been paid by educational researchers to qualitative methods. Having their origin in the typical nature of inquiries in sociology, anthropology, political science and psychology, qualitative methods have been given refined shape through current literature. In this unit, you will be exposed to the nature of qualitative research, its types, context and steps involved in conducting qualitative research.

8.2 OBJECTIVES

After going through this unit, you will be able to:

- define qualitative research
- discuss needs and relevance of qualitative research in education
- explain main features of different types of qualitative inquiry viz, biography, phenomenology, grounded theory approach, ethnography and case study
- describe basic procedural details of such methods
- design qualitative research in the context of any educational problem.

8.3 DEFINITION OF QUALITATIVE RESEARCH

As you know, the emergence of qualitative methods of research is of recent origin. Social scientists, anthropologists and sociologists have given a shape to the concept of qualitative research mostly during the end of twentieth century. The procedural clarity is still in the process of refinement. Clarity of the definitions of qualitative research is as follows:

1. In the initial stage of conceptual analysis of qualitative research there was a trend of defining qualitative research as an opposite pole of scientific (quantitative) inquiry. Quantitative research deals with a few variables and many cases whereas qualitative research is carried out with a few cases and many variables.
2. The above definition focuses on the scope of qualitative methods of inquiry. However, from the point of view of methodological and process dimensions the following two definitions may clarify your understanding of qualitative research. Cresswell (1998) defined qualitative research in a similar tone. To him “qualitative research is an inquiry process of understanding based on distinct methodological traditions of inquiry that explore a social or human problem. The researcher builds a complex holistic picture, analyses words, reports detailed views of informants and conducts the study in a natural setting”.
3. Denzin and Lincoln (1994) say “Qualitative research is multi-method focus, involving an interpretive, naturalistic approach to its subject matter Qualitative research involves the studied use and collection of a variety of empirical materials – case study, personal experience, introspection, life story, interview, observational, historical, interactional and visual texts-that describe routine and problematic and meaning in individuals’ lives”.

You may trace at least four clear meanings from the above definitions.

One, qualitative research focuses on the study of complex human and social problems in totality, unlike scientific method of concentrating on study of fragmented variables or situations or events.

Two, qualitative research places the main emphasis on the researcher who narrates and interprets phenomena in terms of meanings derived from people’s experiences, events etc. Hence, human and subjective approach is highlighted.

Three, the studies are conducted in a natural setting i.e., to observe the events without making any manipulations or controls on variables studied.

Four, it involves a variety of data gathering techniques and approaches of qualitative nature viz., case study, interviews, dialogues, observations, personal experience, life story, visual data like photography etc. These data are gathered from varieties of sources.

8.4 CHARACTERISTICS OF QUALITATIVE RESEARCH

The following are the characteristics of qualitative research:

i) Multiple realities

First, qualitative research assumes that there exist multiple realities in social and educational situations. These realities exist in concrete forms. They are perceived by people differently and thus become different mental constructs for different people. In other words, realities are taken to be what people perceive them to be at a particular point of time. Since social and educational situations keep on changing from time to time, the realities too keep on changing. Furthermore, since the realities are context specific, they cannot be tangible in a generalized form.

ii) Meanings and interpretations

Qualitative research emphasises on study of meanings given to or interpretations made about objects, events and processes concerning educational situations. To them changes in terms of social and behavioral phenomena cannot be identified with the concept of physical movements which can be identified by external observation alone. Rather the understanding of human behaviour or a social phenomenon involves understanding of how men are, what they are doing or participating in an activity.

iii) Generation of knowledge

Qualitative inquiry insists on generation of knowledge resulting from the interaction between the inquirer and the respondents. The respondents answer the questions put by the inquirer in terms of their perception or meanings they attach to their actions. Moreover, interactions take place between the inquirer and his/her respondents to achieve maximum levels of responsiveness and insights concerning the problem under investigation.

iv) Generalization

As stated above, the researchers do not believe in the process of generalisation as propounded by scientists. They argue that in the process of making a generalisation a lot of meaningful information existing in individual units is undermined; hence generalized knowledge does not represent real knowledge. For them, the process of knowledge generation must take into account the differences or real evidences existing in different specific situations.

v) Human relations

In the case of human relations, several intrinsic factors, events and processes keep on influencing each other constantly. Therefore, it is not possible to identify one to one cause and effect relationships at this level of naturalistic studies. The causality in social sciences cannot be demonstrated in the 'hard' sense as it is done in the case of physical sciences. Rather, only patterns of plausible influences can be inferred from social and behavioural studies.

vi) Value systems

Qualitative Researchers do not believe in value-free inquiry. The influence of value systems is recognized in the identification of problems, selection of samples, use of tools, data collection, the conditions in which data are gathered, and the possible interaction that takes place between the inquirer and the respondents.

8.5 REASONS FOR CONDUCTING QUALITATIVE RESEARCH

As a research student you may be curious to explore in what circumstances one opts for qualitative methods of inquiry in comparison to quantitative methods of inquiry. Some of the situations which prompt a researcher to opt for the qualitative method are:

- i) As you know, there are different kinds of research questions about the phenomena under investigation, such as What happens? How does it take place and Why did it take place? or What are the causes of certain effects? The first two types of questions involving What (The present context and status) and How (the process) are dealt with very well through qualitative methods. Unlike quantitative inquiry, where you may intend to explain causal relationships (Why question) through comparison of groups or to establish associations between different variables, the qualitative method focuses on exploring the intricacies involved in process dimensions of an event in totality. For example, if you are interested in understanding the curricular practices of best quality universities, the qualitative method will suit you best.
- ii) Qualitative method is also preferred in the context of initial level of theoretical research. In social sciences, particularly in education, theories are not available to explain many completed events. The variables concerning the events are not easily identifiable. In such cases the qualitative method is used to identify significant variables associated with the event. For instance, formal education practices taking place in a tribal setup vis-à-vis human and social development need to be tackled through qualitative method since different variables involved in the situation need to be explored. Identification of different variables and trends lead towards refinement and theoretical explanation.
- iii) There are certain research problems which need holistic treatment. In other words, many variables need to be studied in depth in the context of one case or unit. For instance, designing a grass root level plan for educational development of a village would require application of a qualitative method of inquiry where multifaceted data need to be gathered through various sources for intervention and development which treat the uniqueness of the concerned village.
- iv) Unlike experimental studies where a researcher intends to explain a cause and effect relationship in a controlled laboratory setting, the qualitative method is preferred to conduct the study without disturbing neutrality in setting. For instance, curricular practices of best quality schools need to be explored in natural settings through adopting qualitative methods like participant observations, visual documents, verification of project works, interviewing students, teachers and parents, etc.
- v) One of the major limitations of quantitative inquiry is associated with the study of limited variables. Moreover, those variables need to be amenable to measurement. However, if your research problem is of such type where variable are not easily amenable to measurement and extensive data situations, you will have to opt for qualitative inquiry.
- vi) The nature of certain problems is such that your role as a researcher plays a vital subjective role than objective and impersonal role. For instance, in the process of exploring meaning of certain behavioural exposures with its motives your role is to be valued with a lot of significance since you will have to describe the event from the participant's point of view. Moreover, in such a process you can explore the reality, being a part of it as well as interacting with situations. You will have to depict the situations as an active learner and not by passing judgment as an expert. Such kind of studies demand application of qualitative methods in comparison to quantitative methods.

Check Your Progress

Notes: a) Space is given below for writing your answers.

b) Compare your answers with those given at the end of the unit.

1. Differentiate between quantitative studies and qualitative studies.

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2. What are the basic factors of qualitative studies ?

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3. Why should you choose the qualitative method in educational research?

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8.6 TYPES OF QUALITATIVE METHODS

Many varieties of traditions of qualitative studies exist in social sciences. They have been categorized by Creswell (1998) in the context of their forms, terminologies and focus as under:

- Biographical study
- Phenomenological study
- Grounded Theory study
- Ethnography
- Case study

8.6.1 Biographical Study

Main features

Biographical study is the study of an individual and his or her experiences as narrated to the researcher or found in different sources. You can come across biographical writings in different fields like literature, history, anthropology, sociology, education, psychology etc. Biographies are presented with different perspectives like literary, historical, anthropological, sociological, educational, psychological as well as of interdisciplinary nature. The focus of biography remains on telling and inscribing the stories of others. It explores history of life e.g. accounts of major achievements of life.

