Course Code: 1649 Unit: 1-9

EDUCATIONAL RESEARCH

Department of EPPSL, Faculty of Education
ALLAMA IQBAL OPEN UNIVERSITY,ISLAMABAD

EDUCATIONAL RESEARCH Course Code: 1649 Unit: 1-9

EDUCATIONAL RESEARCH

PGD (ELM) PROGRAMME

Course Code: 1649 **Units: 1–9**

DEPARTMENT OF EDUCATIONAL PLANNING,
POLICY STUDIES AND LEADERSHIP
FACULTY OF EDUCATION
ALLAMA IQBAL OPEN UNIVERSITY
ISLAMABAD

First Printing	2018
Quantity	100
Price	
Typeset by.....	M. Hameed Zahid
Printing Coordinator	Muhammad Riaz Khan
Printer.....	AIOU-Printing Press, H-8, Islamabad.
Publisher	Allama Iqbal Open University, Islamabad.

PREFACE

We have designed this book for the students who may be pr-eservice or in-service teachers completing the PGD ELM programme. Most programmes of university require the completion of a mid-level research project. These projects are more in-depth than an undergraduate level programme, but not as intense as required by a doctoral level research study. We assume that these pre-service teachers have unique needs for educational research instruction. Typically, the students already possess a master degree. Some may be older and dissatisfied with their current career choices and others may be uncertain of their career options as graduates. All of you have decided to enter the teaching profession. Most of the students tend to have limited classroom experience and are not familiar to educational research. They probably have not used statistics during their undergraduate class, and in all likelihood know nothing about educational research. Similarly, in-service teachers and administrators also seek a master degree in education. However, most of the students are typically not familiar to educational research and also are not familiar to statistical or quantitative/qualitative methods. Both groups of students are learning about educational research methods and designing and conducting their own initial research project while they are taking other coursework and have heavy responsibilities as classroom teachers, administrators or student teachers. Their comfort level with research is generally not high, which makes juggling work, school, and personal responsibilities even more difficult. When it comes to coursework on research, pre-service and in-service teachers both need the same basics: (a) an understanding of why educational research is important to them in their professional lives; (b) instruction on being critical consumers of educational research; and (c) guiding direction on designing, conducting, and reporting on their own research. We have designed this text to meet those goals. Specifically, the book provides: – the background needed for pre-service and in-service teachers and administrators to appreciate the importance of educational research in their daily professional lives. Students will learn all aspects of a typical five-chapter research design (introduction; literature review; methodology; results; conclusion/discussion/implications), with guidance to actually write a five chapter research report – the tools needed to locate and review published educational research.

The text will leads pre-service and in-service teachers and administrators through step by step process of educational research, providing actual classroom examples and showing the relevance of the materials. We strived to include the essentials without being overwhelming. Ultimately, we hope the text will help teachers and administrators to see both the value of becoming life-long critical consumers of educational research and the merits of using research in helping them to become teacher leaders and change agents in their own professional settings.

Dr. Nasir Mahmood
Dean Faculty of Education

FOREWORD

Department of Educational Planning, Policy studies & Leadership has launched Post Graduate Diploma in Educational Leadership and Management (PGD-ELM). This course focuses on the students who are interested in research in the area of school leadership and management. In the scheme of study PGD ELM a course in research of three credit hours, is mandatory for all the candidates. So course under the title "Educational Research" is also presented. This course will help the students to learn about the basic concepts of research methodology in education i.e. need and importance, types of research, sampling as well as tools & techniques to collect data etc. Students will be able to design a research proposal and write a research report after going through this course successfully. This course contains nine units. Each unit is divided into subtopics to cover the most area.

This course is developed in the light of two courses (837 & 6569) developed previously for master level programmes. The course on Educational Research is developed to cater the needs of researchers, teachers and administrators in the discipline of education who will be enrolled in PGD (ELM) programme.

The readers will find this course more meaningful and simple to understand. These units have been strengthened with practical activities for deep learning. Each unit has a reflective exercise at the end for self assessment. In future, the course will be updated and revised to make it more beneficial for scholars.

Dr. Azhar Mumtaz Saadi

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CONTENTS

Page #

COURSE OUTLINE FOR EDUCATIONAL RESEARCH
PGD (ELM) Programme

Name of Course: Educational Research **Course Code: 1649**
Based on: 837 & 6569 **Credit Hours 03**

Course Description:
This course will help novice researchers to design, collect, and analyze quantitative data and then present their results to the scientific community. It stresses the importance of ethics in quantitative research and taking the time to properly design and think through any research endeavor.

Learning Outcomes:
It is hoped that the study of this course will enable the students to:
1. comprehend different concepts related to educational research
2. apply scientific method towards the solution of research problems
3. follow the ethics of research
4. employ different sampling techniques
5. develop different kinds of research instruments
6. write a good research report

Unit–1: Introduction of Educational Research (Unit 1 and 2 of Code 837)
- 1.1 Sources of Knowledge
- 1.2 Scientific Method
- 1.3 Concept of Research in Education
- 1.4 Need and Scope of Research in Education

Unit–2: Types of Research (Unit 2 and 3 of Code 837)
- Types of Research by Purpose
  - 2.1 Basic Research
  - 2.2 Applied Research
  - 2.3 Action Research
- Types of Research by Methods
  - 2.4 Historical Research
  - 2.5 Experimental Research
  - 2.6 Descriptive Research

Unit–3: Historical Research (Complete unit of 6569)
- 3.1 Introduction
- 3.2 What is History?
- 3.3 Scope of Historical Research
- 3.4 Formulation of Problem for Historical Research
- 3.5 Historical Sources
- 3.6 Historical Criticism
- 3.7 The Historical Hypothesis

Unit–1

INTRODUCTION TO EDUCATIONAL RESEARCH

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CONTENTS

Page #

INTRODUCTION

Doubtless to say that the secret of our cultural development has been research, pushing back the areas of ignorance by discovering new truths, which in turn, lead to better ways of doing things and better products. There is no alternative to truth and, therefore, to research. To research is to get nearer to truth.

Likewise, the human knowledge works at two levels. At the primary level it functions as the basis of useful human activities, as when a teacher solves mathematical problems for the students or as when a doctor uses his knowledge to cure diseases. At the secondary level, knowledge is employed to obtain increments in the existing knowledge.

The activity that produces this new knowledge is known as research. All research is an advance on existing frontiers of knowledge. It takes us beyond the frontiers of present knowledge. Both are breaking fresh ground and improving existing knowledge and the proper functions of research.

However, the research adds to the existing knowledge in an orderly way. This orderliness is to be particularly emphasized. Mere aimless and confused grouping for new knowledge does not stand for research. The knowledge which accrues from research is verified and verifiable by anybody who may like to do so.

The process by which it has been derived is replicable i.e. it can be repeated and the stated results confirmed. It is objective and capable of 'third party' verification.

However, people have always tried to understand, discuss, explain and control the things and events around them. Sense perception, reason, tradition, authority, metaphysics, magic, expert opinion, personal experience, deduction and induction and science are among the system that have been used to acquire the knowledge.

Effort has been made in this unit to highlight all the sources of knowledge.

OBJECTIVES

After studying the unit, it is hoped that the student will be able to:

1. identify the sources of knowledge;
2. explain the sense perception;
3. discuss the role of tradition, authority, expert opinion metaphysics in acquiring knowledge;
4. evaluate different sources of knowledge;
5. explain the concept of research in education;
6. discuss the need for educational research;
7. evaluate the scope of educational research;.
8. identify the qualities of a researcher.

1.1 Sense Perception

The earliest understanding of the environment probably came through sense perception. It ranges from practical judgments and experiences in everyday life. The sense perception may be defined as a connected series of concepts that help people to make sense out of a chaotic environment and to function more effectively in it.

Although sense perception conclusions have been and can be valuable, let they can be wrong. For example, early observations of the learning process by educators and psychologists led to the sense perception conclusion that practice enhances learning i.e. "practice makes perfect". Observations of highly skilled individuals such as musicians and artists who practice a great deal to perfect their abilities, probably contributed to this belief. As a result, students have been repeatedly asked to recite the alphabet and multiplication tables and to complete large homework assignments. We can quote here the renowned theorist Thorndike (1930) who argued that the results may not always be positive. According to him, he consequences of practice determine at least, in part, the effectiveness of practice.

1.2 Tradition

The dependence on tradition or custom is also necessary. We often refer to custom and tradition in the event of solving a problem. In many activities and situations this ready reference serves the purpose very well. It largely determines but mode of facing the situations and mode of making adjustments. The combine customs and traditions specify for us our food, clothes, speech, dealings etc. Ordinarily we obey the customs and traditions and avoid violating them. We try to seek explanations of the phenomena through the media of traditions and customs..

1.3 Authority

When a crisis arises due to unforeseen situation or even in terms or storm, calamities and conflict, man often finds the tradition inadequate. He normally coma out of his complacency and to look for newer and better modes of behaviour. The savage tribal wise man appeals, to his gods in times of crises. The tribal chief remained the supreme authority for many centuries and his subjects considered him as an all-knowing and all-competent superman. They looked to him for guidance and advice in their social, religious, economic, political and even private affairs.

Similarly, the example of a religious scholar can be cited who assumed the role of authority. The followers turned to the religious leader for knowledge, advice, explanation of the phenomena, domestic problems and medical treatment.

Moreover, the expert or the scholar is a centre of authority to whom we look in times of crisis still. The scholars, philosophers, economists or scientists are the most dependable interpreters of the existing knowledge, evidence as well as the sources of new ideas, innovations and inspirations. The expert of discipline is considered to have a solution for every problem of the area concerned.

Finally, authority is a valuable source of knowledge but it does have a major weakness. An authority, whether a political figure, parent, religious leader or scholar can be wrong. Consequently, it is dangerous to rely solely on a single source of knowledge.

1.4 Expert Opinion

Sometimes in search of knowledge one can take the testimony of experts who, because of their intellect, training, expert experience or aptitudes, are better informed than other people. Contacts and discussions with experts are also helpful to get knowledge. The participation of researchers in conferences, seminars and workshops and listening to the learned experts are very helpful in getting knowledge and locating research problems.

However, an effort must be made to find out whether the experts are recognized by other authorities in the field and whether they are in a position to-know the facts about the particular problems under consideration.

For further details of sense perception, tradition, customs, authority, expert opinion, please read the below referred materials.

Fred N. Kerlinger (1983)	*Foundations of Behavioral Research*, 2nd ed. Delhi, Surjeet Publications, pp. 10–17.	1.1
Deobold B.Van Dalen, (1973)	*Understanding Educational Research*, 3rd ed. New York, McGraw-Hill Book Company, pp. 1–9.	1.2

1.5 Rationality

Rationalism is a system by which knowledge is gained by reason and not experiencing the world. It is also called metaphysics. It is a national approach knowledge of ultimate causation and reality. It deals with the causes and principles of existing things, not with experience.

Rationalism regards human reason as the only reliable guide to knowledge. Rationalists do not believe that it is necessary to verify knowledge either by faith experience. Finally rationality can provide a valuable means of knowing.

1.6 Magic

Another way an individual can gain knowledge and control the world is through magic. According to Craig (1985, P.6) whenever magic occurs in is unadulterated form it assumes that in nature one event follows another, necessarily and invariably, without intervention. There are two broad classes of magic. One is imitative magic and other is contagious.

In imitative magic people attempt to produce a desired effect by imitating that effect. On the other hand, contagious magic is based on associations between objects or events.

1.7 Scientific Method

According to Kerlinger (1983, P.11) science is the systematic, controlled, not critical investigation of hypothetical propositions about presumed relations among natural phenomena. However, science is based on the assumption that the universe is uniform and orderly and governed by cause-and-effect laws.

On the other hand, scholars are unhappy with the weakness of existing ways of-knowing, learned to integrate the strengths of these ways of knowing into a new approach--i.e. scientific method. Of particular importance is that deductive and inductive reasoning were incorporated into the scientific method.

In induction, observed facts are used to generate theories or hypotheses that are consistent with those facts. Similarly, in deduction, specific implications are derived from a theory. Sometimes, both inductive and deductive methods are used to acquire knowledge.

However, in order to comprehend further the rationality, magic and scientific method, please read the below referred material.

Deobold B.Van Dalen, (1973)	*Understanding Educational Research*, 3rd ed. New York, McGraw-Hill Book Company, pp. 10–17.	1.3

1.8 Activities

1. Outline the information you would wish to gather about sources of knowledge particularly the sense perception, tradition and expert opinions.

   _____

   _____

   _____

   _____

2. Draw a chart of sources of knowledge.

3. Discuss the significance of inductive and deductive method with any educationist and prepare a report of your discussion.

Self-Assessment Questions

Hopefully you have studied the unit, now please answer the following questions.

Q. 1 Discuss the science and common sense.

Q. 2 Describe at least five ways in which science and common sense differ from each other.

Q. 3 Critically examine the method of authority for acquiring knowledge.

Q. 4 Discuss the method of science.

Q. 5 Explain the role of expert opinion in a search of knowledge.

Q. 6 What role rationalism can play in acquiring knowledge? Discuss.

Q. 7 Write a short note on the following:

a) Inductive method
b) Deductive method
c) Magic
d) Tradition
e) Metaphysics
f) Perfect induction
g) Imperfect induction
h) Baconian induction

Q. 8 Discuss various steps in the scientific method.

1.9 Concept of Research in Education

According to J.W. Best (1992) research is an "intellectual activity which brings to light new knowledge or corrects previous error-and misconceptions and adds in an orderly way to the existing corpus of knowledge."

The term 'research and scientific method' are often used synonymously and 'research is considered to be more formal' systematic intensive process of carrying on the scientific method of analysis. There are seven elements of scientific process namely: -

i. Purposeful Observation;
ii. Analysis – Synthesis;
iii. Selective Recall;
iv. Hypothesis;
v. Verification by Inference and Experimentation;
vi. Reasoning by: (a) Method of Agreement, (b) Method of Disagreement, (c) Method of Concomitant Variation, (d) Method of Residues, and (e) Joint Method of Agreement and Disagreement;
vii. Judgment.

It might be helpful to highlight some of the accepted connotations of research. These includes:

1. Research is simply a systematic and refined technique of thinking, employing specialized tools, instruments, and procedures in order to obtain a more adequate solution of a problem than would be possible under ordinary means. It starts with a problem than would be possible facts, analyses these critically, and reaches decisions based on the actual evidence. It evolves original work instead of mere exercise of personal opinion. It evolves from a genuine desire to know rather than a desire to prove something. It is quantitative, seeking to know not only 'what' but 'how much', and measurement is therefore, a central feature of it.

2. Research 'per se' constitutes a method for the discovery of truth which is really a method of critical thinking. It comprises defining and redefining problems; formulating hypothesis or suggested solution; collecting, organizing and evaluating data; making deductions and reaching conclusions; and at last, carefully testing the conclusions to determine whether they fit the formulating hypothesis.

3. The systematic and scholarly application of the scientific method, interpreted in its broader sense, to the solution of educational problems; conversely, any systematic study designed to promote the development of education as a science can be considered educational research. Best (1992) thinks, "Research is considered to be the more formal, systematic, intensive process of carrying on the scientific method of analysis. It involves a more systematic structure of investigation, usually resulting in some sort of formal record of procedures and a report of result or conclusions."

4. Moreover, research is a point of view, an attitude of inquiry or a frame of mind. It asks questions which have not been asked, it seeks to answer them by following a fairly definite procedure, is not a mere theorizing, rather it is an attempt to elicit facts and to face them once they have assembled.

5. Research is also called a kind of human behaviour. However, one general definition of research would be that which refers to the 'activity' of collecting information in an orderly and systematic fashion. Research is literally speaking a kind of human behaviour, and 'activity' in which people engage. In education, teachers, administrators, scholars, or others engage in educational research when they systematically assemble information about schools, school children, the social matrix in which a school system is determined, the characteristics of the learner or the interaction between the school and pupils.

6. Educational research is normally considered as scientific research. The educational research is meant here 4ie whole of the efforts carried out by public or private bodies in order to improve educational methods and educational activity in general whether involving scientific research and a. high level or more modest experiments concerning the school system and educational methods.

7. The Webster's International Dictionary proposes a very inclusive definition of research as “careful inquiry or examination in seeking facts or 'principles; diligent investigation in order to ascertain something.”

8. D. Slesinger and M. Stephenson in the Encyclopedia of Social Sciences define research as “The manipulation of things, concepts or symbols for the purpose of generalizing to extend, correct or verify knowledge, whether the knowledge aids in construction of theory or in the practice of an art.”

9. While discussing the nature and significance of educational research some scholar say, “Educational research is that activity which is directed towards development of science of behaviour in educational situations. The ultimate aim of such a science is to provide knowledge that will permit the educator to achieve his goals by the most effective methods”.

10. Some scholars considered research as a process of developing process. According to them “Research may be defined as a method of studying problems whose solutions are to be derived partly or wholly from facts. The facts dealt with in research may be statements of opinion, historical facts, those contained in records and reports, the results of tests, answers to questions, experimental data of any sort, and so forth. The final purpose of educational research is to ascertain principles and develop procedures for use in the field of education; therefore, it should conclude by formulating principles or procedures. The mere collection and tabulation of facts is not research, though it may be preliminary to it on even a part of thereof”.

Characteristics of Research

An older description of research may be explained with the five characterizations spelling out the word *MOVIE*

M–stands for Mathematical Precision and Accuracy.
O–stands for Objectivity.
V–stands for Verifiability.
I–stands for Impartiality.
E–stands for Expertness.

Tuckman B.W. (1978) has mentioned the following characteristics of research:

1. Research is systematic.
2. Research is logical.
3. Research is empirical.
4. Research is reductive.
5. Research is replicable and transmittable.

Main Characteristics of Scientific Research

Educational research shares some of the main characteristics of scientific research which may be analysed as under:

1. Research is purposive. It is concerned with problems to be solved.
2. Research is objective. Stress is- always on testing.
3. Research endeavours to organize data in quantitative terms.
4. Research is systematic and accurate investigation.
5. Research usually involves a hypothesis or a set of hypotheses concerning the explanation of a phenomenon or the solution of a problem.
6. Research collects facts.
7. Research places emphasis on the discovery of scientific generalizations which can be applied to the solution of a wide range of problems.
8. Research expresses results without being influenced by any extraneous consideration.

An examination of the above characteristics of scientific research reveals that educational research cannot always be viewed as strictly scientific i.e. empirical, inductive and exact. It is recognized that in educational research it may not be possible to phrase or report many historical, descriptive surveys and case-clinical studies in mathematical terms. Similarly, in many cases the criteria of objectivity and verifiability may be only partially satisfied in educational researches. Knowledge gained through scientific method seeks to describe phenomena of nature in a series of condensed and compactly expressed generalizations. Research also does not describe facts alone but seeks to describe their relationship and generality in time and space. The method of research involves the process of complete act of reflective thinking. The verifiability of conclusion is tested in the light of the hypothesis.

Specific Characteristics of Educational Research

1. Educational research must be related to the study of complex relationships of various facts. It requires an inter-disciplinary approach.