There are different connotations linked with biographical study viz., individual biographies, autobiography, life history, oral history. In all these cases the researchers must take care of objectivity in expression with little research interpretation. It must be written in a scholarly way with a strong historical background of the subject and chronological organisation. The account must be presented artistically from the perspective of presenting details in a lively and interesting manner.

Steps of Biographical Studies

Different steps involved in writing biography are:

- (i) The first step is to identify the experiences in an individual's life to be arranged chronologically in different stages of life.
- (ii) The researcher gathers concrete contextual materials through interviews. He gathers stories.
- (iii) The stories are organized around different themes. The themes indicate major events of individual's life.
- (iv) The researcher explores the meaning of these stories.
- (v) He also looks for larger structures to explain cultural issues etc.

8.6.2 Phenomenological Study

Main features

Phenomenological study's focus remains on describing the meaning of live experiences for several individuals about a concept or the phenomenon. It is said that through phenomenological approach the researcher explores the structures of consciousness in human experiences. Here experiences contain both the outward appearance and inward consciousness based on memory image and meaning.

Steps of Phenomenological Studies

The procedural details of phenomenological studies are listed as under:

- i) At first the researcher must recognize his or her own pre-conceived ideas about the phenomena to understand it through the voices of several experienced persons.
- ii) Second, he writes research questions that explore the meaning of that experience for individuals.
- iii) Third, the researcher collects data from individuals who have experienced the phenomenon under investigation. Usually the data are gathered through long interviews of 5 to 25 experienced persons.
- iv) Data are analysed in the form of statements and units. Then the units are transformed into clusters of meanings. Finally such analysis is linked with general description of experiences incorporating what was experienced and how it was experienced.

8.6.3 Grounded Theory Study

Main features

This kind of study aims at discovering or generating a theory. Here theory means an abstract analytical scheme of phenomenon. In other words, a theory is understood as a plausible relationship, as any concept or sets of concepts. In this case, theory is discovered in the context of a particular situation. This situation is one in which individuals interact, take actions, or engage in a process in response to a phenomenon. The researcher intends to explore how people act and react to a phenomenon. The process involved in data collection can be through continuous visits to the field, interviews with participants, in-depth observations of activities etc. The researcher develops and interrelates categories of information and writes theoretical propositions or hypotheses.

Through the grounded theory method, a theory is generated in the context of a phenomenon being studied. Hence, the researcher goes beyond one step ahead of understanding the complexities of processes involved in a situation. He tries to help others to comprehend such complexities with the help of a theoretical framework developed by him. Such a theory is evolved towards the end of the study. As stated

above, the theoretical framework may be depicted in the form of a narrative statement, a series of hypotheses or propositions or in the form of a visual picture.

For example, the researcher studies the complexities involved in the teaching learning processes where the sole responsibilities of such processes are shared by learners under the guidance of a teacher. The researcher would like to build a theory in this context through application of the grounded theory method, and shares different steps involved in this method.

Steps of Grounded Theory Study

- i) In the context of a particular situation, the researcher makes several visits to the field, makes in-depth observations and conducts interviews. The data collection process continues till the researcher comprehends the totality in a situation. However, the major focus remains on in-depth interviews.
- ii) With the help of data available, the researcher makes categories of information. A unit of information composed of events, happenings, and instances is presented in the form of one category.
- iii) Often it happens that during the data collection process the researcher analyses the data and gradually categories are formed on specific instances or happenings. Hence the data collection process and data analysis are integrated on many occasions.
- iv) After data analysis, the researcher may like to be back to the field to gather more information, analyse the data and so forth. Hence, this zigzag process continues till a saturated state is identified for arriving at a theoretical framework.
- v) Towards the end of the study, the researcher presents an elaborate theoretical framework to understand the complexity of an event.

8.6.4 Ethnography

Main features

Ethnography can be understood as a description and interpretation of a cultural or social group or system. Here the focus of the study remains on examining the patterns of behaviour of a group, its customs and ways of life. This method involves prolonged observation of events where the researcher becomes a part and parcel of the day-to-day lives of the people. One to one interviews with the members of group corroborated with participant observation can form the base of such a method. The researcher makes use of ethnography to study the meanings of behaviour, language and interactions of the culture sharing group. For instance, educational processes of particular tribe or a rural village can be studied applying ethnography where cultural and behavioural interactions involved in education processes can be studied in totality. As an outcome, the researcher comes out with a report almost in a book form.

8.6.5 Case Study

Main features

Case study as a method of research focuses on indepth study of a unit or case in totality. The case may be an individual, programme, an event, an institution, an activity, etc. The case study method was originally used in medicine to examine the patient's previous development, his health and physical state from the beginning and many other factors in the past, besides making a careful study of the patient's present condition and symptoms. Freud used the case study method to assist his subjects in solving their personality problems. The published detailed accounts of his interviews with patients and his interpretations of their thoughts, dreams and actions provide excellent examples of case studies. The investigation of a case is of exploratory nature. It involves detailed, in-depth data collection employing multiple sources of information concerning all pertinent aspects of a case. It is also interpreted that a case may be a unique and

bounded system. This means the case under investigation is bound by time and place. The uniqueness of a case refers to the typical characteristics of a case, such as a quality institution or an ashram school, a particular programme or course of study, or university or an innovation etc. The researcher tries to explore in detail about what events occur, and how they occur. Multiple sources include observations, interviews, audio-visual materials, documents, records, etc. A case is to be studied in a given context, i.e., study of a case is conducted within its setting. The setting may be a physical setting, social, historical or economic setting, etc. As a whole, the case study helps a researcher to understand the complexities of an event or events with contextuality and develops insight about with the nature and process dimensions of the events studied. In the Indian context, such a method has been used in the case of doctoral and research projects like:

1. "A study of distance education in an Indian university". This study's focus is an identification and description of different underlying factors. Contributing towards success of distance education programme of all university as a whole.
2. "A case study of management processes of National Adult Education Programme in Orissa". This study aims at description of the management processes interlinked with national level, state level, district level, project level and village level adult education programmes in terms of the different dimensions of management like policy making, planning, communication, staffing, direction, co-ordination, budgeting and evaluation.

Besides these kind of case studies we have come across some other studies like 'A case study of school products in Delhi', 'A study of school involvement in a village of Nagaland', 'Case studies of innovative institutions at secondary level in Tamil Nadu', 'Management of Medical Colleges – A case study'. From the above you can see that the case study method in educational research may focus either on the study of an educational programme or on a set of processes of an institution, in the context of development of learning skills, language competencies, reading comprehension of students. Guidance counsellors or social workers conduct case studies for diagnosing a particular condition or problem and recommending therapeutic measures. They gather data from a particular individual and confine their interest to the individual as a unique personality.

Steps of Case Study

Case study is conducted by adopting the following steps:

- i) First, the researcher identifies the uniqueness of the case to be studied or a number of cases to be studied. Whether a normal case is to be studied or an unusual and typical case is to be studied is decided at this stage.
- ii) Keeping in view different contexts and perspectives of the problem, the researcher delimits what is to be studied within the scope of investigation.
- iii) Once the dimensions of a unit are identified for investigation, the researcher locates different mechanisms of gathering different varieties of evidences from different sources. After identification of the case and content, the present status of the case is determined through direct observation or record. Here the researcher goes far beyond casual observation or superficial description. For example, to make a case study of a delinquent child, the first thing the researcher has to do is to survey the present status of the child by making an assessment of his physique, cognitive and non-cognitive factors. The mechanisms to be chosen may be observation, interviews, document surveys, audiovisual recordings, projective and non-projective tests, etc. The observation can be participant in nature as employed in ethnography. It can be direct observations. Data may be gathered through various sources like gathering evidences from participants, functionaries and stake holders of a programme, institutional records and documents, observation of events taking place etc.

- iv) Data gathered through multiple sources are subject to qualitative analysis. It can be a holistic analysis of the entire case or analysis of a specific aspect of a case.
- v) Data analysis involves descriptive procedures. The themes or issues are identified. Interpretations are made about the case in its given contexts. It also involves narration of events chronologically and giving an account of events in totality. The detailed perspectives of significant events concerning a case are highlighted through such narrations.
- vi) In case of study of number of cases the analysis is done in two phases. First is analysis of data concerning the themes of each case separately i.e., within-case analysis which follows the first is doing a thematic analysis across the case. This is called cross-case analysis.
- vii) In the final step the researcher reports about the experiences and findings of the case.

For example, in a study first the researcher gathers evidence through participant observations and interviews. He notices certain trends and puts them into different cluster themes. Then he tries to place these themes in different groups and makes more abstract categories at the last stage of inquiry. Hence with the help of an inductive approach the researcher’s initial level ideas and questions are refined in due course of investigation.

A summative view of different qualitative methods

Different research methods have their uniqueness with regard to the focus of studies. As stated above, **Biography** is used to explore the life of an individual where as **Phenomenological Inquiry** is used to understand the essence of experiences of persons about a phenomena. **Grounded theory** approach is adopted to develop a theory grounded in data from the field. **Ethnography** aims at describing and interpreting a cultural and social group. **Case study** is used to develop an in-depth analysis of a single case or multiple cases. However, all these methods adopt qualitative techniques of data collection such as interviews, observation, study of documents, relevant records, etc and incorporate descriptive and narrative approaches of data analysis.

Check Your Progress

- Notes:** a) Space is given below for writing your answers.
b) Compare your answers with those given at the end of the unit.

4. Give one example of each of the following:

- i) Biography
- ii) Phenomenological study
- iii) Ethnography
- iv) Case study
- v) Grounded theory approach

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5. What are the common points of different kinds of qualitative studies?

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8.7 CONTEXT OF QUALITATIVE METHODS

All the kinds of qualitative methods have a common framework of ontological, epistemological, axiological, rhetorical and methodological perspectives.

- i) From the point of view of assumptions regarding nature of reality, the qualitative inquiry values subjective and multiple social realities. It presumes that reality cannot not have existence being separated from the perceiver / researcher. Rather, reality is constructed by individuals involved in research situations. Unlike assumptions of single reality as emphasized by scientific inquiry the concept of multiple realities is emphasized in the qualitative paradigm of the researcher. Through qualitative inquiry, multiple realities are narrated by representing diverse perspectives on the phenomenon. Hence diversified constructed realities are the focus of qualitative model of inquiry.
- ii) In qualitative methods the role of researcher is visualized as inseparable from the problem under study. The qualitative researcher interacts with the situation he/she studies. The researcher becomes a part and parcel of situations studied. He almost tries to find the meaning by being very close to the reality. Hence the gap between observer and observed is minimised. He shifts his status from objective and external observer to insider.
- iii) From an axiological point of view, qualitative research emphasizes on value loaded inquiry. Since the researcher is the sole instrument of investigation it is natural that his values and biases influence the process of inquiry. Hence, field studies conducted by qualitative researchers reflect their values and biases in presentation of data and interpretation.
- iv) The language of qualitative research is artistic and literary in nature. Unlike scientific reporting where an impersonal third person presentation is emphasized, the qualitative studies are reported in informal style using the personal voice. Qualitative terms are presented in narrative form rather than presenting a definition along with its explanations instead of using the terms like internal validity, external validity, generalizability, the qualitative terms like credibility, transferability, dependability and conformability are used in reporting of the studies.
- v) The qualitative research paradigm emphasizes an inductive logical approach. The researcher studies a given situation. He identifies categories from data gathered through interaction with the situation rather than confirming predecided categories through gathering evidences.

8.8 COMMON STEPS OF CONDUCTING QUALITATIVE STUDIES

The steps in conducting qualitative studies are i) identifying problems and research questions ii) designing sources of data, sample and data gathering techniques iii) conducting field study or collecting data and iv) data analysis and reporting.

i) Identifying Problems and Research Questions

At the first stage the researcher identifies a problem to be investigated. It emerges from a thorough analysis and review of literature and the experiences of the researcher and experts on several issues and problems. The major process of research, at this stage, is identified with building the central question of the study and subsequently linking it with a number of sub-questions.

While identifying a central question the researcher puts in open-ended and non-directional queries. The queries focus on the "What" and "How" aspects of the phenomena under investigation. The exploratory questions highlighting the "process" aspects or "meaning" aspects are considered as the main theme of the investigation.

Following the central question, a small number of sub-questions are identified at the first stage of research. There can be a number sub-questions, keeping in view the scope and focus of the study.

For instance, in the context of a phenomenological study of understanding professional ethics of teachers, the researcher may ask sub-questions like:

1. What does professional ethics mean to an experienced teacher?
2. What do the teachers do to upgrade professional ethics?
3. Describe one person with high professional ethics.

These kind of questions become the guiding force for the next steps of research.

ii) Design of the study

At this stage the researcher develops an open sketch of sampling, tools and techniques to be adopted, sources of data etc.

Unlike a scientific investigation where the design is built prior to conduct of the study, the qualitative researcher develops an open and flexible approach. At this stage of inquiry, the following considerations are kept in mind by the researcher.

a) Sampling

Purposive sampling techniques are used for identification of informants' responses of the study. For instance, in the case of a phenomenological study the researcher identifies all participants who experience the phenomena being studied. Moreover, the researcher examines the individuals who can contribute significantly to develop a theory in the context of a grounded theory. In the case of a case study, the researcher likes to gather evidence from diverse situations which display multiple facets of the case. Hence, he picks up a heterogeneous group of respondents who are stake holders of the system. As a whole, it can be said that keeping in view the nature of questions involved in the study, the researcher identifies the appropriate sample. The sample size may vary from problem to problem.

b) Forms of data

The researcher must be clear about what kinds of data are to be gathered for investigation. Mainly, they can be categorized under the following four heads:

1. evidences about the surroundings, situations, activities, events and performances, etc. through observations;
2. evidences or experiences as explored through interviews;
3. evidences on developments; performances, demography, rate of participating, nature of progress recorded or noticed in various kinds of documents, publications, write ups etc; and
4. physical trace of evidence, behavioural dynamics, expression, feelings, emotional outbursts, etc. to be trapped by audio-visual data gathering devices.

The investigator must keep an open mind while employing various data gathering devices keeping in view the nature of data that emerge during the data collection process /field work.

iii) Data collection process

As stated earlier, mainly four kinds of data gathering devices are adopted by qualitative researchers viz., observation, interviews, document analysis and audio-visual gadgets. The researcher must be competent enough to deal with these different qualitative techniques of data collection.

a) Interviewing

The researcher adopts informal interviews keeping in view the sub-questions related to the issues and themes involved in the study. Identifying sample respondents to be interviewed purposefully is the first step. Whether a researcher goes for one-on-one interview or focus group interview is to be kept in mind. For smoothening the process of the interview, the researcher may make use of an interview protocol / format with open-ended questions and ample space between the questions to write responses of the interviewers comments. The researcher may opt for using audio cassette recorders or a telephonic device for interviews.

b) Observing

The qualitative method mainly makes use of participant observation technique where the researcher gets an opportunity to witness the events being a complete insider. While ethnography insists on this kind of observation, in the case of study the researcher may opt for direct observation. In employing the observation technique the researcher must be careful about identifying the site to be observed, identifying who or what to observe and how long, the observation protocol to be used, the role of the observer i.e., participant or outsider are to be thought about during the data collection stage.

Moreover, the recording of observations i.e., portraits of the informant, physical setting, particular events and activities, researcher's reactions must be kept in mind while adopting observation techniques.

c) Documentation

While adopting this technique the researcher must examine which materials are relevant to the study. He will also have to explore the means of how to trap evidences or having accessibility to relevant documents. As in case of historical studies, the researcher will have to be careful about authenticity of documents and the validity of information presentable therein.

d) Visual devices

As a field worker the qualitative researcher must be acquainted with using various kinds of audio-visual recording practices. While using them he must be careful about the sensitivity of situations, ethical aspects, uniformity, etc.

All these devices are used to gather evidences in natural setting with a view to studying the emerging total picture of the situation.

iv) Analysis of data and reporting

Data collection and data analysis go on side by side in qualitative studies. Different techniques of data analysis include:

- a) Review of data and representing data by case, by subject and by themes in the form of description, diagrams, tables and graphs.
- b) Initial codification and categorization and further minimizing categories.
- c) Frequent appearance of codes, development of categories, development of analytical frame work for theorization.
- a) In this approach the researcher makes a thorough review of information as noted in the observation formats or interview schedules, notes, etc. He points out key points and writes reflective notes on the basis of an initial review. Sometimes it motivates the researcher to verify certain points by making further interaction with the informants. The researcher translates the ideas of informants into metaphors.

Furthermore, the researcher presents descriptions in the form of tables, graphs, pictures, figures, diagrams, etc. He represents the case by themes or by specific subject areas.