2. Educational research usually employs methods of description, explanation, interpretation, sympathetic of intuitive understanding methods which are mainly speculative and deductive in character and which rarely furnish results that can be subjected to measurement of mathematical procedures.

3. Educational research should come out of a desire to do things better. It should help them to narrow down the proverbial gap between theory and practice in education.

4. Educational research is not as exact as research in physical science. No human beings have ever been found to be alike. No scientific investigations of human behaviour - even those of so called – "identical twins" have resulted in the findings of individuals completely similar in structure or behaviour. This fact stands in the way of making educational research an exact science.

5. Educational research should be concerned directly with the problems of school. It can properly concern itself with such matters as child development, class organization, teacher-pupil relationships interaction with the community, curriculum matters, teaching techniques, and many others.

6. Educational research can be undertaken by any teacher with common sense, intelligence and insight. In the beginning such workers may require some guidance and training but this can be made easily available to them at the hands of experts.

7. Educational research stands in need of men and women of imaginative insight, who look beyond the present and behold the vision splendid.

8. Educational research generally requires inexpensive material. In many educational research studies we simply need subjects i.e. children, their educational tools of daily use, paper and pencil and a few tests.

9. Educational research is based on the subjectivity and intangibility of social phenomena.

10. Educational research generally does not admit quantitative statement. We can talk of urbanization, cultural, assimilation etc, but we cannot measure quantitatively.

11. Educational research is based on interdependence of causes and effects

A. For further details concerning the concept of research in education, please read the below mentioned material.

Kulbir Singh Sindu (1987)	Methodology of Research in Education, 2nd ed. New Delhi, Sterling Publishers Private Limited pp. 1-3.	1.4
John. Best and James V. Kahn (1992)	Research in Education 6th ed. New Delhi, Prentice-Hall of India Private Limited, pp. 17-20.	1.5

1.10 Needs of Research

The following points will justify the need for educational research.

1. *Rapid Expansion and Democratization of Education.* Need for research in education to improve educational policies and practices is being realized increasingly. Research in education has assumed greater urgency because of the very rapid expansion and democratization of education throughout the world during the last decade.

2. *Technological Changes.* The rapid technological changes have brought an increase in educational problems and both laymen and educators have felt that they can no longer depend upon trial and error. No amount of experience gathered and no amount of wisdom collected in the form of casual observations, traditions or recommendations of groups or individuals can ever promise rapid progress and improvement as is needed all over the world. Therefore, educationists are constantly searching for effective methods of instruction, more satisfactory techniques of evaluation, richer learning materials, more efficient system of administration and better human relations. Just as the sociologists, the anthropologists, and economists are carrying on research, so is the case with the educationists.

3. *New Demands on Education.* With educational research it may not be possible to develop new curricula, new teaching methods and new teaching materials to meet the new demands placed on the educational systems .of the world. Robert M.W. Travers in 'An Introduction to Educational Research' has. stated that educational research forms an indispensable basis for any "national organization of education, especially as regards curricula, syllabuses and methods as well as for financing education, for its planning, and for the building of schools."

4. *Interdisciplinary Approach* to *Education.* Education is a growing science and its foundations are to be explored for a study of the subject as an interdisciplinary approach. It is, therefore, almost imperative to study education in its proper perspectives. Philosophy is the cornerstone of the foundation of education and psychology provides the bricks and mortar for laying the foundation of education

on a scientific basis. Educational research is thus an indispensable development for its growth. Thus we can hardly afford to think of education in isolation to-day.

5. *Knowledge Explosion and* the *Need for Educational Research.* World has witnessed an unprecedented explosion of knowledge. Since education depends on a corpus of knowledge, the need for research arises to study the changes in various disciplines and to make necessary adjustments in educational philosophy, programme and policies. The means, methods and machinery of education need change in the light of a progressive social milieu, and changing economic, political and social set-up.

6. *Education and Productivity.* Education and productivity are positively correlated and education needs planning according to manpower needs which in its turn is based on research.

7. Scarce *Resources and Optimum Development.* It is through research only that we come to know how best to utilize the available resources for achieving best results.

8. *Spirit of Research is Needed Everywhere.* A spirit of enquiry adds to competence and scholarship in the researcher.

9. *Research is Needed to Keep out of Fixed track.* Research enables an individual in changing his conservative outlook. It keeps us out of fixed track by making us mentally alive.

Educational Research and Educational Planning

Educational Research has a critical role of play in guiding educational planning. Adequate educational planning depends for its success on a systematic knowledge of the social resources and liabilities of the people and their culture, of their similarities and differences of the organizations and operative controls of their needs and problems etc. Any effort at educational planning is bound to fail if it is based on fictitious assumptions of planners as to what the consumers of planning need. What their problems are, what they want remedied and what kind of system they want as an emergent product of planning. Educational planning or for that matter any planning requires a store of reliable, factual knowledge on which basis the difficulties in its implementation can be anticipated and guarded against. Such a foundation of systematically gathered knowledge affords a basis for evaluating the net gains of planning for the educational system in question. Educational research is of immense help in securing such knowledge.- It is obvious that educational research has direct implications for social and economic welfare. By virtue of the deeper understanding of the causal nexus underlying social and economic 'maladies' educational research provides a secure basis for effective remedial measure. Educational researchers analyse the problem in the total context and as such are in a better position to suggest suitable remedies.

Question such as what are the tangible indices or referents of modernization of education can very effectively be solved through educational research. Pakistan is a welfare State which has to provide services for the benefit of the weaker and vulnerable section of the population. Such social welfare services including education, in order' to be beneficial and fruitful, have to be based on reliable information about people whose welfare is being contemplated. The foregoing discussion should make it abundantly clear that educational research has to play an important role in not only the educational reconstruction but also social and economical re-construction in Pakistan.

To the question "of what use is educational research?" We may reply "of what use is a new-born child?" in the manner of Benjamin Franklin when asked about the utility of his findings about the relationship between thunder-clouds and electricity.

This means that the new knowledge like the new-born baby; holds great potential of growth and maturity. Also like the new-born child it gives us pleasure. It gives us satisfaction of knowing the unknown — this points to a value that the scientist is committed to i.e. self-justifying goodness of 'new knowledge' about anything big or small. Educational research is persistently opening our eyes to the social reality, simplifying the mysterious within the commonplace in social life and "shattering its garments of make-believe by which pious banks have hidden its uglier features. The obvious function of research is to add new knowledge to its existing store, but its power of cleaning our minds of cliches and removing the rubus of inapplicable theory are equally notable." The educational research has also definite relation to people's basic needs and welfare.

In short educational research leads to the following advantages:

a) Educational research economses efforts and increases efficiency.
b) It brings confidence in the teacher.
c) It also brings dignity to the work of the teacher.
d) It leads to the adoption of new methods.
e) It keeps up alert.
f) It brings a sense of awareness.
g) It develops a better understanding of the teaching learning process.
h) It enables us to have a better understanding of the social life.
i) It promotes educational reform.

Priority at the Field of Educational Research in Pakistan

1. One of the priority areas in the field of education in Pakistan is the achievement of free and compulsory education for all children up to the age of 14. Any research and innovation which will help to extend the educational programmes to girls and to the weaker sections of the community will certainly contribute to national development.

2. In this connection, it may be mentioned that the drop-out rate in school education is very high for various reasons. It is not likely to decrease very much in the near future. While every attempt should be made to increase the holding power of the

school, one should also think of non-formal education as a possible alternative. Organization and methods of self-learning will also have to be evolved so that children in school learn better and those who drop-out form school are not left out the country's educational effort.

3. Again, considering the rate of population growth, which is not likely to decline rapidly in the near future, one has to consider whether education should be co-extensive with schooling, because, if so,-the number of schools and teachers required will be so large that the necessary resources are not likely to be available. What are the alternative strategies of education? What are the new techniques? Research in these areas will be encouraged.

4. The children from the low income and the economically deprived sections of the society need educational opportunities as much as children from the other sections of the society. How can similar opportunities be made available? How can the effects of deprivation in the early life of infants be counteracted by social and educational intervention? These are some of the important problems which need the immediate attention of research workers.

5. How education can be made more relevant to the socio-economic needs of the country is another important area of research. Research investigations and innovative projects in this area will be encouraged to find out how the existing educational structure and content can be altered, enhanced and modified to bring about faster economic growth and social change.

6. In the area of 'talents it is not only important to identify talent at all levels of education, but also to find out ways and means to develop the talented children. This may require careful examination of the concept of talent in the context of developing societies.

B. In order to comprehend the idea of need for research, please read the below referred material.

S. P. Sukhia, P. V. Mehrotra, R. N. Mehrotra, (1991)	*Element of Educational Research,* 3rd ed. New Delhi, Allied Publishers Limited, pp. 1–7.	1.6
S.P.S. Sukhia P.V.Mehroa R.N. Mehroa (1991)	*Elements of Educational Research,* 3rd ed. New Delhi, Allied Publishers Limited, pp. 1–6	1.6

1.11 Scope of Research in Education

The importance of educational research in national development is now being increasingly realized all over the world. This is apparent from the educational progress in developing countries, particularly from the fact that education had become more and more effective, dynamic and purposeful in countries where research has flourished. It is on the bases of research that the function of education has been broadened. Educational research has a great bearing on the role of education in introducing social and economic charges.

Six Major Possibilities of the Utilization of Research towards National Development

Six major possibilities of the utilization of research towards national development can be identified. They are:

1. Educational research throws up valuable background data from which the planner can make his own assessment of the prevailing situation, especially of the magnitude, complexity and ramifications of the problem he has to handle.
2. Carefully designed analytic studies can illuminate critical areas of policy. The overt and covert dimensions of a given problem emerging in such studies provide the planner with a measure of foresight to deal with them effectively and efficiently.
3. These studies open up the possibility of testing the validity of the assumptions that must, of necessity, be made by the planner in setting his proximate and ultimate objectives.
4. They enable the planner to estimate the possible consequences and cost of the different choices available to them in determining the path for the attainment of their goals.
5. Diagnostic studies suggest where and why particular projects gearing. Their unattended consequences are also brought to light.
6. Wide dissemination of educational research findings increases general awareness in respect of the situation to be met as well as the policy designed for this purpose. This may enhance the credibility of particular policies and prepare the people for them. It may also help towards building up popular pressures for reformulation of particular policies or for weeding them out altogether.

Further details, please read the below mentioned material:

S. P. Sukhia, P. V. Mehrotra, R. N. Mehrotra, (1991)	*Element of Educational Research,* 3rd ed. New Delhi, Allied Publishers Limited, pp. 7–15.	1.7

Some or all of these possibilities can be realized provided research is geared to policy needs and the planner is responsive and sensitively to the research findings.

1.12 Summary

Educational research acquires the same general and natural characteristics as other research. Educational research follows the scientific method of investigation. Its scope is, however, restricted to educational issues. Its goal is to discover laws or generalizations concerning educational issues with a view to making predictions, controlling events and improving the quality of instruction and education.

Education research, therefore, should help the teachers, headmasters and supervisors to narrow down the-proverbial gap between theory and practice in education. Educational research is not mere reporting, defining and stating amassing of facts. On the other hand, on the basis of these activities, educational research should result in better education by providing better development and formulation of instructional aims, better motivation of pupils, better teaching methods, better evaluation and better supervision and administration.

Educational research involves a systematic and orderly study of the complex relationships that constitute research activity. It is the study by scientific methods of the educational process. It is, therefore, obvious that educational research does not mean acceptance of all the observations that have been presented. It implies a scientific enquiry in a definite direction. Educational research is not merely a report of facts but it interests itself in facts about facts of nature. Educational research should end at the discovery of new knowledge, either by reopening the settled issues and offering new solution, or exploring new vistas of knowledge.

Decisions made on systematic research in education would surely save time, money, energy and a lot of failure and frustration and show us the path of progress.

Educational research economizes effort, prevents wastages, increases efficiency and reacts to vitalize and dignify the work of the teacher. Knowledge gained by educational research is that of the highest order.

Knowledge gained by research is more authentic and valid than the knowledge based on the evidence of tradition, learned authority, and personal experience.

Educational research is “progress depending on experience, it is rightly observed, is accidental and slow, whereas research seeks to settle the question here and now and avails itself of experiment rather than experience. Moreover, research further. analyses 'experience' and trick to synthesize 'tradition' and abstract forms like good teaching', ‘creative activity’, etc, in a scientific process, the contents and results of which can be used, verified and accepted or corrected, if necessary by others.

1.13 Activities

1. Write down the definitions of educational research.

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2. Write a survey report concerning the feasibility of research in Pakistan.

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Self-Assessment Questions

Hopefully, you have studied the material, now please answer the following questions:

Q. 1 Define the term educational research.

Q. 2 Why is research in the field of education necessary? How does educational research help in the advancement of education? Give examples with your answer.

Q. 3 "The mere reporting, defining stating and amassing of facts, even in numerical form, is in itself not educational research." Discuss with reference to functions and uses of research.

Q. 4 "Educational research should not be viewed only as scientific research which is empirical', inductive and exact." Discuss the statement with reference to characteristics of research.

Q. 5 What do you understand by the term 'Science of the human mind? Would you consider educational research in the fields of the philosophy of education, the history of education, and comparative education more in the nature of scientific research or of search in the sciences of the human mind? Why?

Q. 6 Why we need research in the field of education?

Q. 7 Critically examine the significance of research in education.

Q. 8 Discuss the benefits of research in The advancement of distance education. Give examples to 'illustrate your answer

Q. 9 "Research is not a mere search for truth," Discuss the statement.

Q. 10 "Research seeks by preference principles or facts of universal validity." Discuss.

Q.11 "Research should not be viewed only as scientific research which is empirical inductive and exact'. Discuss the statement with special reference to the characteristics of educational research.

Annexure-I

ALLIED MATERIAL

Fred. N. Kerlinger (1983)	Foundations of Behavioral Research, 2nd ed. Delhi, Surjeet Publications, pp. 10–17	1.1

To understand any complex human activity we must grasp the language and approach of the individuals who pursue it. So it is with understanding science and scientific research. One must know and understand, at least in part, scientific language and the scientific approach to problem solving.

One of the most confusing things to the student of science is the special way the scientist uses ordinary words. To make matters worse, he invents new words. There are good reasons for this specialized use of language, which will become evident later. Suffice it to say now that we must understand and learn the language of psychological and educational scientists. When a psychological investigator tells us about his independent and dependent variables we must know what he means. When he tells us that he has randomized his experimental procedures, we must not only know what he means—we must understand why he does what he does.

Similarly, the scientist's approach to his problems must be clearly understood. It is not so much that this approach is different from the layman's. It is different, of course, but it is not strange and esoteric. Quite the contrary, when understood, it will seem natural and almost inevitable that the scientist does what he does indeed, we will probably wonder why much more human thinking and problem-solving are not consciously structured along such lines.

The purpose of Part 1 of this book, then is to help the student learn and understand the language and approach of science and research. In the chapters of this part many of the basic constructs of the social and educational scientist will be studied. In some cases it will not be possible to give complete and satisfactory definitions because of lack of background at this early point in our development. In such cases we shall attempt to formulate and use reasonably accurate first approximations to later, more satisfactory definitions. Let us begin our study by considering how the scientist approaches his problems and how this approach differs from what might be called a commonsense approach.

Science and Common Sense

Whitehead has pointed out that in creative thought common sense is a bad master. "Its sole criterion for judgment is that the new ideas shall look like the old ones." [1] This is well said. Common sense may often be a bad master for the evaluation of knowledge. But

[1] A. Whitehead an introduction to Mathematics. New York: Holt, Rinehart and Winston. 1911. p. 157.

how are science and common sense alike and how are they different? From one viewpoint, science and common sense are alike. This view would say that science is a systematic and controlled extension of common sense, since common sense as Conant points out, is a series of concepts and conceptual schemes satisfactory for the practical uses of mankind[2]. But these concepts and conceptual schemes may be seriously misleading in modern science--and particularly in psychology and education. It was self-evident to many educators of the last century—it was only common sense—to use punishment as a basic tool of pedagogy. Now we have evidence that this older, commonsense view of motivation may be quite erroneous. Regard seems more effective than punishment in aiding learning.

Science and common sense differ sharply in five ways. These disagreements revolve around the words "systematic" and "'controlled." First, the uses of conceptual schemes and theoretical structures are strikingly different while the man in the street uses "theories" and concepts; he ordinarily does so in a loose fashion. He often blandly accepts fanciful explanations of natural and human phenomena. An illness, for instance, may be thought to be a punishment for sinfulness. An economic depression may be attributed to Jews. The scientist, on the other hand, systematically builds his theoretical structures test them for internal consistency, and subjects aspects of them to empirical test. Furthermore, he realizes that the concepts he is using are manmade terms that may or may not exhibit a close relation to reality.

Second, the scientist systematically and empirically tests his theories and hypotheses. The man in the street test his "hypotheses," too, but he tests them in what might be called a selective fashion. He often "selects" evidence simply because it is consistent with his hypothesis. Take the stereotype: Blacks are musical. If a person believes this, he can easily "verify" his belief by noting that many blacks are musicians. Exceptions to the stereotype, the unmusical or tone-deaf black, for example, are not perceived. The sophisticated social scientist, knowing this "selection tendency" to be a common psychological phenomenon, carefully guards his research against his own preconceptions and predilections and against selective support of his hypotheses. For one thing, he is not content with armchair exploration of a relation; he must lest the relation in the laboratory or in the field. He is not content, for example, with the presumed relations between methods of teaching an achievement, between intelligence and creativity, between values and administrative decisions. He insists upon systematic, controlled, and empirical testing of these relations.

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[2] J. Conant. Science and Common Sense. New Haven: Yale University Press, 1951. pp. 32-33. A concept is a word that expresses an abstraction formed by generalization from particulars. "Aggression" is a concept, an abstraction that expresses a number of particular actions having the similar characteristic of hurting people or objects, A conceptual scheme is a set of concepts interrelated by hypothetical and theoretical propositions, (See ibid; pp, 25, 47—48.) A construct is a concept with the additional meaning of having been created or appropriated for special scientific purposes. "Mass.", "energy.", "hostility." "introversion." and "Achievement." are constructs. They might more accurately be called "constructed types" or "constructed classes" classes or sets of objects or events hound together by the possession of common characteristics defined by the scientist The term " variable"‘ will be defined in a later chapter. For now let in mean a symbol or name of characteristic that takes on different numerical values.

A third difference lies in the notion of control. In scientific research, control means several things. For the present let it mean that the scientist tries systematically to role out variables that are possible "causes" of the effects he is studying other than the variables that he has hypothesized to be the "causes." The layman seldom bothers to control his explanations of observed phenomena in a systematic manner. He ordinarily makes little effort to control extraneous sources oil influence. He tends to accept those explanations that are in accord with his preconceptions and biases. If he believes that slum conditions produce delinquency, he will tend to disregard delinquency in no slum neighborhoods. The scientist, on the other hand, seeks out and "controls" delinquency incidence in different kinds of neighborhoods. The difference, of course, is profound,

Another difference between science and common sense is perhaps not so sharp. It was said earlier that the scientist is constantly preoccupied with relations among phenomena. So is the layman who invokes common sense for his explanations of phenomena. But the scientist consciously and systematically pursues relations. The layman's preoccupation with relations is loose, unsystematic, uncontrolled. He often seizes, for example, on the fortuitous occurrence of two phenomena and immediately links them indissolubly as cause and effect.