- b) The process of codification or categorization involves developing a short list of tentative codes that match a text segment. Elaborate lists of codes are arrived at in the initial stage. Then categorization of facts and themes takes place by identification of common codes. Furthermore, the categories are reduced to identify major themes and present them in narrative forms.
- c) Another data analysis technique indicates preliminary counts of data and determines how frequently each code appears in the total data. Then the researcher identifies categories and develop analytical frameworks with a view to generating theories. In the whole data analysis procedure, a spiral approach is followed to identify categories, reflecting, cross-questions, reading, interpreting etc.

Check Your Progress

Notes: a) Space is given below for writing your answers.

b) Compare your answers with those given at the end of the unit.

6. How does a researcher identify research questions?

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7. What are the different sources of data used in qualitative studies?

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8. How is participant observation different from general observation?

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9. What are the different data analysis techniques used in qualitative studies?

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8.9 VERIFICATION OF TRUSTWORTHINESS OF QUALITATIVE RESEARCH

Unlike standard procedures followed in establishing the objectivity and validity of quantitative research, you will come across many qualitative approaches to verify the trustworthiness of qualitative research. Generally, the following verification procedures are employed for studying trust worthiness of such kind of studies :

- i) **Prolonged engagement and persistent observation:** Researcher's prolonged interaction with informants and participatory observation wins the confidence of the informants. Hence, this procedure minimizes the possibility of vagueness of data, prolonged engagement in the field helps the researcher to reflect on the genuineness and authenticity of data, on gathering relevant data and on making purposeful use of evidences.
- ii) **Rural explanations:** Once the researcher (after qualitative analysis) has described the patterns and their explanations, it is important to look for rival or competing themes and explanations both inductively and logically. Inductively, it implies looking for other ways of organizing the data that might lead to different results. Logically, it involves searching for other logical possibilities and then finding if those possibilities can be supported by the data. However, while

considering rival hypotheses and competing explanations, the strategy to be employed by the researcher is not attempting to disprove alternatives, but to look for data that support alternative explanations. In this strategy, the researcher should give due weightage to supporting evidence look for the best 'fit' between data and analysis.

- iii) **Triangulation:** It is another significant technique of verification where the researcher makes use of multiple and different sources, methods and theories in order to provide corroborating evidence. In other words, through triangulation, evidences are corroborated from different sources to throw light on a theme or perspective. It involves comparing and cross checking consistency of data derived by different means at different times using qualitative methods. It means (i) comparing observational data with interview data; (ii) comparing observational data with questionnaire data; (iii) what participants of a programme say in public with what they say in private; (iv) checking for consistency the opinion of the participants about a programme over a period of time and (v) comparing the opinion of the participants of a programme with others who are associated with programme in one capacity or the other. The triangulation of data sources within qualitative methods will seldom lead to a singly totally consistent picture. But such triangulation is helpful to study and understand when and why there are differences.
- iv) **Peer view or debriefing:** The methodology followed in the study with emphasis on subjective approach gets cross-examined by the peer researchers. The peers review the study, present their views in debriefing sessions. Such an operation helps the researcher introspect on the study in the context of peers reflection on the procedural dimensions and reporting.
- v) **Design checks:** The nature of research design and methodology also contribute to distortion in results. Sampling gives rise to three type of errors. The errors may be due to : (i) distortion in situations that were sampled for observation; (ii) distortion introduced by the time periods during which observations took place; (iii) distortion because of selectivity in the people who were sampled either for observation or interviews. Thus the researcher must be careful to limit results of his study to those situations, time periods, people and contents for which data are applicable.
- vi) **Negative case analysis:** Unlike quantitative study where the hypothesis is set prior to conduct of the study the, qualitative researcher keeps on refining the working hypotheses in due course of conducting the study. Hence context specificity is kept in mind for refining the initial hypotheses till the completion of the data collection process and its analysis. The search for negative cases and instances that do not fit within the identified pattern and their understanding is also competent in the verification and validation of results.
- vii) **Clarifying researcher's bias:** It is presumed that the researcher himself recognizes his bias and subjectivity. Hence in view of making it transparent the researcher comments on past experiences, prejudices, and orientations that influenced the interpretation and approach to study.
- viii) **Member checks:** Through this technique the entire study's report with its prime data base, analysis and interpretations is presented before the participant respondents who can judge the accuracy and credibility of the account. They are asked to provide critical observations on the research work.
- ix) **Rich and thick descriptive presentation:** The researcher describes in detail the participants or setting under study. Hence, the readers get a clear picture of the setting. They get chance to examine the findings that can be applicable or transferred to other similar settings.

- x) **External audits:** Through this process the expert consultant who is purely external and independent to the study examines both the process and the product of the account, thus assessing its accuracy.

The above indicators are employed to examine the authenticity and credibility of qualitative studies through involvement of human experiences in the process. What is more significant is that the researcher must maintain transparency throughout the study so that the scope of verifying its trustworthiness becomes wider and accessible.

8.10 LET US SUM UP

In the foregoing sections, you were shown that main features of qualitative studies are needed mainly with the purpose of understanding process dynamics of a phenomenon in contextual frameworks. Such understanding may lead towards theorizations. Different kinds of qualitative methods are used in different context, such as biographies, ethnography, grounded theory, phenomenology and case study. However, these methods follow common approaches like interviews, observation, study of documents and narrative techniques of data analysis. These methods adopt subjective human and participant experience-based techniques in contrast to that of generic methods of inquiry. However, as a researcher, you will have to be mature enough to adopt various checks and balances for trustworthiness of findings of such studies.

8.11 UNIT-END ACTIVITIES

1. Identify and state different problems / topics in the area of education belonging to each of the categories of qualitative researcher:
 - a) Biography
 - b) Ethnography
 - c) Phenomenology
 - d) Grounded theory
 - e) Case study
2. Chalk out the strategy for conducting any of these studies.
3. Differentiate between the strategies adopted in conducting qualitative studies and those in quantitative studies.

8.12 POINTS FOR DISCUSSION

1. What is the relevance of qualitative research in education?
2. What are the limitations of qualitative research?
3. How can we judge trustworthiness of qualitative research?
4. What should be the role of a researcher in conducting qualitative research?
5. Can we integrate qualitative studies with quantitative studies? Discuss.

8.13 SUGGESTED READINGS

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8.14 ANSWERS TO CHECK YOUR PROGRESS

1. Quantitative studies are mainly of explanatory nature focusing on the 'why' components. Qualitative studies focus on 'how' and 'what' components with a view to understanding in process dynamics in specific situations.
2. Natural setting, researchers involvement, visual and verbal images, process dynamics, inductive logic and participant perspectives.
3. To study complex human and social problems in totality, to observe the phenomena without making any manipulations or controls on variable, to study and explore the nature of subjective quality.
4. (i) The contribution of an innovative teacher.
(ii) Existing curriculum transaction in a school.
(iii) Parents involvement in school management.
(iv) Study of an ashram school.
(v) Professionalism in teaching.
5. Using qualitative data collection techniques like interviews, observation, document analysis, photographic techniques, and descriptive and narrative approaches of data analysis.
6. Experiencing first-hand exposures, study of literature, identify central question and link sub-questions to the theme.
7. Empirical evidences as revealed through interviews and observations, demography, documents, physical trace of evidences, visual and verbal images.
8. A participant observer plays the role of being part and parcel of locality. General observer is alien to the reality.
9. Reviews, descriptions, codification, categorizations.

UNIT 9 PHILOSOPHICAL AND HISTORICAL STUDIES

Structure

- 9.1 Introduction
- 9.2 Objectives
- 9.3 Philosophical Studies
 - 9.3.1 Meaning and Nature of Philosophical Research in Education
 - 9.3.2 Areas of Philosophical Research in Education
 - 9.3.3 Philosophical Inquiry: Main Steps
- 9.4 Historical Research
 - 9.4.1 Meaning of Historical Studies
 - 9.4.2 Relevance and Scope of the Study of Educational History
 - 9.4.3 Main Characteristics of Historical Research
 - 9.4.4 Historical Research: Main Steps
- 9.5 New Trends in Historical Approaches to Education
- 9.6 Enhancing the Importance of Historical Research
- 9.7 Let Us Sum Up
- 9.8 Unit-end Activities
- 9.9 Points for Discussion
- 9.10 Suggested Readings
- 9.11 Answers to Check Your Progress

9.1 INTRODUCTION

Philosophical and historical methods of inquiry form the basic foundations of knowledge in education. In such methods, major emphasis is laid on the researcher's analytical bent of mind and insight into various concepts, issues and practices of education system.

This unit has been devoted to clarification of meaning and nature of these methods of research, their scope and steps involved in conducting philosophical and historical studies in education.