Take the relation tested in a study by Hurlock.[3] In more recent terminology, this relation might be expressed: Positive reinforcement (reward) produces greater increments of learning than does negative reinforcement (punishment) or no reinforcement. The relation is between reinforcement (or reward and punishment) and learning. Educators and parents of the nineteenth century often assumed that negative reinforcement (punishment) was the more effective agent in Seaming. Educators and parents of the present often assume that positive reinforcement (reward) is more effective. Both may say that their viewpoints are "only common sense." It is obvious, they may say, that if you reward (or punish) a child he will learn better the scientist, on the other hand, while he may personally espouse one or the other or neither of these viewpoints, would probably insist on systematic and controlled testing of both (and other) relations, as Hurlock did.

A final difference between common sense and science lies in different explanations of observed, phenomena. The scientist, when attempting to explain the relations among observed phenomena, carefully rules out what have been called "metaphysical explanations." A metaphysical explanation is simply a proposition that cannot be tested. To say, for example, that people are poor and starving because God wills it, that studying hard subjects improves the child's moral character, or that it is wrong to be authoritarian in the classroom is to talk metaphysically.

None of these propositions can be tested; thus they are metaphysical. As such, science is not concerned with them. This does not mean that a scientist would necessarily spurn

[3] E. Hurlock, "An Evaluation of Certain Incentives Used in Schoolwork." Journal of Educational Psychology, XVI (1925). 145-159.

such statements, rule them out of life, say they are not true, or claim they are meaningless. It simply means that as a scientist he is not concerned with them. In short, science is concerned with things that can be publicly observed and tested. If propositions or questions do not contain implications for such public observation and testing, they are not scientific questions.

Four Methods of Knowing

Charles Pierce, the great American philosopher, said that there are four general ways of knowing or, as he put it, of fixing belief[4]. The first is the method of tenacity. Here men hold firmly to the truth, the truth that they know to be true because they hold firmly to it, because they have always known it to be true. Frequent repetition of such "truths" seems to enhance their validity. Recent psychological evidence has shown us that men will often cling to their beliefs in the face of clearly conflicting facts. And they will also infer "new" knowledge from propositions that may be false.

A second method of knowing or fixing belief is the method of authority. This is the method of established belief. If the Bible says it, it is so. If a noted physicist says there is a God, it is so. If an idea has the weight of tradition and public sanction behind it, it is so. As Peirce points out, this method is superior to the method of tenacity, because human progress, although slow, can be achieved using the method. Actually, life could not go on without the method of authority. We must take a large body of facts and information on the basis of authority. Thus, it should not be concluded that the method of authority is unsound; it is only unsound under certain circumstances.

The a *priori method* is the third way of knowing or fixing belief. (Cohen and Nagel call it the *method of intuition.*) It rests its case for superiority on the assum0ption that the propositions accepted by the "a priorist" are self-evident. Note that a priori propositions "agree with reason" and not necessarily with experience. The idea seems to be that men, by free communication and intercourse, can reach the truth because their natural inclinations tend toward truth the difficulty with this rationalistic position lies in the expression "agree with reason," Whose reason? Suppose two good men, using rational processes, reach different conclusions, as they often do. Which one is right? Is it a matter of taste, as Peirce puts it? If something is self-evident to many men—for instance, that learning hard subjects trains the mind and builds moral character, that American education is inferior to Russian and European education, that women are poor drivers—does this mean it is so? According to the a priori method, it does—it just "stands to reason."

The fourth method is the method of science. Peirce says:
To satisfy our doubts.... therefore, it is necessary that a method should be found[5] by which our beliefs might be determined by nothing human, but by some external per-

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[4] J. Buhler. ed. Philosophical Writings of Pierce. New York: Dover. 1955. Chap.2. In the ensuing discussion. I am taking some liberties with Peirce's original formulation in an attempt to clarify the ideas and to make them more germane to the present work. For a good discussion of the four methods, sec M. Cohen and E. Nagel. An Introduction to Logic and Scientific Method. New York: Harcourt. 1934. pp. 193-196.

[5] Buchler, op cit. p.18.

manency—by something upon which our thinking has no effect.... The method must be such that the ultimate conclusion of every man shall be the same. Such is the method of science. Its fundamental hypothesis... is this: There are real things, whose characters are entirely independent of our opinions about them….

The scientific approach[6] has one characteristic that no other method of attaining knowledge has: self-correction. There are built in checks all along the way to scientific knowledge. These checks are so conceived and used that they control and verify the scientist's activities and conclusions to the end of attaining dependable knowledge outside himself. Even if a hypothesis seems to be supported in an experiment, the scientist will test alternative hypotheses that, if also supported, may cast doubt on the first hypothesis. A scientist does not accept a statement as true, even though the evidence at first looks promising. He insists upon testing it. He also insists that any testing procedure be open to public inspection.

As Peirce says, the checks used in scientific research are anchored as much as possible in reality lying outside the scientist and his personal beliefs, perceptions, biases, values, attitudes, and emotions. Perhaps the best single word to express this is objectivity. But, as we shall see later, the scientific approach involves more than this. The point is that more dependable knowledge is attained through science because science ultimately appeals to evidence: propositions are subjected to empirical test. An objection may be raised: Theory, which the scientist uses and exalts, is part of man himself. But, as Polanyi points out, "A theory is something other than myself"[7] thus a theory helps the scientist to attain greater objectivity. In short, scientists systematically and consciously use the self-corrective aspect of the scientific approach.

Science and its Functions

What is science? This question is not easy to answer. Indeed, no definition of science will be directly attempted. We shall, instead, talk about notions and views of science and then try to explain the functions of science.

Science is a badly misunderstood word. There seem to be three popular stereotypes that impede understanding of scientific activity. One is the white coat-stethoscope-laboratory stereotype. The scientist is perceived as a peculiar person who works with facts in laboratories. He uses complicated equipment, does innumerable experiments, and piles up facts for the ultimate purpose of improving the lot of mankind. Thus, while he is somewhat of an unimaginative grubber after facts, he is redeemed by his noble motives. And you can believe him when, for example, he tells you that such and such toothpaste is good for you or that you should not smoke cigarettes.

The second stereotype of the scientist is that he is a 'brilliant' individual who thinks, spins

[6] This book's position is that there is no one scientific method as such. Rather, there are a number of methods that scientists can and do use, but it can probably be validity said that there is one scientific approach.

[7] M.Polanyi, Personal Knowledge Chicago: University of Chicago Press, 1958, p.4.

complex theories, and generally spends his time in the ivory tower aloof from the world and its problems. This scientist is a rather impractical theorist, even though his thinking and theory occasionally lead to results of practical significance like atomic bombs.

The third stereotype equates science with engineering and technology. The building of bridges, the improvement of automobiles and missiles, the automation of industry, the invention of teaching machines, and the like are thought to be science. The scientist's job in this conception is to work at the improvement of man's inventions and artifacts. The scientist himself is conceived to be a sort of highly skilled engineer working to make life smooth and efficient.

These notions impede student understanding of science, the activities and thinking of the scientist, and scientific research in general. In short, they make the student's task harder than it would otherwise be. Thus they should be cleared away to make room for more adequate notions.

In the scientific world itself there are two broad views of science: the static and the dynamic.[8] The static view the view that seems to influence most laymen and students, is that science is an activity that contributes systematized information to the world. The scientist's job is to discover new facts and to add them to the already existing body of information. In short, science is even conceived to be a body of facts. Science, in this view, is also a way of explaining observed phenomena. The emphasis, then, is on the present stale of knowledge and adding to it, on the extent of knowledge, and on the present set of laws, theories, hypotheses, and principles.

The dynamic view, on the other hand, regards science more as an activity, what scientists do. The present slate of knowledge is important, of course. But it is important mainly because it is a base for further scientific theory and research. This has been called a heuristic view. The word “heuristic,” meaning serving to discover or reveal, now has the notion of self-discovery connected with it. A heuristic method of teaching, for instance, emphasizes students discovering things for themselves. The heuristic view in science emphasizes theory and interconnected conceptual schemata that are fruitful for further research. A heuristic emphasis is a discovery emphasis.

Deobold B. Van Dalen, (1973	Understanding Educational *Research*, 3rd ed. New York, McGraw-Hill Book Company, pp. 1–9	1.2

Knowledge, broadly speaking, consists of facts and theories that enable one to understand phenomena and to solve problems. The pragmatic test of knowledge and one's command of it is: Can I use this information to comprehend, explain, control, predict, or cope with a given situation? Knowledge can range from the simplest perception of an object to the most profound understanding of a complex theory. Knowledge can be obtained from direct personal experience or from the many secondhand sources that inundate us constantly with rival claims of useful information.

[8] Conant. Op. cit., pp. 23-27.

Knowledge claims on any level of complexity or from any source may range from those that are highly reliable to those that are completely unreliable. The flickering motion pictures recorded on our consciousness may trick us into making inaccurate observations of phenomena. The secondhand authority upon whom we rely for information may not know what he is talking about. To be certified as reliable, knowledge must pass successfully certain tests: it must be supported by evidence. What evidence is required? How much evidence is required? At what point does man really know he knows? The degree of reliability required of knowledge depends on the use that is to be made of it.

Scientists have developed exacting methods of observation and specific criteria for validating facts and theories. Moreover, they have not merely discovered knowledge, presented supporting evidence, and stored it forevermore in a knowledge warehouse. Our scientists' work is never done. The discovery of new evidence, the imaginative reordering of old evidence, and the intellectual insights of gifted men all these illuminate new, unified patterns of meaning. These patterns, in turn, give broader and deeper understandings of phenomena, understandings that repeatedly upset the knowledge warehouse. Acquiring reliable knowledge is not a one-shot, finished business; it is a complex, challenging, continuous adventure.

We are all somewhat scientific in nature; we are creatures capable of knowing and have a desire to test our capacity. We are also notoriously inconsistent. On the one hand, we are curious, exploratory animals who want to understand our environment and to solve problems; on the other hand, we are lazy creatures of habit who seek personal comfort and social approval. In many instances, acting without accurate knowledge does not deeply disturb us. We accept alleged knowledge without testing it settle for ad hoc solutions, improvise something that works in the immediate situation even though in the long run the consequences may be undesirable. Indeed, we may not only refrain from exerting the self-discipline to obtain reliable knowledge ourselves but also may ruthlessly repress others who construct theories or develop inventions that would make us change our behavior or beliefs. The adventure of coping with new ideas and adopting new life-styles may excite us or frighten us. Not uncommonly, we fear change. We fear that it may adversely affect our economic or social status, may require us to reeducate ourselves, or may force us to alter our customary lie patterns. We feel safer sticking with the status quo. The acquisition and expansion of reliable knowledge is not an automatic, self-perpetuating process. It rests on our willingness to develop critical thinking skills and the moral fiber necessary to accept change as a constant.

Centuries of effort were required for our predecessors to improve their capacity and readiness to obtain reliable knowledge. To gain some insight into the tortuous pathway they traversed, the following discussion briefly examines various sources of knowledge they have drawn upon to solve problems: (1) authority, (2) personal experience, (3) deductive reasoning, and (4) the scientific method.

Methods of Acquiring Knowledge

When his habitual method of dealing with situations produced discouraging results, man resorted to crude trial-and-error methods of seeking solutions. Through considerable experience with problem solving, he was gradually able to refine his knowledge-seeking methods. Periods of complacency and retardation periodically halted cultural progress, but exciting leaps forward also occurred, and the long term trend was characterized by an extension of knowledge.

Authority

Seeking advice from an authority was a well-established method of solving problems even in the earliest civilizations. Pre-literate man appealed to the medicine man to relieve him of pain and plied the tribal chieftain with questions about the elements. When floods, famine, lightning, or leprosy terrified him, he blindly accepted the ancestral explanations that his elders imparted, and he appealed to supernatural powers for help. Rather than attempting to determine truth independently, modern man may also seek advice from authorities. A trial lawyer may ask a psychiatrist to testify concerning the sanity of the defendant, a ballistics expert to give opinions concerning weapons, and a handwriting specialist to compare signatures. A housewife may consult a childcare book or a doctor concerning the spots on her son's chest. Turning to authorities to obtain knowledge often saves time and effort but care must be employed in choosing authorities and evaluating their pronouncements.

Tradition in many situations modern man does not evaluate the truth or falsity of his beliefs any more than his forefathers did. He unconsciously or unquestioningly accepts many traditions of his culture, such as the customary modes of dress, speech, food, worship, and etiquette. In the World of practical affairs this automatic acceptance of approved patterns of behavior is often necessary, for one cannot question all things. But one should not make the mistake of assuming that everything that has customarily been done is right or that an appeal to the accumulated wisdom of the ages will always lead to the truth.

Historical records reveal that man has not only solved many problems and accumulated much wisdom but has also formulated many erroneous explanations of phenomena. Many long-revered educational, medical, and scientific theories have been proved false. For instance, man once believed that children differed from adults only in size and dignity, that asafetida bags warded off disease, and that the planets revolved around the earth. Truth is not a guaranteed product of a popularity contest: a statement is not true merely because “everyone knows it” or “everybody has always believed it.” Age, alone, is not sufficient to establish the truth or falsity of a belief.

Church, State, and Ancient Scholars Preliterate man turned to Tribal leaders when seeking knowledge. In medieval times, man believed that ancient scholars and churchmen had discovered the truth for all time and that their pronouncements could not be questioned. The Scholastics, for example, Accepted Aristotle's conjecture that women have more teeth than men as absolutely true, even though simple observation and enumeration would have provided evidence to the contrary. When invited by Galileo to view the newly discovered moons of Jupiter, one scholar refused to look through the

telescope. He was convinced that the moons could not possibly be seen because Aristotle had not mentioned them in his discussions on astronomy. Like most scholars of that era, the man who declined Galileo's invitation clung blindly to faulty Grecian theories and attacked any new idea that contradicted the accepted authorities.

With the rise of strong secular states after the Middle Ages, man began to turn to kings, legislatures, and courts as sources of information. Today, many citizens also expect government officials to solve problems concerning agricultural surpluses, international trade, and labor-management difficulties. Some people appeal to the courts for interpretations on basic issues confronting them, such as the validity of Darwin's theory of natural selection, segregated school practices, and the use of prayers in public schools. From the earliest times to the present, man has sought guidance and information from his oracles, leaders, and rulers.

Man often prefers to rely on the judgment of outstanding authorities whose beliefs have withstood the test of time, because he fears that if he himself searched for answers to difficult questions he might make errors. But if modern man can make errors when searching for knowledge, his ancestors must have been subject to the same weakness. If tradition, the church, and the state are to be the source of all reliable information, what happens when these institutions render opinions that conflict with one another? The authorities in different churches and states do not always agree, and traditions of cultures vary. Man may encounter perplexing problems when he turns to the multiplicity of existing authorities in a search for answers to his questions. Ignoring the cultural accumulations of the centuries is imprudent, for little progress will occur if each generation rejects the judgment of the ages and starts from scratch to accumulate knowledge. On the other hand, refusing ever to question any accepted belief—total reliance on dogmatic authority—will result in social stagnation.

Expert Opinion When searching for knowledge, man sometimes seeks the testimony of experts who, because of their intellect, training, experience, or aptitudes, are better informed than other people. Experts are necessary in a complicated culture such as ours. An effort must be made, however, to find out whether the experts are recognized by other authorities in the field and whether they are in a position to know the facts about the particular problem under consideration. One should check not only the credentials of experts but also the arguments and evidence upon which they base their claims to knowledge. Accepting experts' opinions unconditionally and for all time is a dubious if not a dangerous practice.

Personal Experience

When confronted with a problem, man often tries to recall or to seek a personal experience that will help him reach a solution. When searching for food, ancient nomads probably remembered that certain berries always made them ill, that fish were more plentiful in some streams than others, and that grains ripened at particular times of the year. When trying to determine the quickest route to work, modern man may time himself on different roads. When deciding where to plant seeds, a gardener may try to remember in what part of the yard flowers grew best last year. When given a handful of coins to

divide with his brother, a small boy may recall that selecting the biggest piece of candy on a plate is usually a wise choice; because of his previous experience with candy, he may decide to keep the big nickels and give his brother the little dimes.

Appealing to personal experiences is a useful and common method of seeking knowledge. An uncritical use of personal experience, however, may lead to incorrect conclusions as the boy who selected the nickels with his "candy measuring stick" discovered. A person may make errors when observing or when reporting what he has seem or done. He may (1) omit evidence that does not agree with his opinion, (2) use measuring instruments that require many subjective estimates, (3) establish a belief on insufficient evidence, (4) fail to observe significant factors relating to a specific situation, or (5) draw improper conclusions or inferences owing to personal prejudices. To avoid dangerous pitfalls, the modern research worker exercises many precautions when he turns to experience in his search for reliable knowledge.

Deduction

To obtain more reliable knowledge, Aristotle developed the syllogism a deductive argument which provides a means of testing the validity of a particular conclusion. A syllogism consists of three statements or propositions. The first two statements are called "premises," since they furnish the evidence or grounds for the conclusion, which is the statement standing last. Aristotle defined the syllogism as "a discourse in which certain things being posited, something else than what is posited necessarily follows from them." The following categorical syllogism is an example of such a discourse:

(Major premise)	All mammals are mortal.	If all M are P, and
(Minor premise)	(middle) M (major) P	All S are M
(Conclusion)	All men are mammals	then
	(minor) S (middle) M	All S are P.
	All men are mortal.	
	(minor) S (major) P	

A valid syllogism contains terms referring to three and only three classes[1] of things. In the above argument the classes are mortals, mammals, and men. Each statement in the categorical syllogism contains two terms. Each term appears twice in the syllogism. The subject term S of the conclusion (men), which is called the "minor term," also appears in the minor premise. (See above.) The predicate term P of the conclusion (mortal), which is known as the "major term," is also found in the major premise. The third or middle term M (mammals) occurs once in each premise and does not appear in the conclusion. The function of the middle term is to establish the relationship between the minor term arid major term, which is asserted in the conclusion.

[1] A logical class is a collection of particulars - things, persons, qualities- which are all alike in some defining respect. Consequently, one can infer with confidence knowledge about members of the class room knowledge of the class. Whatever can be asserted or denied of a whole class can be asserted or denied of any member of that class.

In the argument above, “mammals” is the middle term or mediating factor which brings the minor term “men” in the conclusion into the asserted relation with the major term “mortal.” The function of the middle term will become clearer if you examine Figure 1.1 as you read the following review of the argument. If the class of mammals M is included in the large class of mortals P as the major premise stipulates, and the class of men S is included in the class of mammals M as the minor premise stipulates, then it follows, logically that the class of men S is included in the class of mortals P. Thus, this argument is valid, for the premises are related to the conclusion in such a way that the conclusion must be true if the premises are true. If a person accepts the premises, he must agree to the conclusion that follows, because the conclusion merely states explicitly or reformulates information which is already implicit in the premises.

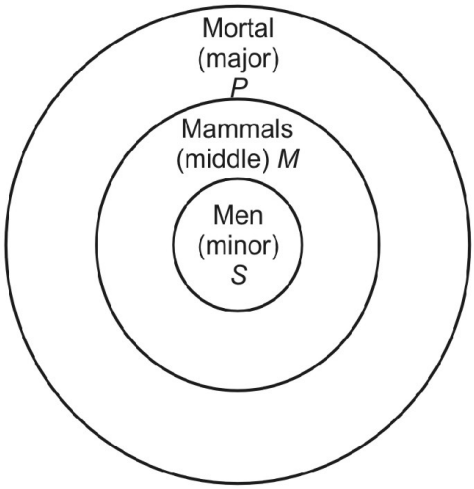

Figure 1.1 a schematic representation of a valid argument.

Categorical syllogisms may be cast in various forms. The position of the terms M. P, and S may be ordered in four different ways in the premises. These four forms are known as figures of the syllogism.

M-P	P-M	M-P	P-M
S-M	S-M	M-S	M-S
S-P	S-P	S-P	S-P

The nature of the categorical statements in a syllogism may also vary. The four types of categorical statements are (1) universal affirmative (example: All students are white), (2) universal negative (example: No students are white), (3) particular affirmative (example: Some students are white), and (4) particular negative (example: Some students are not white). A categorical syllogism may contain any three of these four types of statements in various combinations. By varying the types of statements used in the four figures, one can state arguments in 256 forms, but most of them are invalid. From two negative premises or from two particular premises, for example, no conclusion can be inferred.

A syllogism does not have to be composed exclusively of categorical statements. As the examples below reveal, arguments may involve hypothetical, alternative, and disjunctive propositions.

Hypothetical
If the school is on fire, the children are in danger.
The school is on fire.
Therefore, the children are in danger.

Alternative
Either I will get a passing mark on this test, or I will flunk the course.
I will not get a passing mark on this test.
Therefore, I will flunk the course.

Disjunctive
It is not the case that it is both a rainy day and a good day to present the school pageant outdoors.
It is a rainy day.
Therefore, it is not a good day to present the school pageant outdoors.

As you note in the examples, each syllogism is labeled according to the type of proposition occurring in the major premise. Each type of syllogism is used in different stages of assurance concerning knowledge. Let us examine when the various types of syllogisms are used.

Categorical propositions represent a certain settled stage of our knowledge, and conclusions validly drawn from categorical syllogisms are unconditional. Hypothetical or conditional propositions, however, represent an unsettled stage in thinking and knowing. Hypothetical thinking proceeds on various levels, from the solution of simple problems of daily life, and the detection of crime, to the technique of identification and classification in science, and the search after scientific laws by means of the statement and testing of hypotheses. Likewise alternative arguments represent an unsettled state of knowledge, but within limits; the alternative often being quite well within the possibility of progressive elimination or verification. The disjunctive syllogism is a combination of knowledge and ignorance, like the alternative, but is an advance upon the alternative in the direction of more definite knowledge, and reaches a conclusion by means of what is known and can be asserted in the minor premise [1 20:1 14-1 15].[2]

In personal and professional life, you use deductive reasoning when solving problems. The lawyer, doctor, soldier, and detective often resort to deductive argument in investigating a murder case, a prosecuting attorney may search through piles of evidence—existing knowledge select previously unconnected facts, and combine them in

[2] Numbers in brackets refer to the numbers bibliography on pages 507-515.

such a way that they logically imply a hitherto unsuspected conclusion. Deductive reasoning enables him to organize premises into patterns that provide conclusive evidence for the validity of his particular conclusion.

The modern research worker also utilizes deductive reasoning to carry out certain phases of his work. Some men scoff at the role of reason in research and contend that an investigator is only concerned with facts he can obtain through observation and experiment. But collecting facts is not sufficient. Without deduction "most of our preoccupation with facts would be fruitless, since we could not fit them into the increasingly deductive systems which we call sciences. The latter are man's must economical instruments" (86:113). The scientist frequently tries to pigeonhole a particular instance under an already established principle from which the instance can be deduced. Through the use of the tools of deduction, he hypothetically manipulates and explores possibilities that may open up new areas of inquiry.

In daily discourse many assertions are deductive in nature and may be logically correct without appearing in a syllogistic form. Outside of logic texts one rarely finds arguments set off in the middle of the page and explicitly labeled. The premises may or may not precede the conclusion, and some premises may be missing. The conclusion may come first, last, or even in the middle of the argument. One must be able to recognize arguments that appear in prose or discourse; locate the premises and conclusion; supply the missing premises, if necessary; restate the argument in a complete and explicit form; and then apply logical standards to determine whether the argument is logically correct or fallacious.

When analyzing a deductive argument, one must pay close attention to language. Words may have more than one meaning; consequently, language may play tricks that lead thinking astray. A syllogistic argument is not valid unless each term is used in the same sense throughout the argument. A shift in the meaning of any term leads to an error in reasoning. Examine the following syllogism:

- Only man can talk.
- No woman is a man.
- All women cannot talk.

The above argument would be valid if the term "man" had the same meaning in each premise, but in the major premise the term "man" means "human being," and in the minor premise it means "human male." Since the meaning of the middle term "man" has been changed during the course of the argument, there is no mediating term which links the two premises together so that they yield a logical conclusion.

The categorical syllogism has severe limitations. The content of the conclusion of the syllogism cannot exceed the content of the premises. A categorical syllogism deduces the consequences of preexisting knowledge; it does not enable man to gain new knowledge or to make new discoveries. A second weakness of deductive reasoning lies in the possibility that one or more of the premises are not materially true. When the validity of a

deductive argument is checked, questions are not raised about the content (truth or falsity) of the statements but about the forms of the arguments. One asks: Are these premises related to the conclusion in such a way that a person cannot accept the premises and reject the conclusion? The formal reasoning in an argument may be sound even if the argument is based on false premises. Consider the following as an example:

Deobold B. Van Dalen, (1973)	Understanding Educational Research, 3rd ed. New York, McGraw-Hill Book Company, pp. 10–17	1.3

- All professors of education hold doctoral degrees.
- All men in this meeting are professors of education.
- Hence, all men in this meeting hold doctoral degrees.

The conclusion "All men in this meeting hold doctoral degrees" is valid, for it necessarily follows from the premises given. But the conclusion is not true in fact, for some professors in the meeting hold only masters' degrees. In this instance the major premise was not true in fact.

The conclusion reached by a deductive argument produces reliable knowledge only if it is deduced from true premises and the premises are properly related to the conclusion. Deductive logic, therefore, cannot be relied upon exclusively in searching for the truth, because it is not a self-sufficient means of securing dependable knowledge.

Induction

If the conclusions reached by deductive reasoning are true only if derived from true premises, man must find some way of determining whether his premises are true. Consequently, he has devised inductive reasoning to complement deductive reasoning as a means of searching for knowledge. In inductive reasoning, an investigator initiates his inquiry by observing particular instances (concrete facts). From his examination of these facts, he establishes a general conclusion about the whole class to which these particular instances belong. If an investigator arrives at general conclusions through induction he may use them as major premises .for deductive inferences.

Perfect Induction One form of induction is complete enumeration. In this form of induction, one simply counts all the instances in a given class and announces his results in a general conclusion. In other words, a conclusion about all instances of a class is drawn from premises, which refer to the observed instances of the class. For example; to determine the occupations of the members of a club, one questions each member, tabulates the results, and announces the conclusion. All twenty-five members of this club are teachers. Perfect induction obtains reliable information. But how often does one have an opportunity to examine all the instances to which a conclusion refers? This type of enumeration cannot be employed as a method of investigation in the solution of most Problems.

Baconian Induction Francis Bacon (1561-1626) severely criticized the medieval practice of deducing conclusions from self-evident or authoritative premises. He held that man should not enslave himself to other men's thoughts. Rather than accepting the premises (generalizations, theories) handed down by authorities as absolute truths, Bacon believed the investigator himself should study nature closely and establish general conclusions on the bases of direct observation.

The system Bacon recommended for arriving at generalizations was laborious. He advised the investigator to tabulate all the facts concerning nature and to study these facts for their "forms," that is, for the underlying essence of the phenomena. To accomplish this task, the investigator was to compile three tables: (1) positive instances—instances where certain phenomena appeared, (2) negative instances—instances where certain phenomena did not appear, and (3) instances where certain phenomena appeared in varying degrees and where the form varied accordingly. The purpose of the tables was to determine what properties were invariably connected with certain forms. Bacon cautioned against formulating any solution to a problem until all the facts had been gathered. His demand that the investigator first search for the facts was justified, but the exhaustive collection of facts he required was beyond the realm of human capacity.

Imperfect induction whereas perfect induction establishes a conclusion by an exhaustive enumeration of all instances that are subsumable under it, imperfect induction arrives at a generalization by observing only some instances that make up the class. The research worker utilizes imperfect induction more often than perfect induction, for in most investigations he cannot examine all of the instances to which a conclusion refers. From observing some instances, however, he can draw a general conclusion regarding all similar instances, some of which he has not observed.

When examining all the instances of a class under consideration is not practical, the investigator does the next best thing: he arrives at a generalization by observing an adequate and representative sample from the entire class. To check on the purity of the water in a swimming pool, for instance, a health officer may take a single sample of water, test it, and draw a conclusion about the purity of the water in the entire swimming pool. Perhaps on the same day his friend, a restaurant owner, purchases 500 steaks. To ascertain whether they are of choice quality without examining each steak, he selects at random a few steaks and finds that they are choice grade. From his selective observations he draws the conclusion that all the steaks are probably of choice quality.

Drawing an inference about a whole class of things after sampling a few of its members does not necessarily yield absolutely certain knowledge. The size and representativeness of the instances observed determine whether one arrives at a sound conclusion. If the material observed is homogeneous, one or a few samples may be adequate for arriving at a reliable generalization. If the material is not homogeneous, the same number of samples probably will yield a less reliable generalization. The conclusion drawn from one sample of water, for example, may be more satisfactory than one drawn from several samples of steak. Previous knowledge of the composition of water gives the health officer greater assurance

(that all the water in the pool is like the small sample) than his friend can expect from a larger number of instances taken from cattle of different breeds and environments.

Both deductive and inductive arguments have advantages and disadvantages. A deductive argument does not guarantee that the conclusion is true, but if the two premises are true, the deductive argument arrives at a conclusion that is necessarily true. The conclusion of the deductive argument, however, does not probe beyond that which is already known—already present, at least implicitly, in the premises. In an imperfect inductive argument, the conclusion does contain information that is not present, even implicitly, in one of the premises (the observed instances). This type of argument is absolutely necessary if man is to extend his knowledge. Through imperfect induction, however, an investigator merely arrives at conclusions of varying degrees of probability. If all the premises (observed instances) are true, the conclusion is probably but not necessarily true. The possibility always exists that some unexamined instance of the class does not agree with the conclusion. To summarize, the inductive argument expands the content of the premises at the expense of achieving absolutely certain knowledge; the deductive argument arrives at absolutely certain knowledge (if the premises are true) by sacrificing any expansion of the content (116:15).

Modern Method of Acquiring Knowledge

About the seventeenth century, man developed a new method of acquiring knowledge and as a result gave birth to the modem scientific movement. Francis Bacon planted the seeds of the scientific method when he attacked the deductive method of reaching conclusions on the basis of authoritative premises, and he recommended reaching general conclusions on the basis of observed facts. As was previously noted, Bacon's method of gathering random facts produced masses of unwieldy information. To construct a more practical method of attaining reliable knowledge, such men as Newton, Galileo, and their successors eventually combined the inductive and the deductive thought processes. This synthesis of reason and observation produced the modern scientific method of research.

Steps in the Scientific Method

In the scientific method, purposeful fact gathering replaces unsystematic fact gathering, and premises are tested probabilities rather than assumed truths. When using the scientific method, man shuttles back and forth between deduction and induction; he engages in reflective thinking. In 1910, John Dewey in how we think analyzed the stages of activity involved in the act of reflective thinking. The fallowing discussion distinguishes five stages in the act of problem solving:

1. **A felt difficulty**
   Man encounters some obstacle, experience, or problem that puzzles him.
   a. He lacks the means to get to the end desired.
   b. He has difficulty in identifying the character of an object.
   c. He cannot explain an unexpected event.

2. **Location and dominion difficulty**
   Man makes observations—gathers facts—that enable him to define his difficulty more precisely.
3. **Suggested solutions of the problem—hypotheses**
   From his preliminary study of the facts man makes intelligent guesses about possible solutions of the problem. The conjectural statements—generalizations he offers to explain the facts that are causing the difficulty are called hypotheses.

4. **Deductively reasoning out the consequences of the suggested solutions**
   Man deductively reasons that if each hypothesis is true, certain consequences should follow.

5. **Testing the hypotheses by action**
   Man tests each hypothesis by searching for observable evidence that will confirm whether or not the consequences that should follow actually occur. By this process, he finds out which hypothesis is in harmony with observable facts and thus offers the most reliable solution to his problem.

These steps in the act of reflective thinking reveal how induction and deduction serve as opposing blades of the scientific shears that cut out segments of truth. "Induction provides the groundwork for hypotheses, and deduction explores the logical consequences of the hypotheses, in order to eliminate those that are inconsistent with the facts, while induction again contributes to the verification of the remaining hypothesis" (120:4). The research worker continually shifts among collecting facts; making generalizations (hypotheses) to explain facts; deducing the consequences of his hypotheses; and seeking additional facts to test the hypotheses. By employing both induction and deduction, he is able to arrive at reliable knowledge.

The scientific method of thinking presented above gives an insight into the procedures that are involved in conducting an investigation. Listing these steps separately and distinctly, however, may give an in accurate impression of the research process. These steps do not provide a rigid pattern into which a scientist must force his thinking, for thinking simply cannot be scheduled. Investigators rarely follow a prescribed sequence of procedures. Research is often a confused, floundering process rather than a logical, orderly one. An investigator does not tackle one step at a time, complete that process, and then move on to the next step. He may tackle the steps out of order, shuffle back and forth between steps, or work on two steps more or less simultaneously. Some steps may require little effort; other steps may absorb a disproportionate amount of time and effort. When the investigator reports his findings to the scientific community, however, he structures his presentation in a precise and logically arranged form which closely parallels the steps of the scientific method listed above.

Illustration of the Scientific Method

The five steps or processes in reflective thinking will be discussed in greater detail in later chapters. For the time being, the following homely illustration may give you a better insight into the scientific method of securing knowledge.

A man returns from his vacation and discovers that his garden is destroyed (felt difficulty-step 1). He examines the garden and finds a twisted fence, flattened flowers, and uprooted stakes (concrete facts that enable him to define the precise nature of the difficulty—step 2). While searching for an explanation of these facts, he considers whether the neighbors' children may have deliberately destroyed the garden (hypothesis or generalization explaining the facts-step 3). His hypothesis goes beyond existing knowledge, for he did not see the children perform the act. He also thinks of a second hypothesis, which may explain the facts—a bad storm may have wrecked the garden.

Consequently, he suspends judgment and searches for proof.
By deduction, the man reasons out the consequences of his first hypothesis (step 4): If the children wrecked the garden, they had to be at home during the time he was on his vacation. To test his hypothesis (step 5), he questions the neighbors and learns that the children were away at camp while he was on vacation. Thus, he must reject his first hypothesis, for it is not in harmony with the verifiable facts. He then reasons out deductively the consequences of his second hypothesis (step 4); if a severe storm destroyed the garden, it probably wrecked other nearby gardens. To test this hypothesis (step 5), he observes other gardens and finds they have also been destroyed. He checks in newspapers and finds an account of a storm, which destroyed many gardens in his section of the city. A neighbor tells him he watched the hail and wind uproot the garden. The man concludes that his second hypothesis is a reasonable explanation of the facts.

Thus, by reflective thinking man moves from particular facts to general statements of explanation about these facts and from his general statements of explanation to a search for facts that will support them. He continues to shuttle between inductive and deductive approaches to the problem until he establishes a defensible explanation of the facts. Research workers follow procedures similar to those of the garden owner, but they carry them out in a more systematic manner.

Applicability of the Scientific Method
The scientific method is a tool that investigators use to solve diverse types of problems. A worker engaged in pure research uses this method to ferret out new knowledge about the mysteries of the universe. A worker engaged in applied research uses it to develop a new product that will improve some existing condition. As J. R. Angell, a former president of Yale University, pointed out, “The objects of research in pure science and the motives inspiring the work may be appreciably different from those encountered in the field of applied science. But the technique of the procedure in the two cases may be all but indistinguishable” (4:27). The scientific method provides a key to advances in both pure and applied research.

Progress Made in Acquiring Knowledge
Man has made considerable progress in developing better methods of seeking knowledge through the ages and, in so doing, has learned to approach the unknown with greater humility. Man once believed that he possessed a store of absolutely reliable knowledge that enabled him to give authoritative answers to questions. The modern research worker is less dogmatic, for he knows that the revolutionary advances made by science within

the past century have overthrown some long-standing theories. His awareness of the tentative, evolutionary status of knowledge makes him more willing to challenge accepted theories when he becomes suspicious about their validity. After carrying out an investigation, he makes no claim that his conclusions are infallible; rather, he invites others to confirm, modify, or refute them. If his hypothesis is found to be incompatible with reliable evidence produced in later experiments, he knows that the scientific community will abandon or alter it. A modern researcher is cognizant of the notorious fallibility of knowledge. He exposes his ideas to critical examination, because he knows that only through testing, rechecking, and refining our concepts concerning the nature of phenomena will uncertainty be reduced and knowledge become cumulative.

The scientific method does not lead to absolute certainties, but Cohen and Nagel point out that this method of obtaining knowledge is more reliable than some methods that claim they do.

The other methods ... are all inflexible, that is, none of them can admit that it will lead us into error. Hence, none of them can make provision for correcting its own results. What is called scientific method differs radically from these by encouraging and developing the utmost possible doubt, so that what is left after such doubt is always supported by the best available evidence. As new evidence or new doubts arise, it is the essence of scientific method to incorporate them—to make them an integral part of the body of knowledge so far attained. Its method, then, makes science progressive because it is never too certain about its results [31:195].

The scientific method is a powerful and practical torchlight for man to use in lighting the way to the discovery of new knowledge. Searching for knowledge in this manner is a slow process, but the tentative solutions to problems that are found may be accepted with greater confidence than definitive answers that are based on arbitrary assumptions and pontifical pronouncements, which preclude any further investigation.

Despite the improvements man has made in searching for knowledge, he has not yet arrived at a perfect method for seeking answers to his questions. Authority, experience, and both inductive and deductive reasoning have certain limitations as research tools. The scientific method has proved to be an especially useful means of reeking knowledge in the natural sciences, and it has also helped educators to probe into problems. But the scientific method is not a suitable instrument for seeking answers to certain types of questions. James B. Conant declares that “only an occasional brave man will be found nowadays to claim that the so-called scientific method is applicable to the solution of almost all the problems of daily life in the modern world” (33:10). The many lively debates that appear in scholarly periodicals reveal that authorities have not reached a common agreement concerning the breadth of the applicability of the scientific method.