9.2 OBJECTIVES

After going through this unit, you will be able to:

- define the meaning and nature of philosophical inquiry and historical methods of research respectively;
- discuss different issues and problems which can be best fitted for philosophical and historical researches;
- design and develop philosophical and historical studies in education; and
- identify significant points to be kept in mind for conducting philosophical, and historical studies in education.

9.3 PHILOSOPHICAL STUDIES

In the process of developing our understanding about the philosophical method in educational research, it is necessary to reflect on the functions of philosophy. The major concerns of philosophy pertain to three kinds of activities: Metaphysical, Normative and Analytical.

- i) **Metaphysical:** The main function of philosophy is to raise basic questions about the nature of reality, the nature of universe, the nature of human kind, the nature of beauty, etc., and to answer these issues through human speculations and introspection.
- ii) **Normative:** The second in the order of philosophical activities is to establish norms, standards or guidelines for the conduct of human affairs with reference to the knowledge of reality. This involves identification of human dispositions which are worthy of cultivation; pointing out the arguments for why these dispositions are to be considered excellences; and discussing how these excellences are to be nurtured or cultivated.
- iii) **Analytical:** The third activity is to clarify the concepts which are used as prime elements of any area of study. Such clarifications are made on the basis of appropriate arguments and exposition of underlying assumptions behind such analysis.

9.3.1 Meaning and Nature of Philosophical Research in Education

Philosophical studies in education aim at

- assessment of the status of knowledge through analysis of meanings and relationships of different concepts and exposition of underlying assumptions, and
- a fruitful synthesis of ideas from different fields concerning educational theories and practices.

In other words, a researcher in the area of educational philosophy aims at analyses of meaning and nature of different educational concepts and the relevance of different kinds of educational practice. He/She identifies appropriate norms and standards for educational practices through a cross-examination of ideas reflected by different thinkers in the field of education. The major thrust of research in educational philosophy is as follows:

Unlike scientific research which aims at making factual statement as empirical laws or generalizations, philosophical research in education focuses on

- (i) development of deep understanding of and fresh insights into educational concepts, theories, principles, issues and problems,
- (ii) and making normative inducements on and evaluations of educational practices and recommendations for doing things in a better way.

In other words, it is expected that the philosophy of education should raise important issues having relevance for education, and tackle them philosophically offering arguments, clarifying concepts, putting forward metaphysical views with intellectual support and offering grounds for normative assertions. It also helps us to enlighten ourselves about concepts like democracy, liberation, equality, secularism, nationalism, freedom, autonomy, authority and social justice in the context of education. Moreover, philosophical enquiry leads towards arriving at normative criteria for governing aims and objectives of education and parameters for curricular processes and clarification of concepts.

Analysis and appraisal of arguments, statements and theories, synthesis and integration of such understanding with different aspects of the education system viz, policy formulation, curriculum, teaching-learning processes, evaluation, teachers' and learners'

expected roles etc. can be treated as major functions of philosophical inquiry in education. Hence, you will notice the use of intellectual processes of conceptualization, logical analysis, synthesis and evaluation of ideas and thoughts remain in the forefront of philosophical inquiry. You may agree that the education system needs sound theoretical and ideological bases. In this context philosophical research contributes towards building a normative framework for educational priorities, curriculum, curricular practices and management of the education system through a cross-examination of ideas reflected by different philosophers in the field of education. Categorization of philosophical inquiries in education has been done in the following section:

9.3.2 Areas of Philosophical Research in Education

i) Studies of educational philosophy/ contributions of educationists / philosophers

Ideas about education are expressed philosophically and are practised through educational processes. There is a direct impact of philosophy on education from the viewpoint of identifying aims and objectives, relevant contents, disciplines, methods, and evaluation processes.

A philosopher or a group of philosophers who follow similar lines of thought may express their ideas about the above aspects in different forms: speeches, discourses, writings and institutional practices.

An educational researcher may be interested in making an analytical and critical appraisal of the educational philosophy of a thinker or a group of thinkers and present their ideas on education in a consolidated, formal, and systematized form.

You will come across most of the studies (i.e., around 70 percent in the area of philosophy of research) belong to this area. The researcher intends to analyse educational philosophy contributions of individual thinkers, philosophical schools, scriptures, historical/ cultural periods. For instance, studies like 'Educational Thoughts of Gandhiji and their relevance to contemporary education', 'Educational Philosophy of Dr. Radha Krishnan and its relevance for social change', 'Educational Philosophy of Sri Aurobindo and its impact on schooling', 'Educational Philosophy of J. Krishnamurti and its implications for the modern system of Indian education', etc. come under the category of describing and classifying the philosophical thoughts of individual thinkers and drawing their implications for the present day education system.

In such studies, it is expected that the researcher presents a consistent and coherent account of ideas, and their basic assumptions and validity. In the absence of this exercise, it becomes an activity of mere collection of facts from different sources and presenting them in a compilation form.

ii) Study of the educational philosophy propounded by a particular school of thought

Philosophy can be classified under different schools of thought like idealism, naturalism, realism, existentialism, pragmatism, socialism or communism i.e., dialectical materialism. Every school of thought projects its educational philosophy based on its own ideology regarding the attainment of the basic goals of education. Abstractions and formal statements governing principles and ideas of a school of thought on educational systems can also be considered as one of the areas of philosophical inquiry.

iii) Study of the philosophical bases of curriculum

There are several issues related to theoretical as well as practical aspects of education which have philosophical bases and can be resolved through rational exercises. Several questions raised in the criteria for identifying the desirable state of mind are the concern of an educational philosopher. For example a study conducted on the concept of child as per Tagorian Philosophy fits well into this area.

You will also notice that philosophical research pertaining to curriculum development can answer several other questions. What should be the ratio of general and specialized courses at secondary and higher secondary stages? To what extent can subject classification be perfect at the secondary school stage? etc. Research in this area can help us identify objectives, and course contents in the process of curriculum development.

iv) Study of the philosophical bases of instructional processes

Several ways and means of teaching have been grouped under different methods of teaching, but many questions are being raised about the meaning of terminologies, concepts, and activities highlighted under different methods. For instance, How does the term “imparting” differ from “instruction”? Is there any need for “punishment” in education? or What must be the grounds for punishing learners? A number of such philosophical questions related to the instructional processes need to be answered through analytical exercises. Through such exercises clear-cut ideas are generated about the activities carried out in educational settings and appropriate norms are suggested from time to time for educational practices. For instance a study conducted on the concept of child as per Tagorian Philosophy fits into this area.

v) Study of the philosophical analysis of contributions made by psychological theories to education

We are aware of the influence of developments in the field of psychology like ‘developmental psychology’, ‘need theories’ and ‘concept formation’ on the educational process. At a particular time, one or other theory has been given importance in the educational field because of its popularity at that time. Very little research has been done to justify the relevance of psychological theories to educational situations. There is scope for philosophical inquiries about the relevance and scope of such theories as far as educational practices are concerned.

vi) Study of the philosophical analysis theories which influence education

There can be several issues of education related to imbibing certain social ideals into the system. The issues like ‘freedom of the classroom setup’, ‘autonomy of the higher education institution’, ‘democratic values in education’, ‘equality of educational opportunities’, ‘policies and practices of educational opportunity’ require philosophical analysis from time to time in order to accommodate the changes in societies. This helps us in examining appropriate social aims and norms existing in a given educational setup and suggesting the norms for further development.

vii) Understanding and analysing concepts philosophically

Identifying and defining various concepts and thoughts and drawing their implications for education has also remained as one of the focuses of philosophical research. Moreover, analysis of viewpoints and issues on education is also linked with philosophical research. A number of studies have been conducted on these lines such as, ‘Mechanistic and organismic concepts in Biology and their place in Education,’ ‘the concept of Education as viewed by different thinkers’.

viii) Philosophical research centred on certain themes

Philosophical inquiries are made on analysis of certain themes, their ontological and epistemological aspects, taking into account the assumptions of the representative schools of philosophy, and to synthesize viewpoints to provide premises for education. You will come across thematic studies like ‘Experience as a Major Premise in Education’, ‘Conception and Perception of Environmental Education’, ‘Phenomenology in Relation to Education’, ‘Nature and Development of Personality in the Bhagavad Geeta, and its Educational Relevance’, ‘Dialecticism in Indian Education’ etc. These studies help us to evaluate the significance of certain themes or ideas in the context of education.