Some critics contend that the scientific method cannot be used except in the natural sciences. Others question whether the scientific method follows a single method of investigation. They believe that no rigid set of logical rules can be established for

physical scientists, archaeologists, mathematicians, psychologists, sociologists, educators, and historians to follow in their respective undertakings. These critics argue that since sciences differ from one another, each science requires a different method. When questioned about the existence of a general scientific method, other scholars note the numerous common features in scientific inquiries conducted in different fields and suggest that.

On a highly conceptual level science may be considered a general method. When scientists study specific problems, however, this general method is modified in numerous ways, and many of these adaptations are of sufficient importance and sufficiently general in nature to be considered methods within themselves. Science, then, is a very general method, modified in various ways into many less general methods that are utilized in the study of specific problems [17:5].

Controversy exists concerning the nature and use of the scientific method, but most scholars regard this intellectual tool as one of the most promising instruments that man possesses for pushing back the frontiers of human understanding and increasing the accumulation of tested and verified knowledge. Thus, you will want to become better acquainted with this disciplined and scholarly method of investigation.

Kulbir Sing Hindu (1987)	*Methodology of Research in Education*, 2nd ed. New Delhi, Sterling Publishers (Pvt.) Ltd., 1–3)	1.4

Before we discuss the implications and importance of research, it is desirable that we try to understand its meanings.

Dictionaries describe it as careful search or inquiry, endeavor to discover new ideas by scientific study—a course of critical investigation.

Research is such a vast and multi-dimensional concept that ordinary definitions cannot project its meanings completely. Various definitions given by experts in the subject are being reproduced below in order to obtain a better understanding of its meanings.

Research is endless quest for knowledge or unending search for truth. It brings to light new knowledge or corrects previous errors and misconceptions and adds in an orderly way to the existing body of knowledge. The knowledge obtained by research is scientific and objective and is a matter of rational understanding, common verification and experience.

It is a deliberate effort to collect information, to sift it, to analyze it, to put it together and to evaluate it. It works with a high degree of organization on a rather well-defined problem and pursues it hopefully to a successful conclusion. It is a careful search for solutions to the problems that plague and puzzle the mankind.

P.M. Cook—Research is an honest, exhaustive, intelligent searching for facts and their meanings or implications with reference to a given problem. It is the process of arriving at dependable solutions to problems through the planned and systematic collection, analysis and interpretation of data. The best research is that which is reliable, verifiable and exhaustive so that it provides information in which we have confidence.

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

C.C. Crawford—Research is a systematic and refined technique of thinking, employing specialized tools, instruments and procedures in order to obtain a more adequate solution of a problem than would be possible under ordinary means. It starts with a problem, collects data or facts, analyses them critically and reaches decisions based on the actual evidence.

Travers—Educational research is that activity which is directed towards development of a science of behavior in educational institutions. The ultimate aim of such a science is to provide knowledge that will permit the educator to achieve his goals by the most effective methods.

J. Francis Rummel—Research is an endeavor to discover, develop and verify knowledge. It is an intellectual process that has developed over hundreds of years, ever changing in purpose and form and always searching for truth.

Clifford Woody—Research is a careful inquiry or examination in seeking facts or principles, a diligent investigation to ascertain something.

R.M. Hutchins—Research in the sense of the development, elaboration and refinement of principles together with the collection and use of empirical materials to aid in these processes, is one of the highest activities of a university and one in which all its professors should be engaged.

Rusk—Research is a point of view, an attitude of inquiry or a frame of mind. It asks questions which have hitherto not been asked and it seeks to answer them by following a fairly definite procedure. It is not a mere theorizing, but rather an attempt to elicit facts and to face them once they have been assembled.

Research is likewise not an attempt to bolster up preconceived opinions, and it implies a readiness to accept the conclusions to which an inquiry leads, no matter how unwelcome they may prove.

When successful, research adds to the scientific knowledge of the subject.

George G. Mouly—The systematic and scholarly application of the scientific method, interpreted in its broadest sense, to the solution of educational problems; conversely, any

systematic study designed to promote the development of education as a science can be considered educational research.

W.S. Monroe—Research maybe defined as a method of studying problems whose solutions are to be desired partly or wholly from facts. The facts dealt with in research may be statements of opinions, historical facts, those contained in records and reports, the results of tests, answers to questionnaires, experimental data of any sort, and so forth. The final purpose of educational research is to ascertain principles and develop procedures for use in the field of education; therefore, it should conclude by formulating principles or procedures. The mere collection and tabulation of facts is not enough, though it may be preliminary to it or even a part there of.

Human knowledge works at two levels. At the primary level it functions as the basis of useful human activities, as when a teacher solves mathematical problems for the students or as when a doctor uses his knowledge to cure diseases. At the secondary level, knowledge is employed to obtain increments in the existing knowledge. The activity that produces this new knowledge is known as research. All research is an advance on existing frontiers of knowledge. It takes us beyond the frontiers of present knowledge. Both breaking fresh ground and improving existing knowledge are the proper functions of research.

Research adds to the existing knowledge in an orderly way. This orderliness is to be particularly emphasized. Mere aimless and confused groping for new knowledge does not stands for research.

The knowledge, which accrues from research, is verified and is verifiable by anybody who may like to do so. The process by which it has been derived is replicable i.e. it can be repeated and the stated results confirmed. It is objective and capable of 'third party' verification.

Research has proved to be an essential and powerful tool in leading man towards progress. Without systematic research, and its application, there would have been very little progress.

"The secret of our cultural development has been research, pushing back the areas of ignorance by discovering new truths, which, in turn, lead to better ways of doing things and better products".

All significant research leads to progress in one field of life or the other. Every, other day new ways of doing things enter into our lives. All of these and many more are the fruits and rewards of our research effort. Research shows us the way in our difficulties. It opens new avenues and provides to us better alternatives. The gifts of research are exceedingly evident in the form of cures for diseases considered earlier as incurable, machines capable to replace man, green revolution, taming of rivers, sophisticated methods and techniques for every profession, scientific understanding of human behavior, knowledge explosion and so on.

John, Best and James V. Kahn (1992)	*Research in Education,* 6th ed. New Delhi, Prentice Hall of India (Pvt.) Ltd. Pp. 17–20.	1.5

WHAT IS RESEARCH?

How is research related to scientific method? The terms research and scientific method are sometimes used synonymously in educational discussions. Although it is true that the terms have some common elements of meaning a distinction is helpful.

For the purposes of this discussion, research is considered to he the more formal, systematic, and intensive process of carrying on a scientific method of analysis. Scientific method in problem solving may he an informal application of problem identification, hypothesis formulation observation, analysis, and conclusion. You could reach a conclusion *why* your car wouldn't start or why a fire occurred in an unoccupied house by employing a scientific method, but the processes involved probably would not be as structured as those of research. Research is a more systematic activity that is directed toward discovery and the development of an organized body of knowledge. Research may he defined as the systematic and objective and recording of controlled observation that may lead to the development of generalization principles or theories resulting in prediction and possibility ultimate control of events.

Because definitions of this sort are rather abstract, a summary of some of the characteristics of research may help no clarify its spirit and meaning.

1. Research is directed toward the solution of a problem. The ultimate goal is to discover cause-and-effect relationships between variables, though researchers often have to settle for the useful discovery of a systematic relationship because the evidence for a cause-and-effect relationship is insufficient.
2. Research emphasizes the development of generalizations, principles or theories that will be helpful in predicting future occurrences. Research usually goes beyond the specific objects, groups, or situations investigated and infers characteristics of a target population from the sample observed. Research is more than information retrieval, the simple gathering of information. Although many school research departments gather and tabulate statistical information that may be useful in decision-making, these activities are not properly termed research.
3. Research is based upon observable experience or empirical evidence. Certain interesting questions do not lend themselves to research procedures because they cannot he observed. Research rejects revelation and dogma as methods of establishing knowledge and accepts only what can be verified by observation.
4. Research demands accurate observation and description. Researchers use quantitative measuring devices, the most precise form of description. When this is not possible or appropriate, they use qualitative or non-quantitative descriptions of their observations. They select or devise valid data-gathering procedures and, when feasible, employ mechanical electronic, or psychometric devices to refine observation description, and analysis of data.

5. Research involves gathering new data from primary or firsthand sources or using existing data for a new purpose. Teachers frequently assign a so-called research project that involves writing a paper dealing with the life of a prominent person. The students are expected to read a number of encyclopedias, books, or periodical references and to synthesize the information in a written report. This is not research, for the data are not new. Merely reorganizing or restating what is already known and has already been written, valuable as it maybe as a learning experience, is not research. It adds nothing to what is known.
6. Although research activity may at times be somewhat random and unsystematic, it is more often characterized by carefully designed procedures that apply rigorous analysis. Although trial and error are often involved, research is rarely a blind, shotgun investigation or an experiment just to see what happens.
7. Research requires expertise. The researcher knows what is already known, about the problem and how others have investigated it. He or she has searched the related literature carefully and is also thoroughly grounded in the terminology, concepts, and technical skills necessary to understand and analyze the data gathered.
8. Research strives to the objective and logical, applying every possible test to validate the procedures employed, the data collected, and the conclusions reached. The researcher attempts to eliminate personal bias. There is no attempt to' persuade or to prove an emotionally held conviction. The emphasis is on testing rather than on proving the hypothesis. Although absolute objectivity is as elusive as pure righteousness, the researcher tries to suppress bias and emotion in his or her analysis.
9. Research involves the quest for answers to unsolved problems. Pushing back the frontiers of ignorance is its goal, and originality is frequently the quality of a good research project. However, previous important studies are deliberately repeated, using identical or similar procedure%, with different subjects, different settings, and at a different time. This process is replication, a fusion of the words repetition and duplication. Replication is always desirable to confirm or to raise questions about the conclusions of a previous study.
10. Research is characterized by patient and unhurried activity. It is rarely spectacular, and researchers must expect disappointment and discouragement as they pursue the answers to difficult questions.
11. Research is carefully recorded and reported. Each important term is defined, limiting factors are recognized, procedures are described in detail, references are carefully documented results arc objectively recorded, and conclusions are presented with scholarly caution and restraint. The written report and accompanying data are made available to the scrutiny of' associates or other scholars. Any competent scholar will have the information necessary to analyze. evaluate, and even replicate the study.
12. Research sometimes requires courage. The history of science reveals that many important discoveries were made in spite of the opposition of political and religious authorities. The Polish scientist Copernicus (1473-1543) was condemned by Church authorities when he announced his conclusion concerning the nature of the solar system. His theory, in direct conflict with the older Ptolemaic theory, held that the sun, not the earth, was the center of the solar system. Copernicus angered

supporters of prevailing religious dogma, who viewed his theory as a denial of the story of creation as described in the book of Genesis. Modern researchers in such fields as genetics, sexual behavior, and even business practices have aroused violent criticism from those whose personal convictions; experiences, or observations were in conflict with some of the research conclusions.

The rigorous standards of scientific research are apparent from an examination of these characteristics. The research worker should be a scholarly, imaginative person of the highest integrity, who is willing to spend long hours painstakingly seeking truth. However, it must he recognized that researchers are human beings. The ideals that have been listed are probably never completely realized. Like righteousness, they are goals to strive for and are not all achieved by every researcher.

Many people have a superficial concept of research, picturing research workers as strange introverted individuals who, shunning the company of their fellows, find refuge in their laboratory. There, surrounded by test tubes, retorts, beakers, and other gadgets, they carry on their mysterious activities. In reality the picture is quite different. Research is not all mysterious, and it is carried on by thousands of quite normal individuals, more often in teams than alone, very often in the factory, the school, or the community, as well as in the laboratory. Its importance is attested to by the tremendous amounts of time, manpower, and money spent on research by industry, universities, government agencies, and the professions. The key to the cultural development of the Western world has been research, the reduction of areas of ignorance by discovering new truths, which in turn lead to better predictions, better ways of doing things, and new and better products. We recognize the fruits of research: better consumer products, better ways of preventing and treating disease, better ways of understanding the behavior of individuals and groups, and a better understanding of the world in which we live. In the field of education, we identify research with a better understanding of the individual and a better understanding of the teaching-learning process and the conditions under which it is most successfully carried on.

PURPOSES OF RESEARCH

Fundamental or Basic Research

To this point we have described research in its more formal aspects. Research has drawn its pattern and spirit from the physical sciences and has represented a rigorous, structured type of analysis. We have presented the goal of research as the development of theories by the discovery of broad generalizations or principles. We have employed careful sampling procedures in order to extend the findings beyond the group or situation studied. So far, our discussion has shown little concern for the application of the findings to actual problems in areas considered to be the concern of people.

S.P.S. Sukhia P.V.Mehroa R.N. Mehroa (1991)	*Elements of Educational Research,* 3rd ed. New Delhi, Allied Publishers Limited, pp. 1–6	1.6

RESEARCH IN EDUCATION: SIGNIFICANCE, NEED AND CHARACTERISTICS

Research and progress. Significance of and need for research in education. Educational research and scientific research their common characteristics. Special characteristics of educational research. Summing up.

Research has proved to be an essential and powerful tool in leading man towards progress. There would have been very little progress, as we find it today, without systematic research.

> "The secret of our cultural development has been research, Pushing back the areas of ignorance by discovering new truths, which, in turn, lead to better ways of doing things, and better products."
>
> "Research is a power of suspending judgment with patience, of meditating with pleasures, of asserting with caution, of correcting with readiness and of arranging thought with scrupulous pain. Francis Bacon.

All significant research leads to progress in some field of life or the other. Each year new products, new facts, new concepts and new ways of doing things 'come into our lives due to ever-increasing significant research in the physical, the biological, as well as the social and the psychological fields. Research activity is no longer confined to the science laboratory. Even as the manufacturers, the agricultural experts and the archaeologists carry on research in their respective spheres so also, the sociologists, anthropologists. economists and the educationists.

The goal of all research is progress and good life. In so far as good education is recognized as the basis of adequate individual and social development, need for research, in education to improve educational practices and policies are being realized increasingly. The educationists are constantly searching for more effective methods of instruction, more satisfactory techniques of evaluation, richer learning materials, more comfortable physical facilities, more efficient systems of administrative organization, and so on. This search is assuming greater urgency because of the very rapid expansion and democratization of education throughout .the world during the last few decades. Since the right of every individual to full development through education has been recognized everywhere, every country is aiming at providing universal education to its people in the shortest possible time. As a result a number of new educational problems, never imagined hitherto, have arisen, and many old problems in various educational fields have become

more complicated and acute. For a successful solution of the multitude of old and new problems, and for a full realization of the educational aims set up during the present times, it is realized that research work, adequate both in quantity and quality, should be carried out by properly trained research workers. The abstract quoted below brings home very effectively this very fact.

Article 26 (i) of the Universal Declaration of Human Rights states:

> "Everyone has the right to education. Education shall be free at least in the elementary and fundamental stages. Elementary education shall be compulsory, technical and professional education shall he made generally available and high education shall he equally accessible to all on the basis of men.
>
> "To realize this goal, the nations of the world will have greatly to expand their educational efforts: more facilities must, he provided: more' teachers must he trained: new curricula must be developed: and new teaching materials must he provided. It is inconceivable that this can be done efficiently, or indeed that it can be ever done at all, without detailed guidance from the facts collected and the principles established through educational research."

No amount of learning by trial and error, no amount of experience gathered through actual practices and no amount of wisdom collected in the form of casual observations, traditions or recommendations of groups of individuals can ever promise such rapid progress and improvement in education as is required all over the world today. Decisions based on systematic research in education would surely save time, money, energy and a lot of failure and frustration, and show us the path of progress.

"In many of its recommendations, the International Conference on Public Education has stressed the need for psycho-educational knowledge of the child as the starting point [for:] any educational activity. It has also shown that research formed an indispensable basis for any national organization of education, especially as regards curricula, syllabuses and methods as well as for financing education, for its planning, and for the building of schools.

Thus, it is not difficult to show that research in education is extremely necessary and very worthwhile. But to the question—what is educational research and what are its characteristics?' there may not be one agreed answer. It might be helpful to acquaint ourselves with some of the accepted connotations of the term educational research.

> "Research is considered to be' the more formal, systematic, intensive process of carrying on the scientific method of analysis. It involves a more systematic' structure of investigation, usually resulting in some sort of formal record of procedures and a report of results or conclusions."
>
> "Educational research is that activity which is directed towards development of a science of behavior in educational situations. The ultimate aim of such a science is to provide knowledge that will permit the educator to achieve his goals by the most effective methods."

“At least one general definition of research would be that which refers to the activity of collecting information in-an orderly and systematic fashion. Research is literally speaking a kind of human behavior, an activity in which people engage in education, teachers, administrators, scholars, or others engage in educational research when they systematically assemble information's about schools, school children, the social matrix in which a school system is determined, the characteristics of the learner or the interaction between the school and the pupils.

“By educational research is meant here the whole of the efforts carried out, by public or private bodies in order to improve educational methods and educational activity in general, whether involving scientific research at a high level or more model experiments concerning the school system and educational methods.

Definitions and interpretations of educational research, however, variously worded like the above, do all agree in their implication that educational research involves an application of the main principles of scientific research to the solution of educational problems. As such, much of what is considered educational research would be classified as 'development, demonstration or operations research' since it “works day in and day out to help the teacher or principals or agencies in authority over school system.”

Education, like Medicine, is an applied science. So research in Education, like research in Medicine, is mostly applied research.

> “The primary function of research in education as in medicine is to find improvements for education or medicine both to be understood as fields of human actions, not as fields of knowledge.”

But, educational research may be, basic too. It is basic or fundamental when it is not concerned so much with day-to-clay matters and specific phenomena and problems as with the solution of fundamental problems, and when it results in broad generalizations or principles and theories of education. Discovery of such useful concepts as those of motivation, reinforcement, concept formation and social environment in learning are a result of fundamental (or backroom research) educational research.

A very significant trend in educational research in the recent years has been the involvement of practitioners of education in research work. Traditionally, it has been considered that educational research is the province of the well-trained research expert. It has been believed that those who are expected to practice or apply the research findings cannot be expected to the sufficiently objective. But, now the approach of action research emphasize; encouraging the' practitioner— schoolteachers, administrators and others–to do research in order to improve him or herself. The objective of the research by teachers, for example, will be to improve classroom practices.

“A useful definition of action research is the research a person conducts in order to enable him to achieve his purposes more effectively. A teacher conducts action research to improve his own teaching. A school administrator conducts action research to improve his administrative behavior,”

A good teacher normally takes decisions about his work on the basis of tradition, or recommendation of experts or experience of others, or his own experience guided by common-sense. Action research is a step ahead of the common-sense approach. The difference between the two is mainly of degree of refinement and discipline in the various steps for taking .a decision. In action research, the teacher is deliberately more scientific and careful in diagnosing the problem, in collecting facts, in designing hypotheses in experiments with tentative practices and actions, and in evaluating results of the actions taken. At every stage, however, he tries to keep the experimental approach towards problem-solving in close touch with reality.

Action research may be individual or co-operative. When many people are concerned about a problem, or when the experiment is likely to affect many people, the- research could directly involve all these people. It then becomes co-operative action research.

It is a well-known fact that much of the research work done by professional students of educational research is not noticed by the workers in the actual field of education. Even when some research is fully reported and is in point, not many consciously benefit by it. The advantages of action research vis-à-vis improvement in educational practices are very many.

> "He (the practitioner) does not read about these practices, he engages in them. And lie learns what lie does, placing an exaggerated value on what may happen as a consequence of publishing traditional research studies of educational problems in one of the occupational diseases of pedagogues, who are strongly disposed to over-estimate the extent to which reading will change behaviour."

There are many high-level educationists who lament this current concentration of interest in the practical problems. They worry that even in those rare instances where a research worker succeeds in resisting the allurements of applied research, it is found that ultimately utilitarian consideration infiltrate the high-level investigations and pollute the spirit of pure research. According to this school of thought, the willful neglect of research in pure theory:

> ".. is symptomatic of the pragmatic drive that compels the present day world to seek and obtain quick results in every field of human endeavor irrespective of their intrinsic value. These drives are the hall-mark of the technician and the technologists, and not of the creative thinker."

S.P.S. Sukhia P.V.Mehroa R.N. Mehroa (1991)	*Elements of Educational Research,* 3rd ed. New Delhi, Allied Publishers Limited, pp. 7–15	1.7

RESEARCH IN EDUCATION

Educational field has a large number of problems at various levels. They can engage both the highly trained professional research student and the ordinary practitioner in both the basic and the applied investigate tins. Educational research may be looked at in two ways, viz. according to the objects that are investigated and according to our aims. There are two important classes of objects studied by educational researchers:

1. Individuals, e.g., pupils, teachers, researchers; administrators;
2. Organizations, e.g., class-room, school; society; state. There are two important aims of research involved in studying these objects:
    i. Improving services.
    ii. Increasing knowledge.

The process of action research has the following aspects:

1. Self-dissatisfaction: The researcher is dissatisfied and perturbed with the way things are happening in his field of work.
2. Confidence: Yet, he has the confidence that improvement can be brought about.
3. Specifies the dissatisfaction: .He is then able to pinpoint the problems, which are causing his dissatisfaction.
4. Defines the problem: This then enables him to define his problems.
5. Diagnosis: He then locates the weaknesses, which cause the problem.
6. Search for more promising practice.
7. Design the testing of the hypothesis. Based on (1).
8. The action hypothesis.

Thus, as a result of research, there may be an improvement in teaching, administration or human relations, or an increase in comparative, developmental, historical knowledge and its philosophical, sociological or psychological foundations.

“Among the advantages claimed for action' research as a method of bringing about change are these:

a. The person who must improve if the problem is to be solved I,-, active' in The change process from the beginning.
b. Facts and evidence are stressed, which keep the change process anchored more c6ntinuously to reality.
c. The approach is experimental and tentative rather than dogmatic.
d. An integral part of action research is 'the experiment' which actually is change-evaluated.
e. Action research emphasizes a desirable decentralization of decision making and action.”

Whether educational research be of the basic or the applied type, it shares some of the main characteristics of scientific research. They may be analyzed as below:

1. Research is highly purposive. It deals with problems to be solved.

2. Research is expert, systematic and accurate investigation. Data are gathered, recorded and analyzed with as complete accuracy as possible.
3. Research usually involves, as a step, a hypothesis or a set of hypotheses concerning the explanation of a phenomenon or the solution of a problem.
4. Research collects facts, i.e. gathers new knowledge or data from primary or firsthand sources.
5. Research is logical and objective. The data gathered and procedures employed are verified at each step. Emphasis is always on testing rather than proving the hypothesis through close observation and/or accurate experiment.
6. Research endeavors to organize data in quantitative terms as far as possible, and to express them in numerical measures. Even otherwise, research is carefully recorded and reported. Every term is carefully defined; all procedures are described in detail; all limiting factors are fully recognized; all references are carefully documented and all results are objectively recorded.
7. Research places emphasis upon the discovery of general principles and scientific generalizations that can be applied to the solution of a wide range of problems.
8. Research is patient and unhurried and required great courage and persistence. The researcher is willing to follow his procedure to conclusions that may be unpopular and may bring social disapproval. The research worker must be not only a scholarly and imaginative person but also of -the highest integrity, willing to spend long hours, painstakingly, in search of truth and must have courage to express his findings without being influenced by any extraneous considerations.

The rigorous standards of scientific research are evident from an examination of the above characteristics. Educational research, however, cannot always be viewed as strictly scientific, i.e. empirical, inductive and exact. Educational Research acquires, because of the nature of the material handled, a few special features characteristic of all systematic, social and mental studies. They may be analyzed as below:

1. A sound philosophy of education must form the basis of evaluating any principles and activities of educational research. By reason of the social nature of education, most of the problems are highly complex and its philosophical nature demands that in the solution we must reckon with ultimate values.
2. Educational research deals with the problems of motivation and ethics which admit of varied interpretations and assumptions on the part of the investigator as well as the subjects. The educational researcher, therefore, needs imagination and insight as much as a scientific attitude of mind.
3. The educational arena is inter-disciplinary and an educational problem can require the characteristic of several disciplines—Psychology, Sociology, History, Economics, Anthropology and Political Science, etc.
4. Much of educational research which deals with historical, philosophical or comparative data involves a good deal of subjective interpretation and deductive reasoning.
5. Social or behavioral sciences like Sociology, Economics and Psychology have not achieved the degree of specification possible in the physical sciences. The method of interview, for example commonly employed by these sciences still combines art and science.

6. Almost all problems of educators are sociological problems. Social problems present an increasingly large range of variables and a multitude of causes brings about a certain result. Difficulties of manipulating and controlling all the variables outside the laboratory put limits on the exactness and precision of results arrived at in Social or Psychological experimentation.
7. Most educational experiments do not require very costly apparatus, but (a) paper and pencil (b) human material—children, (c) some mathematical equipment—knowledge of ' elementary Statistics, (d) library facilities and (e) facilities for publishing research papers.
8. Educational research is not the field of the specialist only. "Any teacher with common sense, intelligence and insight can undertake research in a problem. In the beginning such workers may require some guidance and training but this can be made easily available to them at the hand of experts.

The significance and characteristics of educational research, as discussed above, can be easily summed up in the following words of C. N. Patwardhan:

> "Progress depending on experience, it is rightly observed, is accidental and slow, whereas research seeks to settle the question here and now and avails itself of experiment rather than experience. Moreover, research further analyses 'experience' and tries to synthesize 'tradition' and abstract forms like 'good teaching', 'creative activity', etc., in a scientific process, the contents and results of which can be used verified and accepted or corrected, if necessary, by others."

In the words of Principal Lahiri:

> "Research economics effort, prevents wastages, increases efficiency and reacts vitalize and dignify the work of the teacher.

Undoubtedly, significant educational research must, by its very nature develop a faith in new methods, result in improved educational practices; provide" a vision for a better future and promote policies and plans that shall lead to progress.

It may be underlined that a research without a strong base of clear-cut theory does not lead to any sound results. Systematic knowledge has to be based on broad foundations; otherwise, the insights of education are limited to narrow specific settings. A sound "theory increases the fruit fullness of research by providing significant leads for inquiry, by relating seemingly discrete findings by means, of similar underlying processes, by providing an explanation of observed relationships. The more research is directed by systematic theory the more likely are its results to contribute directly to the development and further organization of knowledge.

> "The relation of theory and research is one of mutual contribution. Theory can point to areas in which research is likely to be fruitful, can summarize the findings of a number of specific studies, and can provide a basis for explanation and prediction. Research findings, on the other hand, can test theories which have been worked out, can clarify theoretical concept and can suggest new theoretical formulations or extend old ones. Moreover, the process of reciprocal contributions

is a continuing one; research stimulated by theoretical considerations may raise new theoretical issues, which in turn lead to further research and so on…

To conduct research without theoretical interpretation or to theorize without research is to ignore the essential function of theory as a tool for achieving economy of thought.

Summary

1. Research is as indispensable for progress in education as it is for progress in any other field of life.
2. The need for research in education has increased with the changing ideas and the rapid expansion and democratization of education all over the world.
3. Educational research is the application of the principles and methods of scientific research for the solution of problems in the field of education.
4. Educational research is more often applied than fundamental. Involvement of the practitioner in what is known as action research has been emphasized for some time.
5. The characteristics of educational research common with those of scientific research are:
    i. It is highly purposive.
    ii. It is expert, systematic and accurate.
    iii. It involves the formulation and testing of hypotheses.
    iv. It gathers new knowledge or data.
    v. It is logical and objective.
    vi. It organizes data in quantitative terms and records and reports the studies carefully.
    vii. It emphasizes the discovery of general principles.
    viii. It is patient and unhurried and requires a man of integrity, Imagination and scholarship.
6. The characteristics of educational research common with those of social, behavioral and mental studies are:
    i. It reckons with ultimate values and ethics and needs a sound philosophy and commonsense.
    ii. It needs imagination and insight as much as a scientific attitude of mind.
    iii. It is interdisciplinary and requires the help of other sciences.
    iv. It uses speculative and deductive methods to a great extent.
    v. Its procedures are not absolutely exact.
    vi. The results are not precise due to the difficulty of controlling a wide range of variables.
    vii. It does not usually require costly apparatus.
    viii. It is not the field of the specialist only.
7. Indian educationists have well realized and expressed the need and significance of educational research.

Question and Problems

1. Why is research in the field of education necessary? How does educational research help in the advancement 'of education? Illustrate your answer with examples.
2. "The mere reporting, defining, and stating amassing of facts, even in numerical form is in itself not educational research". (Eric Hylla). Elaborate upon this idea with reference to the functions and uses of educational research.
3. "Educational research should not be viewed only as scientific research which is empirical, inductive and exact." (Eric Hylla). Discuss this statement in the light of the special characteristics of educational research.
4. What do you understand by the term 'sciences of the human mind'? Would you consider educational research in the fields of the philosophy of education, the history of education, and comparative education more in the nature of scientific research or of search in 'the sciences of the human mind'? Why?

Selected References

Best, J. W. Research in Education, U. S. A.: Prentice-Hall Inc. Englewood Cliffs, 1959, pp. 322.

Corey, S.M., Action Research to Improve School Practices, New York: Teachers College, Columbia University, 1953.

Corey, S.M., Research in Education, New Delhi, National Council of Educational Research and Training, 1962.

Cornell. Francis G., Report of the First International Conference on Educational Research, Educational Studies and Documents, No. XX. Paris: UNESCO, 1956.

Good, Carter, V., Introduction to Educational Research. New York: Appletion Century Crofts, 1959.

Good, Carter. V., A. S. Barr and Douglas E. Scates, Methodology of Educational Research, New York: Appleton century Crofts, Inc., 1935, pp. 890

Hillway, Tyrus, Introduction to Research, Boston; Houghton Miffin Co., 1958, 284 pp.

Hylla, Eric. "The Nature and Function of Educational Research." Report of the First International Conference on Educational research, Educational Studies and Documents, No. XX. Paris: UNESCO, 1956.

International Bureau of Education, The Organisation of Educational Research; UNESCO, Paris, Publication, No. 228, 1 l2pp.

Karnat, V. V., “Can a Teacher do Research?” Teaching. Vol. XXX. No. 1, Sept. 1957.

Lahiri J.,” Research and Experiments in Education in India,” Educational India, Vol. XXV. No.5, Nov. 1957. pp.148–155.

Lazarsfeld, P.F. and Sam D. Sieber, Organizing Educational Research; Englewood Cliffs, Prentice-Hall. 1964, 112 pp.

NCERT. Research in Education, New Delhi, 162, 84p.

Patwardhan, C,N. “Educational Research-the Principles and Procedure”, The Progress of Education, Vol. XXIX, No. 2, 3, 4, 5, 6.

Rusk, Robert R., Research in Education: An Introduction. London: University of London Press Ltd., 1932.

Shah, Madhuri, “Improving Instruction by Research; A Challenge”, Teaching, Vol. XXX, No.1.

Travers, Robert M.W., An Introduction to Educational Research. New York; Macmillan and Co., 1958. 466pp.

Zahoda, M., et. Al; Research Methods in Social Relations, Methuen & Co., London, Revised ed. 1967.

BIBLIOGRAPHY

Best, J. W. & Kahn, J. V. (1992). *Research in Education* (6th Ed.), New Delhi: Prentice Hall of India Private Limited.

Sidhu, K. S. (1987). *Methodology of Research in Education* (2nd Ed.), New Delhi: Sterling Publishers Private Limited.

Sukhira, S. P., Mehrotra, P.V. & Mehrotra, R. N. (1991). *Elements of Educational Research* 3rd Ed.), New Delhi: allied Publishers Limited.

Unit–2

TYPES OF RESEARCH

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CONTENTS

Page #

INTRODUCTION

Educational research is classified into Basic research Applied research and Action research. The basic and applied researches are differentiated by their purposes. The primary purpose of basic research is the extension of knowledge whereas the purpose of applied research is the solution of an immediate, practical problem.

However, some misconceptions have developed with the use of the terms basic and applied research. One such misconception is that basic research is complex and applied research is simple in its methodology. A related misconception is that applied research is often sloppy and haphazard but of great practical value, whereas basic research is precise and exacting but of no use in a real situation.

Likewise, one type of applied research is action research. Action research is usually conducted by teachers and administrators for solving a specific problem or for providing information for decision making at the local level.

Effort has been made in this unit to highlight the actual role played by basic research, applied research and action research with their characteristics.

OBJECTIVES

After studying the unit, it is hoped that the student will be able to:

1. explain the nature and concept of basic research;
2. describe the characteristics of basic research;
3. discuss the nature a scope of applied research;
4. differentiate applied research from basic research;
5. explain the nature, need and scope of action research;
6. specify different aspects of the process of action research;
7. identify the limitations of action research.

CLASSIFICATION OF EDUCATIONAL RESEARCH BY PURPOSE

2.1 Basic Research

This type of research is also regarded as fundamental/pure research. It builds up broad generalizations, principles and theories of education. It results in the discovery of useful concepts such as those of motivation, reinforcement, concept formation etc. It is not concerned with day to day problems.

The basic research has the following characteristics.

1. It aims at developing educational theories and principles that will be applicable to a broad population.
2. It requires expert training.
3. It makes use of a wide range of methods to locate the research problem.
4. Highly specific hypothesis are developed.
5. It involves careful attention so that error is reduced to the minimum.
6. It calls for a complex analysis of data.
7. The generalizations usually remain confined to books and research reports.

William Wiersma (1986, P.13) has very rightly stated that a sound theory increases the fruitfulness of research by providing significant leads for inquiry, by relating seemingly discrete findings by means of similar underlying processes and by providing an explanation of observed relationship.

However, this research is done by the outstanding experts with the help of desired facilities. It demands higher level of problems, procedures, tools, controls, analysis etc. It is expected to be more expert as it has far reaching consequences.

J.C. Aggarwal (1991, pp. 25-37) has discuss the classification of research in the below mentioned book. Please read for full comprehension.

J. C. Aggarwal, (1991)	*Educational Research: An Introduction;* New Delhi, Arya Book Depot, pp. 25–37	2.1

2.2 Applied Research

This type of research is also called functional research. Education like Medicine is an applied science. Walter R. Borg (1987,P.11) has stated, "The primary function of research in education as in medicine--is to find improvements for education or medicine both to be understood as fields of human actions, not as fields of knowledge."

Applied research does not aims at solving the practical problems which are faced by the teachers, educational planners, administrators, curriculum specialists etc. Applied research deals with problems of practical value. Applied research is less rigorous than the basic research.

Applied research involves both the classroom teacher and the research specialist. The comparison of applied versus basic research is discussed as under:

It is argued that in a country having limited resources, research should be given a practical orientation. Researches that do not shave apparent relevance to the solution of practical problems are considered an unnecessary luxury. The contrary point of view asserts that in the absence of sound analytical concepts there are obvious limitations to the extent to which applied research is possible. Not only will the lack of conceptual refinement improvise analysis and limit methodological sophistication, it will also result in a constricted perception of cause and effect relationships.

Unless applied research is taken to mean the publication of facts through simplistic tables of percentages and averages, a job which can be done on the existing capital of the social sciences in Pakistan, there is no gainsaying the fact that basic research is an essential base for the development of applied research. Apart from the fact that basic research does not have application as its immediate goal, the two are deeply interrelated, particularly in the case of the social sciences whose concepts and theories derive from the analysis of social reality as an on-going process. A research designed to diagnose social reality and to introduce correctives for the achievement of goals uses a theoretical base no less than it helps enrich it.

Thus, the difference between basic and applied research is not as sharp as that between the applied and theoretical social scientist. To illustrate, survey research can be taken as an example of 'pure' applied research. However, a few survey researches do not lend themselves to generalizations germane to theory building. Whether such attempts are actually made depends upon the training and professional orientation of the researcher. In such areas of organizational performance, intergroup conflicts or the administration of and response to social change, the opportunities for testing hypothesis and for theory building are enormous. Perhaps the seriousness with which the distinction between theoretical and applied research is made will be lost as more and more Pakistanis social scientists acquire components in quantitative research methodology. Both basic and applied research have an important part in the development of the social sciences and must be supported.

However, it would be of great interest to quote what William Wiersma (186, p13) has stated regarding basic and applied research, “The relation of theory and research is one of mutual contribution. Theory can point to areas in which research is likely to be fruitful, can summarize the findings of a number of specific studies, and can provide a basis for explanation and prediction. Research findings, on the other hand, can test theories which have been worked out, can clarify theoretical concepts and can suggest new theoretical formulations or extend old ones. Moreover, the process of reciprocal contributions is a continuing, one, research stimulated by theoretical considerations may raise new theoretical issues, which in turn lead to further research and so on,... To conduct research without theoretical interpretation or to theorize without research is to ignore the essential function of theory as a tool for achieving economy of thought.

2.3 Action Research

The process by which practitioners attempt to study their problems scientifically in order to guide, correct and evaluate their decisions and actions is called action research.

There is no doubt that research work done by professional students of educational research is seldom noticed by the workers in the actual field of action. Now it is increasingly being realized that the practitioners of education must be involved in research work. Action research is a step ahead of common sense approach. A good teacher does not merely depend upon tradition, or experience of others or recommendations of expert bodies. In action research he is deliberately more systematic and scientific in dealing with the problem.

A useful definition of 'Action Research' is the research a person conducts in order to enable him to achieve his purposes more effectively. A teacher conducts action research to improve his own teaching. A school administrator conducts action research to improve his administrative behaviour.

Some people differentiate action research from applied research in as much as the former is confined to classroom situations and the latter probes into practical problems of greater complexity and wider applicability.