9.3.3 Philosophical Inquiry: Main Steps

As stated above, philosophical inquiry comprises a few well-defined steps which need to be taken invariably in order to make the inquiry successful. We shall touch upon each of these steps briefly as follows:

Identification of themes

The process of philosophical study starts with the identification of appropriate themes for study. This may be concerned with the areas and issues stated in sub-section 9.3.2. At this stage, every care is to be taken to ensure that the chosen theme is capable of yielding a system of thought with sound justification.

The following list of the titles of some doctoral studies may help you to perceive the nature of themes selected for philosophical inquiry:

- “A Critical Study of the Educational Implications of Existentialism”
- “Educational Philosophy of Upanishads”
- “The Spiritual Element in the Educational Philosophy of Mahatma Gandhi”
- “A Study of Sri Aurobindo’s Philosophy of Education”
- “A Critical Study of Rabindranath Tagore as an Educationist”
- “The Concept of Personality in Samkhya-yoga and the Gita”
- “Equality of Educational Opportunity-a Philosophical Study”

Collection of data

Keeping in view the theme identified and the preliminary questions raised therein the researcher must collect all the possible data relevant to the theme from the available literature. The sources may be mostly of literary nature, such as write-ups or expressed opinions of the philosophers concerned, and commentaries on the relevant philosophical works appearing in the forms of books, journals, transcriptions, recordings, research reports, etc. Mostly collection of such data is possible through intensive library work.

This stage is very crucial since the researcher will have to decide the relevance of the data and the way to collect it. We must be clear about the authenticity of the sources of the data and the nature of the data included therein. In other words, first, we should be vigilant about the genuineness of the sources of the data and, secondly, we should examine whether the data collected through authentic sources are reliable and meaningful for our study or not.

Classification of data and interpretation thereof

We should logically classify the data under different heads focusing on the theme of investigation. Then, we must interpret the data under each classification keeping in view the main questions we raise in specific context. Interpretation may follow different processes like description, comparison, appraisal, cross examination, etc. of different ideas or concepts in the context of major questions under consideration.

Interpretation of the data in philosophical research is a real scholarly job which rests on the analytical insight and the synthesising ability of the researcher. “The task of interpretation is chiefly that of ascribing a significance, meaning, purpose and relatedness to a common end, and to an apparently heterogeneous mass of data”. (Varma, 1965).

We may follow a logical process of interpretation and give substantive references to our judgments/comments but there is every possibility of reflecting our subjectivity in the process. Essentially a researcher studies other ideas from his own point of view. However, conscious efforts must be made to detach ourselves as much as possible and interpret the ideas of others without getting carried away by our own biases.

Reporting the study

The last stage of the work may be identified with reporting of the study. In the report, a logical sequence is maintained between the different heads of classification and appropriate conclusions are drawn towards the end of presentation. At this stage, care is to be taken for clarity and precision of presentation. Moreover, appropriate references with quotations as well as notes on necessary points of presentation are to be cited carefully in the report.

Check Your Progress

Notes: a) Space is given below for writing your answer.

b) Compare your answer with that given at the end of the unit.

1. State briefly the ways in which the major areas of philosophical research can contribute to the development of principles and practices in the area of education. Give two examples.

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9.4 HISTORICAL RESEARCH

9.4.1 Meaning of Historical Studies

History is understood as the study of the past. As such, historical research consists of the studies of the past happenings. In the process of search for an account of what happened, the historian may reveal several interacting factors that contributed to the occurrence of a particular event within a time specific context. In one sense, the study of history highlights causal relationships of past events and outlines enough background for understanding the social phenomena, past as well as present.

History has utilitarian significance. An understanding of our past helps us to develop better perceptions of the dynamics of the present times. It is argued that every occurrence of the present day events has its historical context. History as a study of the route of the march of progress indicates the nature of advancement in socio-economic and political contexts. Accurate understanding of the past trends of development in the different dimensions of socio-cultural life can contribute to plausible forecasting about the future of a society.

9.4.2 Relevance and Scope of the Study of Educational History

A study of the history of educational developments and changes in their social, political and economic contexts is essential for a better understanding of the educational problems of the present times. Especially with regard to policy-making in education, the policy makers and planners should take note of certain historical findings which may guide them to avoid repeating certain policies which might have been found harmful in the past. Interpretation of historical data may help them in developing different hypotheses in the context of the development of educational systems at present and thereby in identifying directions for suitable interventions in the present educational situations. Furthermore, an analysis of the trends of educational developments in their historical context is useful in projecting educational plans with reasonable degree of probability.

Historical studies of educational institutions, administration, subject matter, and teaching methods have direct significance for the work of those involved in curriculum development, actual instruction and day-to-day administration and organization of educational systems. Moreover, the ideas and practices in the present set-up have their historical origins. As such, understanding the present situation, practices and ideas require digging into the past.

As specified by Borg and Gall (1996) the subject matter of historical research embraces the following:

- i) General educational history
- ii) History of educational legislation
- iii) Historical biography of contributors in the field of education
- iv) Institutional history of education like primary education, secondary education, higher education, distance education, non-formal education, adult education, etc.
- v) Cultural history of education concerning the fields of Sociology, Anthropology, Literature and Technology
- vi) History of educational planning and policy formulation
- vii) Historical critics of education.

However, there is a shift in the focus of historical approaches to education in the recent past.

Check Your Progress

Notes: a) Space is given below for writing your answers.

b) Compare your answers with those given at the end of the unit.

2. State briefly the relevance of historical studies of an educational system.

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3. Write any four subject matter of historical research.

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9.4.3 Main Characteristics of Historical Research

Historical method of research or 'Historiography' has some unique features and is generally counted as one of the methods of scientific inquiry.

First, historical research aims at developing knowledge of past events within a particular framework of time and a social-political-economic-cultural context. A historical researcher attaches importance to the meaning of specific events which have already occurred and explains causal relationships on the basis of the analysis of the existing data.

Second, the researcher digs into the significant data that tell us about past events. He/She does not have any control over data since the situations under study do not exist at present. However, each and every bit of information concerning the past events does not get similar treatment at the hands of the researcher. Only those data which are relevant to the problem under investigation are considered for purposes of analysis.

Third, as stated above, historical research is conducted on the basis of the analysis of all the known information related to the research problem. It is a fact that the total amount of information which originally existed at the time of the actual occurrence of events does not survive till the date of investigation. Hence, only those data which have survived till today become the focus of the study. In other words, these existing data are considered to be the population information about the problem. However, the researcher may not have full access to all the data existing at the present moment. Consequently, he/she depends on the total information available to him/her through all possible efforts. Because of this limitation, the interpretation made about causal relationships of certain events suffers from serious limitations.

Fourth, data concerning the past events are available through different sources. One of the approaches to the classification of historical sources is to treat them as

- (i) Primary sources
- (ii) Secondary sources

Primary sources provide first hand information about past events. Direct observation and reporting or recording of experiences can be treated as a primary source of data. There can be different kinds of primary sources such as:

- Personal primary sources like a person's observation of events in which he/she participated in the past;
- Physical artifacts like collections in museums or evidences of historical spots in the form of remains or relics, and institutions of various types;
- Mechanical artifacts like films, video films, audio cassettes, and photographs;
- Verbal testimony or records written by actual participants or observers in the form of constitutions, charters, court decisions, official minutes or records, autobiographies, letters, genealogies, contracts, deeds, wills, permits, licenses, certificates, bills, receipts, magazines or newspaper accounts, maps, pictures, painting, books, etc.

ii) Secondary Sources

- Secondary sources of data include second-hand information about past events. For instance, the person who supplies information about the past is neither a participant nor an eye-witness of events. Items of this type can be written materials like newspaper articles, interviews referred to in the articles, magazines, books, research reports, etc.

Usually, primary sources of data are given first priority in historical studies with a view to authenticating presented facts. However, the second-hand information, which may be found in some distorted form, needs to be considered with great care for developing holistic views on the issue.

The main feature of historical research is the evaluation of historical data. The backbone of historiography is the authenticity of data collected through different sources. Even when the data are collected through different sources, doubts can be raised about their validity, reliability and relevance. The process of judging validity, reliability and relevance of data is carried out through two devices viz. External Criticism and Internal Criticism.

(i) External Criticism

External criticism is also called as lower criticism. It is concerned with testing the authenticity and genuineness of sources of data. In other words, every historical researcher must examine whether a document or source really is what it seems to be. External criticism helps to determine whether it is what appears or claims to be and whether it reads true to the original so as to save the researcher from being the victim of a fraud. On the whole, the general criteria followed for such criticism depend on:

1. A good chronological sense, a versatile intellect, good common sense, an intelligent understanding of human behaviour, and plenty of patience and persistence on the part of researcher;
2. Contemporary reputation of the source; and
3. Consistent reputation of the source over the years.