There are eight aspects of the process of action research. These include the following:

1. Self-dissatisfaction. The teacher feels dissatisfied with the situation.
2. Identification of the problem. The teacher pinpoints the problem.
3. Defining the problem. After identifying the problem, the teacher defines the problem.
4. Problem analysis. The teacher then locates the causes of the weakness.
5. Action hypothesis. Action hypothesis is formed.
6. Use of tools. The teacher decides about the research tools to be used.
7. Action programme. The teacher works out the experiment.
8. Evaluation. The teacher finds out the difference in the result.

Moreover, the Action Research has the following advantages.

1. The person must improve if the problem is to be solved is active in, the changed process from the beginning.
2. Facts and evidences are stressed which keep the changed process anchored more continuously to reality. The approach is experimental and tentative rather than dogmatic.
4. An integral part of action research is the experiment which actually is changed-evaluated.
5. Action research emphasizes a desirable decentralization of decision making and action.

The main functions of action research in the field of distance education are:

1. Action research will powerfully and rapidly develop the technique of teaching.
2. Action research assists in vitalizing and dignifying the work of the teacher.

3. Action research assists in developing professional experiences, open-eyed and open-minded scientific spirit enquiry.
4. Action research assists in creating new interest and new confidence in the ability of the individual teacher.

Sources of problems for Action Research are given below:
The first important source for locating and electing problems for an experiment or project or research is the classroom itself. For example a teacher who finds that the performance of the students in mathematics in his class is poor. He may think that perhaps it is because of his method of teaching which is not helpful in developing mathematical abilities or it is because the students are not making use of the instructional material or it is because the students 'of the class lack speed of calculations.

The second source for identifying problems for an experiment or research is the staff meeting of the school.

The third source is the chairman of department or regional director who can suggest students problems for enhancing the classroom efficiency.

The institution library seems to be an important source for locating problems for research. Sometimes the ministry of education or some national agencies dealing with education throw out some new problems for experimenting in the institution, e.g. a department may conduct an experiment to see whether the suggestive activities in the new syllabus are effective to achieve the desired outcomes.

However, Action Research has the following drawbacks:
1. Action research is relatively of poor quality.
2. The applicability of the findings of action research to another school in the event of teacher transfer is questionable.
3. The classroom teacher does not have enough time to conduct action research.

For further details, please read the following material.

John W. Best James V. Kahn (1992)	*Research in Education*, 6th ed. New Delhi, Prentice-Hall of India Private Limited, pp. 20–22	2.2

2.4 Activities
Please prepare a chart of classification of educational research by purpose.

Discuss the effectiveness of applied and basic research with any educationist and write a summary of your discussion.

2.5 Exercises

Hopefully, you have studied the material, now please answer the following questions.

Q. 1 Define basic research, applied research and action research. Give example to bring out the differences.

Q. 2 Why action research is sometimes called on the job research? Suggest a few situations related to on- the-job research.

Q. 3 "Action research places its emphasis on a problem". Discuss.

Q. 4 "Researchers that do not have apparent relevance to the solution of practical problems are considered an unnecessary luxury." Discuss the statement and bring out the necessity of both applied and basic research.

Q. 5 Elucidate the process of action research with suitable examples.

Q. 6 "The objective of research by teachers will be to improve classroom practices". Explain the statement.

Q. 7 "Action research is a step ahead of the common sense approach". Discuss.

Q. 8 "Action research is the job of specialist only". Explain.

Q. 9 State the need, scope merit and limitations of action research.

Q.10 Bring out clearly the need for action research in education.

Q.11 What is the scope of "action research' in education?

Q.12 Describe the role of teachers in educational research.

Q.13 In what way action research is helpful to the classroom teacher?

Q.14 "Educational research is not the field of the specialist only." How far do you agree with this view?

2.6 Introduction

Research in every field and more so in the field of education is demand of day. Progress in any field is directly linked with research in that field. Our problems and difficulties in the field of education further necessitate a purposeful and 3ined research effort.

Such research efforts are distinguished on the basis of their different purposes and approaches and that is what may technically be called difference in methods. Likewise, research studies, adopting different methods, however, do not as a rule, differ significantly in their procedures, selection, formulation, collection, analysis and interpretation of new data and reporting of the work done are common steps to all types of methods of research.

These types of research are classified as (1) historical research (documentary) descriptive research (normative) (3) quasi experimental research (4) qualitative research.

When classified in the above manner, there is not much developing or confusion among the different methods. They are neither mysterious nor unduly complex. Basically they are simple and founded on common sense.
Keeping in view the importance of each research method, effort has been made to discuss in detail the concept, scope and characteristics of various methods research in the unit.

2.7 Objectives

After studying the unit, if is hoped that the student will be able to:

1. discuss the classification of research methods;
2. explain the historical research method;
3. describe the descriptive research;
4. specify the quasi experimental research;
5. evaluate the qualitative research.

2.8 Historical Research

The use of historical sources and techniques in the field of educational research is known as historical research method. Historical research justifies itself when used to find out the solutions of the present day problems on the basis of the experiences of the past.
However, the value of historical research in education is given as under:

1. It inspires respect for sound scholarship and reverence for great teachers.
2. The history of education enables the educational worker to detect fads and frills.
3. The history of education enables the educational worker to present educational problems in the light of their origin and growth.
4. Past educational experiences my serve as a basis for tentative generalizations in analyzing current educational issues and problem

Historical research has certain characteristics which are given below:

1. It is based on reports of observations which cannot be repeated.
2. It is liable to be subjective.
3. In history, rational process of analysis and inference is verbalized.
4. Science predicts the future course of events, and history uses preserve evidence to retrodict the past.

There are three main-steps involved in historical research. These include:

1. The collection of data through primary and secondary sources;
2. It involves internal and external criticism of the data collected;
3. Presentation of facts which involves problems of organization composition, exposition and interpretation.

In collecting data of historical research, the sources are normally classified into two main categories - primary sources and secondary sources.

Primary sources are those original documents which are the first witnesses a tact. However, some include information in-the form of oral or written testimonial or the records written or preserved by actual participants or witnesses of an event. For example, charters, official records, constitutions, court decisions, autobiographies, diaries, letters, pictures, films, paintings, books and recordings etc. Other primary sources include remains or relics, tools, weapons, house-hold articles, cloths etc.

Secondary sources-are sources of information transmitted by one who was not present on the scene of the original event. He was neither a participant nor an eye witnesses of the original event. In fact, information supplied is second hand. Most of the encyclopedias and history text books come under the category of secondary sources. The secondary sources sometimes prove very helpful as they provide information about primary sources. Moreover, the historical report writing involve the, mechanical problem of documentation, the logical problem of selecting the topics, the logical problem of arrangement of topics and sub-topics, and the philosophical problem of interpretation.

However, the following guidelines should be observed in historical research.

1. The primary sources should be used as extensively as possible.
2. Personal bias should not be allowed to influence research procedure.
3. Proper recognition should be given to the inter-relationship of education with other social institutions and forces.
4. The significant facts must be distinguished from trivial or range facts in a situation.
5. The facts should be synthesized and integrated into meaningful generalizations.
6. Care should be taken in interpreting the words and expressions in the light of their usage in earlier times.

However, the scope of historical research may be mentioned in the areas of biography, history of institutions and organizations, development of ideas through the ages, sources and influences, legal bases of education and bibliographical studies.

In order to fully comprehend the idea of historical research, please read book as mentioned below:

John W. Best James V. Kahn (1992)	*Research in Education*, 6th ed. New Delhi, Prentice-Hall of India Private Limited, pp. 57–75.	2.3

2.9 Descriptive Research

This type of research is also called normative, survey research. It concerns itself with the present phenomena in terms of conditions, practices, beliefs, process, relationships or trends is variously termed as descriptive survey - status, normative or trend study or survey.

Descriptive research has the following characteristics.

1. It is concerned not with the characteristics, of individuals but with characteristics of the whole population or a sample thereof.
2. It collects data from a relatively large number of subjects
3. It provides information useful to the solution of local problems.
4. Its scope is very vast.
5. Surveys may be qualitative of quantitative.
6. Descriptions may be' either verbal or expressed in mathematical terms.

In solving a problem one has to evaluate the present conditions and then seek information concerning ‘what we may want’ and ‘how to reach there’. Normative-a survey research may involve one of more of these elements in different situations.

This type of research helps in locating existing problems, in securing historical perspective through a series of cross-sectional pictures' of similar conditions at different timed, in suggesting the course of future developments, in developing many tools, in contributing to the advancement of knowledge and in providing the background ideas and data from-which many more studies may be conducted.

Such studies are factual and hence supply practical information.

These researches employ application of a scientific method by critically analysing and examining the source materials, by analysing, interpreting data and by arriving at generalizations and predictions.

Descriptive research is classified into the categories such as survey studies, case studies, developmental studies, follow-up studies, correlational studies, trend analysis and documentary analysis.

In the system of distance education, this-type of research is quite useful as it helps in making surveys concerning aims, outcomes of instructional programmes, survey concerning administrative problems of procedures. Moreover, institution appraisal,

financial study, building survey, staff development training survey and teacher training surveys can be conducted by this research method. However, in planning such surveys, the following stages are involved in the planning and the preparation of the final report.

i) Statement of general objectives.
ii) Statement of specific objectives.
iii) Determination of the size and design of the sample.
iv) Preparation and administering of a questionnaire.
v) Determining and conducting interviews.
vi) Making analysis plans.
vii) Machine tabulation.
viii) Analysing.
ix) Reporting

For further details, please read the below mentioned book.

John W. Best James V. Kahn (1992)	*Research in Education*, 6th ed. New Delhi, Prentice-Hall of India Private Limited, pp. 76–109.	2.4

2.10 Experimental Research

J.W. Best (1992, P.110) describes experimental research as the description and analysis of what will be or what will occur, under carefully controlled conditions.

According to carter V. Good, and Douglas E. Scates (1954, P.809) "Experimentation is the name given to the type of educational research in which the investigator controls the educative factors to which a child or group of children is subjected during the period of inquiry, and observes the resulting achievements."

S.P. Sukhia, P.V. Mehrotra and R.N. Mehrotra (1991, P.227) describe the experimental method as the application and adaptation of the classical method of the science laboratory. It is most exacting and difficult of all methods and also the most important from the strictly scientific point of view.

The essence of an experiment may be described as observing the effect on a dependent variable of the manipulation of an independent variable. However, the experimentation in education is useful to determine and evaluate the adequacy and effectiveness of educational aims and objectives through the measurement of outcomes. It serves as basis for the formulation, execution and modification of educational policies and programmes. It is further used to ascertain the effects of any change in the normal educational programmes and practice.

An experiment calls for the satisfaction of three basic interrelated conditions i.e. Control, Randomization and Replication.

1. Control is the basic element in experimentation. The influence of extraneous factors that are not included in the hypothesis are prevented from operating and confusing the outcome which is to be appraised.
   Three types of controls are exercised in an experiment. These include:
   i) Physical controls.
   ii) Selective controls.
   iii) Statistical controls.

2. Randomization is a very difficult to exercise complete control, efforts are made to assign cases in the experimental and control groups randomly.

3. Replication implies conducting a number of sub-experiments within the framework of an overall experimental design.

Experimentation in education is not a perfectly precise method. There are many variables in education which are extremely difficult or even impossible to control. The basic condition of other things being equal' is difficult for fulfillment in educational research. All experiments in education are ultimately experiments with children who for ethical reasons must not be subjected to conditions that may harm them. There are boundaries of a moral character for experimentation which must not be infringed.

There are many areas in which experimental studies in education can approximate strictly empirical research. For example, the teaching of spelling through different methods, difference between the effect of the authoritarian and the democratic set up in education are problems which have been handled in a scientific way through the experimental approach.

The following .are the major steps in experimental research.

1. Planning the experiment.
2. Conducting the experiment.
3. Reporting the results.

Furthermore, the experimental designs are classified as Single Design, Parallel Design and Rotational Method. The details of all such designs are discussed below:

1. *Single Design.* This type of experiment is carried in comparing the growth of a single individual or group under' two sets of conditions. The experimenter observes the performance of the individual or the group before and after the introduction of the experimental variable. Let us say the experimenter is interested in evaluating the reading speed of a group of sixth class students as affected by training. He will adopt the steps like test the group, allow for a period of transition and test the group again.
2. *Parallel or Equivalent Group Design.* In this two or more groups of subjects equivalent in all significant aspects are selected. One of these groups serves as the 'control group' and the other as 'experimental group'.

3. *Rotation Group Experimentation.* This method involves the rotation of 'instructional factors of the experimental and control groups Pt equal intervals. This method is used to obtain control of pupil factors when groups cannot be thoroughly equated. It also neutralizes the teacher variable. Of the three designs of educational experimentation, this is the most valid and at the same time most complicated.

In order to comprehend further details of experimental research, please the below mentioned book:

J. C. Aggarwal, (1991)	Educational Research: An Introduction; New Delhi, Arya Book Depot, pp. 178–188.	2.5

2.11 Activities

1. Please list below the classification of experimental designs.

_____

_____

_____

2. Why descriptive research is more useful for distance education? Give reasons at the space provided for.

_____

_____

_____

3. Write at least four characteristics of historical, research in the space given below.

_____

_____

_____

2.12 Exercises

Hopefully, you have studied the unit, now please answer the following questions:

Q. 1 Discuss the role of historical research in education.

Q. 2 Critically examine the characteristics, advantages and limitations of historical research.

Q. 3 Describe the important steps involved in historical research.

Q. 4 Discuss the nature, need and scope of descriptive research.

Q. 5 Explain how descriptive research helps in solving current educational problems?

Q. 6 Describe the main types of experimental patterns employed in educational research.

Q. 7 Discuss the common types of experimental designs used in educational research with illustrative examples.

Q. 8 "Despite its scientific vigour, experimentation is only one aspect of the scientific method". Discuss the statement and bring out clearly the use of experimental method in education.

Q. 9 Give a comparison of historical research, descriptive research and experimental research.

Q. 10 Which research method is more useful for distance education and why?

Annexure-I

ALLIED MATERIAL

Classification of Educational Research

Research is perhaps the only assurance we have that a discipline or a profession will not decay into meaningless scraps of dogmatic utterances.

BERNARD MEHL

Classification of Educational Research

Educational research may be classified under three categories; basic research', 'applied research' and 'action research'. It must, however, be remembered that there are no clear-cut lines that differentiate these types of research. Basic research has been primarily the activity of psychologists rather than educators. Most of the educational research is applied research. Action research, usually, is the domain of classroom teachers.

Basic or Fundamental Research Meaning

Meaning This is sometime also called 'pure research' or 'fundamental research'. It is aimed at the discovery of basic truth or principles and is not immediately concerned with direct field application. Basic research emphasizes control and precision and gives less attention to direct application of the result in a field situation. According to Travers, "Basic research is designed to add to an organized body of scientific knowledge and does not necessarily produce results of immediate practical value".

Laboratory approach—Basic research is usually carried out in the laboratory and a good deal of equipment and apparatus is needed to carry out experiments.

Researcher use animal subjects—As research workers are concerned with fundamental principles of behavior and research with animals permits a much higher level of control than is possible with human subjects; basic research uses animal rather than human subjects.

Research done by workers in other fields—A lot of basic research bearing implications on education has been done by workers in the other behavioral sciences such as sociology.

Applied Research

Meaning—Applied research or often called 'field research' is concerned primarily with establishing relationships and testing theories in the field setting and applying to other samples of the population from which the research subjects are taken. For example, a study of the friendship pattern of eighth class students is very valuable if the sample has been chosen in such a way that the results may be expected to apply reasonably well to other

samples of the same population. Travers observes that applied research is undertaken to solve an immediate problem and the goal of adding to scientific knowledge is secondary.

Applied research sacrifices controls and precision to some extent as compared with fundamental research.

Basic and Applied Research

Meaning—In basic research, the researcher attempts to control a situation by the use of laboratory techniques or other techniques. In applied research, the researcher is engaged in conducting enquiries in the complicated psycho-sociological climate of on-going educational activities. There are a large number of variables in applied research which limit control and precision.

Applied research is of course, conducted in real situations which provide motivation to the researcher who is interested in the immediate solution of the problem. In basic research, motivation is intrinsic and the value of research is in its contribution to the advancement of knowledge.

Both the basic research as well as applied research is committed to the high standards of scientific objectivity and scholarship. In each type of research, the researcher tries to define the problem being studied with precision, derives his hypotheses from a rich background of information related to the problem, designs the study so that it results in a genuine test of hypothesis, collects and analyses facts or evidence carefully and attempts to draw generalizations objectively. However, the conditions under which the two researchers conduct their studies may differ as observed earlier if terms of the control and precision.

Action Research

Meaning—Action research sometimes called on-the-job research involves the application of the steps of the scientific method to classroom problems. Action research is similar to applied research in many ways. Applied research, usually involves a larger number of samples as compared with action research. In action research many research projects are carried out in a single classroom by a single teacher, while others may be carried on by all teachers in a school or even a school district.

According to Best, "Action Research is focused on the immediate application, not on the development of theory, nor upon general application." Action research places its emphasis on a problem, 'here and now'. It is applicable in local setting.

In the words of Jane Franseth of the U.S. office of education, "Action research is a systematic examination conducted by individuals or groups studying their own practices in search of sound answers to unresolved problems in their work and aimed at improving their own performance on their own jobs".

Corey says of action research, "One of the best ways to enable people to improve their curricular practices is to make it possible for them to study what they are doing to

experiment with ideas that seem to be more promising and to get evidence to find out if they are better".

Action research is not mainly concerned in obtaining generalized scientific knowledge about educational problems but in obtaining specific knowledge concerning the subjects involved in the study.

Stephen M. Corey, a pioneer in the field describes action research as:

"Most of the study of what should be kept in the schools and what should go and what should be added must be done in hundreds and thousands of classrooms and thousands of communities. The studies must be undertaken by those who may have to change the way they do things as a result of the studies. Our schools cannot keep up with the life they are supposed to sustain and improve unless teachers, pupils, supervisors, administrators and school patrons continuously examine that they are doing. Single and in groups, they must use their imagination and creatively and constructively to identify the practices that must be changed to meet the needs and demands of modern life, courageously try out those practices that give better promise, and methodically gather evidence to test their worth.

This is the process I call action research. I hold no special brief for the name, but it has some currency and is sufficiently to descriptive."

Lehmann and Mehrens (1971) point out; "Action research is a type of applied or decision oriented research, but with the stipulation that the researcher is the same person as the practitioner who will make and live with the decision."

Practitioner and Action Research

In Action research in education, the researchers are usually teachers, curriculum workers, principals, supervisors or others whose main function is to help provide good learning experiences for pupils.

The fundamental point is that teachers, supervisors, and administrators would make better decisions and engaged in more effective practices if they, too, were able and willing to conduct research as a base for these decisions and practices. The process by which practitioners attempt to study their problems scientifically in order to guide, correct, and evaluate their decisions and actions is what a number of people have called action research.

A publication entitled 'Research in Education' publishes by National Institute of Basic Education stated as;

"Action research is the research a person conduct in order to enable him to achieve his purposes more effectively. A teacher conducts action research to improve his own teaching. A school administrator conducts action research to improve his administrative behaviour.