This information can be traced through a review of the relevant literature. Furthermore, the literary sources can be verified against the authorship of documents by testing signatures, handwriting, scripts, style of writing, language, usage, etc. The material sources can be subjected to physical and chemical tests like verification of ink, paint, paper, cloth, metal, wood, etc.

(ii) Internal criticism

Once the sources are verified for their authenticity and genuineness, the content of the data is subjected to verification which is known as internal criticism of the data. It is also called higher criticism and is concerned with the validity, credibility, or worth of the content of document.

At first, the internal consistency of information presented through a particular source is studied. The more internally consistent a set of information, the more accurate it can be. In this context, the researcher must find out the literal as well as the real meaning of the content in its appropriate historical context.

Then, the external consistency of the data is to be evaluated. Even though the authorship of a report or a document is found accurate, the report or the document may include distorted pictures of the past. For studying the accuracy of the content, usually two steps are followed by a researcher. One step is to compare the information derived through two independent sources and the other is to match information with the information already available with reliable sources.

To check external consistency of the data, Fox (1969) suggested three major principles that need to be followed that the study should include (i) corroboration of data from two independent sources, (ii) one independent primary source, and (iii) no source reputed for providing contradictory information on any event. It is suggested that in case, the researcher finds it difficult to arrive at a matching information available in two comparable sources, he/she may apply his/her professional knowledge and judgment to make the final evaluation.

The following series of questions have been listed by Good, Barr and Scates (1941) which a researcher would find useful in the process of external and internal criticism of historical data:

1. Who was the author, not merely what was his name but what were his personality, character, position, and so forth?
2. What were his general qualifications as a reporter-alertness, character, bias?
3. What were his special qualifications as a reporter of the matters here treated?
 - a) How was he interested in the events related?
 - b) How was the situation for observation of the events?
 - c) Had he the necessary general and technical knowledge for learning and reporting the events?

4. How soon after the events was the document written?
5. How was the document written, from memory, after consultation with others, after checking the facts, or by combining earlier trial drafts?
6. How is the document related to other document?
 - a) Is it an original source : wholly or in part?
 - b) If the latter, what parts are original, what borrowed? How credible are the borrowed materials?
 - c) How accurately is the borrowing done?
 - d) How is the borrowed material changed, how used?

Invariably, the researcher gets answers for all these questions and, therefore, he has to depend, partially, upon evidence he can no longer verify. At times, he will have to rely on the inferences based upon logical deductions in order to bridge the gaps in the information.

9.4.4 Historical Research: Main Steps

i) Determining the Problem

The first step in historical research is to select a problem falling in the area of the history of education. The researcher may come across several issues of historical significance. The historical studies may be geared towards an assessment of the educational systems at different stages of socio-political development and how the system got modified and changed in the light of the needs they met and the ideas they embodied. On the other hand, studying 'contributions of education' as a component of national history can be of interest to a researcher. The researcher may be interested in a historical investigation of such aspects of education as have not been touched upon by any studies yet. Moreover, the researcher may be interested in re-examining the validity of current interpretations of certain historical problems which have already been studied.

In this context, Borg and Gall (1996) have suggested five types of topics to be included in the area of historical research in education :

- i) Historical studies concerning current social issues such as education of deprived communities, women's education, eradication of illiteracy, etc.
- ii) Histories of specific individuals, histories of specific educational institutions, and histories of educational movements.
- iii) Interpretation of ideas or events which had previously seemed unrelated, like linking educational development with socio-economic development of a region historically.
- iv) Synthesising old data with new facts to modify or rewrite or modify a theory.
- v) Reinterpretation of past events that have been already studied, especially those falling in categories listed under items i and ii above.

The following list of a few doctoral level studies conducted in India will give you an idea of the nature of topics selected in the area of historical research :

- Women's Education in Assam in Post-Independence Period (1947-1971) and its Impact on the Social Life of the State.
- History of Secondary Education in Uttar Pradesh (with special reference to Educational Policy and Finance, (1904-47).
- The growth of Education and Political Development in India, 1908-1920.
- Public Sector as an Instrument of Development (during twenty five years of educational planning in India).

- Secondary Education in the Urban Community of Gwalior (A sociological study, 1947 to 1971).
- Development of Secondary Education in Orissa from 1882 to 1966.
- An Analysis of the Relationship Between Political System and Education with Particular Reference to Primary and Secondary Education in Bombay.
- The implementation of National Educational Policies in India.
- Education in Punjab from A.D. 1707 to 1849: A Critical Study.

ii) Specification of the population of data

The second step is about the specification of the population of data relevant for the study of the problem. Even though a lot of information about the past is available in most cases, the researcher has to point out the type of data that are relevant for the study he/she is taking up. The extent to which different types of data (viz. sociological, political, economic, cultural and psychological) concerning the chosen educational problem are relevant is crucial in the process of one's using the population of information.

iii) Data collection

On the basis of the description of the required population of data, the historical researcher develops, initially, an overall view about the data and judges whether all relevant data are available for study or not. Study of related literature and direct scrutiny of information on different sources help the researcher in such an exercise. Moreover, the researcher makes efforts for discovering new data in addition to depending of his knowledge of data available at present.

Then, the researcher embarks on the task of data collection. At this stage he/she should assess the degree of his/her preparedness on the basis of the following prerequisites :

- a) The researcher should be familiar with all the data known to exist;
- b) The researcher should not be confined only to the sources of data and be ready for exploring new data from the existing sources. (As discussed earlier, the researcher gathers evidences from the primary and the secondary sources, and also evaluates the data collected on the basis of different criteria evolved beforehand.);
- c) The researcher should prepare himself/herself to exercise great care in exploring previously known and previously unknown data in the context of the problem under investigation.

iv) Organisation of data

Having collected sufficient authentic data, the researcher prepares a draft outline of the report. At this stage, the researcher organises data under different headings and tries to depict a holistic picture of the problem. This phase enables the researcher to scrutinize the data in hand to see if the data collected are enough for the study or if there is need for more data.

vi) Interpretation of data and report writing

After collecting all the relevant data the researcher depicts the event with details about what happened to whom, in what place, and at what time, etc. The description of events within a specific framework makes a researcher curious to know "why something happened." This stage poses an intellectual challenge to the researcher since interpretation is to be made about the forces which shaped events and determined policies. A sound knowledge of related fields like sociology, political science, economics, philosophy, geography, educational management and educational technology enables the researcher to develop a holistic view about the situation and to deduce its implication for the present system of education. In fact, there is no phased activity about historical research in a clear-cut sense. Once the first round of data collection is over, the

interaction between writing interpretations, selection of additional data, and subsequent interpretations continues till a satisfactory answer is reached by the researcher. Then a final touch is given to the study by way of preparing a systematic and comprehensive report. It is not only the data which is significant in such studies, but also the ideas and insights of the researcher, especially the interaction which he/she develops between the data and the ideas that are brought in to explain those data.

Check Your Progress

Notes: a) Space is given below for writing your answers.

b) Compare your answers with those given at the end of the unit.

4. Identify a topic of study pertaining to the history of any reputed educational institution you know about, and state the probable primary and secondary sources of data concerning the topic.

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5. How would you check the authenticity of these sources?

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9.5 NEW TRENDS IN HISTORICAL APPROACHES TO EDUCATION

There are some new trends in historical approaches to education viz., local history, comparative history, political history, social history, and intellectual and cultural history (Ghosh, 1999).

Local history

Nowadays historians not only pay attention to study of institutions or personalities of local level, but also on structures and processes of education system. They also look at reconstructing national history from local examples.

Comparative history

The historians look at historical developments with local, regional and national perspectives. The history of education needs a comparative treatment by means of discovering what was common between and what was distinctive to different societies. Historical data collected at local and regional levels can stimulate the historian into asking new questions.

Political history

In this area the historians have shifted attention from the study of particular pieces of legislation to a broad spectrum of studies on cumulative administrative processes on making of critical decisions, on the changing scale and role of organizations etc. Moreover, the emphasis is laid more on the interplay of people and problems than on the political "landmarks".

Social history

Social historians make use of interdisciplinary concepts derived from sociology, anthropology and psychology to study “history from below”.

The new social history takes into account the role and contributions of those people whose names never figured in the older textbooks. Those people who were deprived or neglected in their own time, whose participation in government was minimal or non-existent, or whose attitude towards “authority could be differential or resentful, passive or hostile” are highlighted in the present day’s social history.

Intellectual and cultural history

The current trend of history of ideas is not merely focusing on history of ideas of the ‘great thinkers’. Rather, it is looking towards the history of chains of ideas and their mode of communication through different media, the shifting relationships between different communities, minorities, and mass communication, the significance of the language and the forms of control.

Taking into account the changing scenario of history the status of history of education is to be seen from a new perspective. History of education is no longer treated as a matter of acts and facts. Rather, there is a holistic approach of study of human development through interaction with various social, political, economic, psychological, cultural and technological factors. Modern history of education does not confirm education to mere schooling. On the contrary, it takes into consideration multiple influences that shape a person’s character and intellect. As per Ghosh (1999) history of education is “concerned not merely with institutions but with the social forces which have affected the quality of life, and with the ideas which have been put forward by theorists and practitioners of education in the past. History of education is, therefore, a part of the wider study of the history of society – social history broadly interpreted with the politics, the economics and the religion put in”. A researcher dealing with the problems of history of education may be confronted with a wide spectrum of issues and problems of education system to be dealt with plus historical inquiries of social and human development processes. Such inquiries are conducted with the help of historical methods of research.

9.6 ENHANCING THE IMPORTANCE OF HISTORICAL RESEARCH

There are some important considerations which need to be kept in mind to enhance the importance of historical research.

i) Researcher’s bias and values

As you know, historical research is interpretative in nature. The researcher’s bias, values and interests play a major role in the selection of problems as well as interpretation of data. As a researcher, you must be aware of your bias, values and interests as well as others’ values and biases. Your openness in exposing your values and biases will give scope to others to see your interpretation of historical data in that context.

If you go above your personal bias and try to see your bias and values from a particular school of thought or on ideology of historians, you must make your standpoints more clear in your reporting. For example, the radical historians do not believe in treating history of education to analysis of facts related to formal schooling and the efforts made to promote formal education as “liberal reform” oriented historians do. The radical historians visualize many cultural undercurrents that affect learning and social matter being of citizens. They see educational process with a broad framework of the livelihood of people, interaction and conflict of different groups, the discriminatory

treatment of women and minority groups, the connections between schools and politics and between education and social stratification. Your interpretation will depend on your bias towards either 'liberal reform' thoughts or 'radical' thoughts.

ii) Influence of presentism

Another point to be kept in mind is regarding the influence of presentism in historical data. Many concepts and perspectives that have recent origin are very often imposed on interpretation of historical events. Hence, distorted meaning of historical events gets its place in interpretation. To avoid such bias towards presentism, you must attempt to discover how the various concepts were used in past and in its specific setting rather than attaching present meaning to them.

iii) Use of concepts

As discussed above, the historian takes the help of different concepts to organise the past events. The concepts used by the researcher in dealing with historical data must be defined in the context of time setting. For instance, the concept of teacher as visualised today might not exist in the context of a past agrarian society. If the researcher restricts himself to the concept of teacher as defined in a dictionary and tries to find the role and status of teacher in educational developments he may tie down his hands to a limited scope of formal school teacherhood.

However, the researcher must define concepts with a historical perspective. Various terms and concepts emerging in different disciplines like sociology (e.g., role, bureaucracy, institution, anthropology (e.g., culture, ethnic groups) and psychology (e.g., motive, attitude, personality, creativity, development, needs) are used in interpretation of historical data. As a historical researcher, you must be aware of how these concepts are defined in the social science discipline from which they originate. You must ensure that they are used appropriately in historical research.

iv) Assumptions behind causal inferences

Certain historians assume that humans act similarly across cultures and across time. However, others assume that history does not repeat itself. Historical events are unique. Occurrences at one point in history cannot be used to help explain occurrences at another point of in historical time. The researcher must be careful about these assumptions. For instance, historical explanation of events taking place under colonialism may not be juxtaposed to find meaning of events taking place in the medieval era. There are certain parameters of interpretations of causal relations as used by historians like actions of key persons or reformers, the operation of powerful ideologies, advances in science and technology, economic factors, geographic factors, sociological factors, and psychological factors etc. Which you may choose singularly or in eclectic form to explain historical events. What is significant in this context is that at the time of research problem formulation, you must carefully examine a theoretical framework of analysis of the historical event under study and accordingly you must state the framework of causal relationships. This will help you to streamline your data collection, interpretation and inferences about cause and effect relationships. You must take a holistic look into different circumstances associated with major events under study. In other words, if you restrict yourself to analyse the events in the context of specific antecedents and ignore other factors your analysis will have limited meaning. As a historian you may not use causal links with certainty or absolute terms. Rather you must carefully state causal relations with high probabilistic terms and references giving scope for other interpretations and studies.

v) Generalisability

The question of generalisability in historical research is raised very often by critics. This is raised mainly due to the fact that data concerning historical events have

limitations for generalizations. The historical researcher studies only a small portion of the phenomena that interest him. The data concerning an event may not be available in complete form and chronological order. Limited information may restrict the historians to draw generalizations about the events under study.

As a researcher you must strengthen your findings by increasing the sample data on which they are based. Hence, you must search for as many primary and secondary sources relating to the topic as possible. Where the evidence is limited, you should limit the generalisability of your interpretations accordingly.

9.7 LET US SUM UP

After going through this unit you have understood the meaning, nature and steps of philosophical studies and historical studies in education respectively. The major emphasis has been given on your conceptual clarity of these methods with major focus on emerging thoughts and their applications in educational research. Now you may look into real issues and problems which can be tackled through these methods of inquiry systematically.

9.8 UNIT-END ACTIVITIES

1. Write different research problems/topics in the area of :
 - i) Philosophy of education.
 - ii) History of education.
2. Prepare step-wise research proposals for conducting each of these studies respectively.
3. Make thorough study of trend reports of researches in the area of philosophy of education and history of education as incorporated in the 5th Survey of Educational Research (1988-92) (volume I) published by NCERT, New Delhi: 1999.

9.9 POINTS FOR DISCUSSION

1. How is philosophical research different from scientific research?
2. Why do you perceive educational development as a part of social history?
3. Why should you give major emphasis on analytical and interpretative approaches in philosophical and historical studies?
4. How can you make historical studies free from individual biases?

9.10 SUGGESTED READINGS

- Borg, W.R. and Gall, M.D. (1996): *Educational Research: An Introduction*. Sixth Edition, New York: Longman.
- Fox, David J. (1969): *The Research Process in Education*. New York: Holt, Rinehart and Winston.
- Ghosh, S.C. (1999): "History of Education", in NCERT Publication of *Fifth Survey of Educational Research*, Vol. I, New Delhi: NCERT.
- Good, Carter V., A.S. Barr and Douglas, E. Scates (1941): *Methodology of Educational Research*. New York: Appleton - Cent Crofts, Inc.
- Leon, Antonie, (1985): *The History of Education Today*. Paris: UNESCO.

- Seshadri, C. (1999): "Philosophy of Education", in NCERT Publication of *Fifth Survey of Educational Research*. Vol. I, New Delhi: NCERT.
- Verma, M. (1965): *An Introduction to Educational and Psychological Research*. New Delhi: Asia Publishing House.

9.11 ANSWERS TO CHECK YOUR PROGRESS

1. Development of deep understanding of, and fresh insight into, educational concepts, theories, principles, issues and problems, and making normative inducement on educational practices.

Examples i) A comparative study of educational philosophies of Rabindranath Tagore and Mahatma Gandhi.

ii) Philosophy of Human Rights Education.

2. To visualise history of education with a holistic perspective of human and social development and tracing different sociological, cultural, political intellectual and other pertinent factors that have contributed towards such development historically. To reconstruct history of education by broadening the scope at local and context specific levels so that multifaceted facts can be corroborated to find total meaning of educational development historically.
3.
 - i) History of educational legislation.
 - ii) Historical biography of educational thinkers.
 - iii) Historical development of different levels of education like primary education, secondary education, etc.
 - iv) History of educational policies.
4. Primary sources provide first hand information about past events. The primary sources of data are direct observation, physical artifacts, mechanical artifacts, verbal testimony etc. Secondary sources provide second hand information. An eye-witness of events, written materials, newspaper articles, etc. are examples of secondary sources of information.
5. Both primary and secondary sources of data are authenticated by external and internal criticism.

NOTES