Action research represents and attempts to be more disciplined, more objective, more scientific. It results in a more careful problem diagnosis and more objective evaluation of the consequences of action. To the degree and action intended to solve a practical problem results from objective, disciplined inquiry into the problem and its causes, the problem is more apt actually to be solved. The customary commonsense approach leads to action but afterwards the problem is often still there. Action research is a procedure that tries to keep problem solving in close touch with reality at every stage."

Scope—The action research approach to dealing with practical problems seems to be appropriate and promising for all kinds of professional workers in education so long as their desire is to improve their own professional behavior. An administrator who is dissatisfied with his efforts to develop good morale in his staff could approach this problem with action research, for example. He would only do so, however, if he accepted some responsibility for the morale situation and was willing to effect some changes in his own behavior to improve it.

Characteristics of Action Research

i. It is focused on the immediate problem.
ii. It is applicable in a local setting.
iii. It aims at improving classroom and school practices.
iv. It aims at the improvement of professional efficiency.
v. It involves very little finances.
vi. The researcher and the practitioner is the one and the same person.

Advantages of Action Research

1. A person improves if he remains active in the process and programme he is engaged in.
2. Action research emphasizes a desirable decentralization of decision making and action-taking.
3. Action research broadens and deepens the general as well as specific fund of knowledge of the worker.
4. Facts and evidences are stressed which keep the changed process anchored more continuously to reality.
5. Action research approach is experimental rather than dogmatic.
6. Action research helps the teacher acquire new interests, new motives and new insights.
7. One's own findings are willingly implemented and in this context, action research is very useful.
8. After having involved himself in action research, the teacher can play a better role in translating various research findings into action.
9. Action research has a great stimulating effect upon the teacher for finding better ways of doing things.
10. The entry of the teachers into the world of research will enable them to read reports or summaries of research findings more intelligently.
11. Action research introduces experimental outlook among teachers.

12. Action research enables the teacher to organize instructional procedures on a more reliable and sound bases.
13. Action research on the part of the teacher helps students acquire skill in problem-solving and scientific methods.

Limitations of Action Research

1. Action research is relatively of poor quality. According to Georg G. Mouly, "Action research can become a case of the blind leading the blind, and the problem is further aggravated by the fact that teachers generally are too close to their problems and too untrained in scientific objectivity to be vigorous and objective in their approach"
2. The applicability of the findings to another school or class in the event of teacher transfer is even questionable. Action research by and large, is a localized affair.
3. Action research is frequently added to the shoulders of already but busy teachers who have only limited freedom to say 'no'.

Action Research Design

The following steps may be followed in preparing an action research design:

1. ***Identification of problem area***— It is important to identify the problem area first. Some of the problem areas are: Teaching of different school subjects such as English, Hindi, Science, Mathematics, History, Geography, etc., Student Indiscipline, Human Relations; etc.
2. ***Selection of the problem***— When the problem area has been identified, the teacher differentiates a more specific (pin-pointed) problem for which he wants to do something. For example, in the area of 'Teaching of Hindi', the pinpointed problem may be 'Improving the Hindi Pronunciation of 5th Class Students'.
3. ***Problem analysis***—Problem analysis is of great importance in action research. When the problem has been pin-pointed, probable causes should be outlined.
4. ***Action hypothesis***—From the probable causes, those most relevant to the situation in the school where action research is to be conducted are selected from the action hypothesis.
5. ***The Experiment***—data to be collected—After deciding upon an action hypothesis the teacher designs an experiment. At this stage, sources of data collection and the nature of data to be collected are explored.
6. ***Tools to be used***—The teacher decides about the research tools to be used.
7. ***Action programme***—The teacher works out the programme for conducting experiment.
8. ***Evaluation***—The teacher finds out the difference in the result.

Action Research and the Teacher

Generally people think that educational research is the job of specialists only. As the definition given in a previous chapter clearly shows that it is just an attitude of mind which is to be developed by all and not merely by the specialists. Such an attitude which may rightly be called a scientific attitude is needed not only by specialists but also by teachers.

Action research can be easily taken up by a school teacher. The idea of 'Action Research' is to enable the teacher to tackle everyday problems that he faces in the classroom. It aims at developing in the teacher an attitude of inquiry rather than making him a research scientist. There is no theorizing here as in fundamental research. During the course of classroom teaching the teacher starts with certain expectations or aspirations. In actual practice when he finds that those are not fulfilled, he feels dissatisfied. This dissatisfaction leads him to take up action research. The teacher then rise to focus his attention on the problem and clearly apprehends it. Suppose, he finds that the children in his class do not have a good handwriting and he is eager to improve the handwriting of his children. First he finds out the causes of bad handwriting of the children. This may be designated as diagnosing the problem. Then the teacher carefully analyses the causes and tries to pick up those which he can remove. For example, he finds out that the following are the causes of bad handwriting:

i. The children do not have enough good specimens of handwriting to copy.
ii. The children do not have comfortable seats; and
iii. They do not have proper pens to write.

He may now start his experiment. He evaluates the handwriting of some children before the start of the experiment. Then he provides good specimens of handwriting and good writing material to a group of children during their writing periods and again evaluates their handwriting after say three months. Then he makes a comparison of the results achieved in the improvement of the handwriting of the children experimented upon with those not subjected to the experiment. From this he draws his conclusion. This is an example of simple 'Action Research.'

All teachers can try out experiments of this type. The main point in "Action Research' is that the approach of the teacher is more careful, disciplined and objective rather than haphazard and slipshod.

This type of research i.e. 'Action Research' is necessary for all types of teachers. This will help them in achieving objectivity in their life and also enable them to grow professionally. The school will benefit from such programmes of 'Action Research', because they will go a long way in improving the existing school practices.

The purpose of action research is not only to improve school practices but also at the same time to improve those who are to improve the practices.

It is unrealistic to assume that every teacher can carry on a continuous programme of research. Not everyone who is a good teacher wants to carry on a continuous research programme. What is important is that every teacher is sympathetic to the spirit of research.

Summer research programmes—There are a good many research programmes in which teachers may participate away from their schools. For most teachers these would be limited to summer programmes some of which provide good incentives. Many universities are in a position to provide space and supervision in the summer time for teachers and students from other schools without interfering with their own regular programme.

Limitations of the Teachers in Undertaking Research

1. Lack of background and formal preparation in the statistical and measurement procedures in education.
2. Certain limitations in time and/or ability to pursue studies that go beyond the confines of the classroom i.e. follow up studies.
3. Heavy teaching loads and extra-curricular responsibilities.

Assets of the Classroom Teachers

1. Their direct contact with the pupils and knowledge of their problems, their intellectual potential, their socio-economic development and the like.
2. Ability to record happenings in the classroom and put them in proper perspective as they affect the teaching-learning process.
3. Some capacity to manipulate the educational environment and observe the corresponding reactions of the pupils.

Need and Importance of Action Research in Indian Schools

The need and importance of action research in Indian Schools is being felt by all concerned to keep pace with latest developments in the field of education. A teacher while teaching his students comes across numerous problems. Sometimes he tries to tackle them with great patience and other times being in an angry mood, he scolds the students, turns them out of the class, gives punishment of one form or the other and still at some other times, he overlooks them. If the teachers are encouraged to come out with their problems and are provided necessary facilities in the form of guidance and help in conducting action research, they can solve their problems themselves with great satisfaction to themselves and consequently leading to their professional growth and development.

J. W. Best suggests, "If classroom teachers are to make an active research contribution, it will probably be in the area of action research. Studies will be made for the purpose of improving school practices. Many educational observers see in action research one of the most promising avenues of teacher growth, professional improvement and the development of better curriculum".

W. C. Radford discusses the functions of the school as; "What is the function of the school in educational research? Should it be doing research, and if so, are there any limits to it? I think that there is a limitation—what I call a geographical one. I do not believe we can expect a school, established to serve a particular community, to go beyond that community in its research. Each school is an entity with its own setting, and its own particular complex of factors affecting its operation. I believe that the school should be doing research but within that setting and on its own complex. Every aspect of the educational process is therefore study-learning experiences, pupil-teacher relationships, administration. Nothing inside the school is more important than what is going on within it. All, or almost all aspects of the process can be examined, studied, appraised and the conclusions drawn used to affect the process immediately."

Difference between Fundamental Research and Action Research

Area	Fundamental Research	Action Research
1. Objectives	Its purpose is to develop and test educational theories and to obtain principles that will be applicable to a broad population.	Knowledge obtained is intended to be applied in local setting and to provide a sort of in-service training to participating teachers and administrators.
2. Training	Expert training is needed in measurement, research methods and statistics.	Only a limited training is needed. Even if the research skills of a teacher are low, action research can be done under the guidance or assistance of a consultant.
3. Locating research problem	A wide range of methods is used to locate the research problem.	The participating teachers identify problems which hinder classroom teaching-learning process.
4. Involvement	The research worker is not usually involved in the problem he selects for research.	The teacher is invariably involved in the research problem.
5. Hypotheses	Highly specific hypotheses are developed.	Usually a specific statement of the problem serves as a hypothesis.
6. Review of the literature	AN exhaustive and thorough review of the literature is done to have a thorough understanding of the accumulated knowledge in the research area.	There is no need for such a thorough and intensive review. A glance at the review will serve the purpose of developing general understanding of the area.
7. Sampling	Research worker is required to obtain a random or other-wise unbiased sample of the population being studied.	Pupils studying in the doss of the teacher are used as subjects.
8. Experimental design	Careful attention is given to maintain comparable condi-tions and reducing error and bias.	Bias is usually present because participating teachers are ego-involved in the research situation. Procedures are planned only in general terms.

9. Analysis of data	Complex analysis is often called for Statistical significance is usually stressed.	Simple analysis procedures are usually sufficient.
10. Statistical treatment	Lack of coordination between research workers and teachers generate a serious practical problem.	Subjective opinion of partici-pating teachers is often weighted heavily.
11. Application of results	The generalizations usually remain confined to books and research reports.	Findings are applied immediately to the classes of participating teachers and lead to far-reaching improvements in the teaching-learning process.

The Cooperative Research Programme

Cooperation is essential to progress and achievement. This is as true in education as it is in industry or business.

The Cooperative Research Programme is representative of the new emphasis on educational research in the United States.

Public Law 531and its purpose—In recognition of the need for research in education and for federal funds to support such research, the Eighty-third Congress, Second Session, enacted Public Law 531 in 1954 which authorizes the Commissioner of Education "…to enter into contracts of jointly financed cooperative arrangements with universities, colleges and State educational agencies for the conduct of research, surveys, and demonstrations in the field of education.

The programmed aims at developing new knowledge about major problems in education and devising new applications of existing knowledge in solving such problems.
A substantial amount of the necessary financial support of project is provided by the office of education. The cooperating institution of agency also contributes to the total cost of a project, usually by providing personnel, professional services and facilities.

Complementary programme activities—The following activities complement the Basic research contracts of the Cooperative Research Programme:

1. Individual Research Development Contracts.
2. Conferences to stimulative Interest and exchange Information.
3. Seminars to develop Major Research Plans.
4. Dissemination Activities, which include:
   (a) Documents Expediting Project.
   (b) Cooperative Research Monograph Series.
   (c) Articles in Professional Journals.

Contribution of cooperative research—The following brief descriptions of sample investigations illustrate the contribution of Cooperative Research:

1. Cooperative Research Programme Projects at the University of Chicago and Minnesota have documented the significant fact that creative ability and measured intelligence. (IQ) are not identical.
2. Substantial evidence has emerged that creative ability, unlike intelligence (which remains relatively constant), can be developed, extended and improved.
3. A Cooperative Research Programme Project at Brooklyn College proved that the impact of the teacher on students is determined by the teacher's approach and professional personality on the one hand and by the feelings and levels of intelligence of learners on the other.
4. Of the three types of teacher behavior studies—classified as turbulent, self-controlled and fearful—the self-controlled type of teacher achieved the most uniform learning gains with children of different personality, types and levels of ability.
5. CRP study at the University of California at Los Angles demonstrated that young children (first graders) can double their rate of mastery of mathematics if it is taught in relation to basic algebraic structures.
6. No proof was available for the presumption underlying the argument that larger school districts would increase student learning.
7. Experiments point out that some of the children that have been labelled "mentally retarded", may, in reality, merely be the products of "retarded homes". The evidence proves that some such children can often be taught to read at an early age.
8. A CRP Project at the University of Louisville, has proved that the rate of learning of blind children can be increased fourfold (from 64 to 240 words per minute) by improving the listening comprehension of such students.
9. Studies supported by the CRP have produced evidence that specific types of delinquency are attributable to specific causes, just as are different types of diseases.
10. One CRP study, conducted in ten rural and ten urban high schools in and near Chicago, identified the impact that adolescent climates in school and community, have motivation to learn.

Problems for Discussion

1. Define basic research, applied research and action research. Give examples to bring out the difference.
2. Why action research is sometimes called on the job research? Suggest a few situations related to on the job research.
3. "Action research places its emphasis on a problem here and now". Comment on this statement.
4. Elucidate the process of action research with suitable examples.
5. "Action research is the job of the specialist only". Explain this statement.
6. State the need, scope, merits and limitations of action research.
7. In what way action research is helpful to the classroom teacher?

POSES OF RESEARCH

Fundamental or Basic Research

To this point we have described research in its more formal aspects. Research has drawn its pattern, and spirit from the physical sciences and has represented a rigorous, structured type of analysis. We have presented the goal of research as the development of theories by the discovery of broad generalizations or principles. We have employed careful sampling procedures in order to extend the findings beyond the group or situation studied. So far, our discussion has shown little concern for the application of the findings to actual problems in areas considered to be the concern of people other than the investigator. This methodology is the approach of basic or fundamental research.

Fundamental research is usually carried on in a laboratory situation, sometimes with animals as subjects. This type of research has been primarily the activity of psychologists rather than educators.

Applied Research

Applied research has most of the characteristics of fundamental research, including the use of sampling techniques and the subsequent inferences about the target population. However, its purpose is improving a product or a process—testing theoretical concepts in actual problem situations. Most educational research is applied research, for it attempts to develop generalizations about teaching-learning processes and instructional materials. Fundamental research in the behavioral sciences may be concerned with the development and testing of theories of behavior. Educational research is concerned with the development and testing of theories of how students behave in an educational setting.

Action Research

Since the late 1930s the fields of social psychology and education have shown great interest in what has been called action research. In education this movement has had as its goal the involvement of both research specialist and classroom teacher in the study and application of research to educational problems in a particular classroom setting.

Action research is focused on immediate application, not on the development of theory or on general application. It has placed its emphasis on a problem here and now in a local setting. Its findings are to be evaluated in terms of local applicability, not universal validity. Its purpose is to improve school practices and, at the same time to improve those who try to improve the practices:-to combine the research processes, habits of thinking, ability to work harmoniously with others, and professional spirit.

If most classroom teachers are to be involved in research activity, it will probably be in the area of action research. Modest studies may be made for the purpose of trying to improve local classroom practices. It is not likely that many teachers will have the time, resources, or technical background to engage in the more formal aspects of research activity. Fundamental research must continue to make its essential contribution to

behavioral theory, and applied research to the improvement of educational practices. These activities, however, will be primarily the function of research specialists, many of them subsidized by universities, private and government agencies, professional associations, and philanthropic foundations.

Many observers have deprecated action research as nothing more than the application of common sense or good management. But whether or not it is worthy of the term research, it does apply scientific thinking and methods to real-life problems and represents a great improvement over teachers subjective judgments and decisions based upon folklore and limited personal experiences.

In concluding this discussion, it is important to realize that research may be carried on at various levels of complexity. Respectable research Studies may be the simple descriptive fact-finding variety that leads to useful generalizations. Actually, many of the early studies in the behavioral sciences were useful in providing needed generalizations about the behavior or characteristics of individuals and groups. Subsequent experimental studies of a more complex nature needed this groundwork information to suggest hypotheses for more precise analysis. For example, descriptive studies of the intellectually gifted, carried on since the early 1920s by the late Lewis M. Terman and his associates, have provided useful generalizations about the characteristics of this segment of the school population. Although these studies did not explain the factors underlying giftedness, they did provide many hypotheses to be investigated by more sophisticated experimental methods.

Assessment, Evaluation, and Descriptive Research

The term descriptive research has often been used incorrectly to describe three types of investigation that are basically different. Perhaps their superficial similarities have obscured their differences. Each of them employs the process of disciplined inquiry through the gathering and analysis of empirical data and each attempts to develop knowledge. To be done competently, each requires the expertise of the careful and systematic investigator. A brief explanation may serve to put each one in proper perspective.

Assessment is a fact-finding activity that describes conditions that exist at a particular time. No hypotheses are proposed or tested, no variable relationships are examined, and no recommendations for action are suggested.

The national census is a massive assessment type of investigation conducted by the Bureau of the Census, a division of the United States Department of Commerce. Every 10 years an enumeration of the population is conducted, with data classified by nationality, citizenship, age, sex, race, marital status, educational level, regional and community residence, employment, economic status, births, deaths, and other characteristics. These data provide a valuable basis for social analysis and government action.

John W. Best & James V. Kakn (1992)	*Research in Education*, 6th ed. New Delhi, Prentice - Hall of India (Pvt.) Ltd. pp. 57–75	2.3

HISTORICAL RESEARCH

Historical research differs markedly from the sort of research conducted by most scientists, including behavioral and social scientists. In fact, it is so different from other types of research that it almost does not belong as a topic in this book. It is included because many areas of concern to education can best be studied in this way, because the quantity and quality of research on the history of education has increased greatly in the past two decades e.g., Best, 1983; Warren, 1978 and because a review of the research literature which is done prior to other types of research is in effect, a historical study.

History is a meaningful record of human achievement. It is not merely a list of chronological events but a truthful integrated account of the relationships between persons, events, times, and places. We use history to understand the past and to try to understand the present in light of past events and developments. We also use it to prevent "reinventing the wheel" every few years. Historical analysis may be directed toward an individual, an idea, a movement, or an institution. However, none of these objects of historical observation can be considered in isolation. People cannot be subjected to historical investigation without some consideration of their interaction with the ideas, movements, and/or institutions of their times. The focus merely determines the points of emphasis toward which historians direct their attention.

TABLE 3-1 Some Examples of the Historical Interrelationship among Men, Movements, and Institution

MEN	INSTITUTIONS		Name
	MOVEMENTS	General Type	
Ignatius of Loyola	Counter-Reformation	Religious Teaching Order	Society of Jesus, 1534 (Jesuit Society)
Benjamin Franidin	Scientific Movement Education for Life	Academy	Philadelphia Academy, 1751
Daniel Coit Gilman G. Stanley Hall	Graduate study and Research	University Graduate School	Johns Hopkins University, 1876
Win. Rainy Harper			Clark University, 1887, University of Chicago, 1892
John Dewey	Experimentalism Progressive Education	Experimental School	University of Chicago Elementary School. 1895
W. E. B. Dubois Walter White	Racial Integration in the Public Schools	Persuasion Organization	National Assn for the Advancement of Colored People. 1909
B. R. Buckingham	Scientific Research in Education	Research Periodical, Research Organization	Journal of Ed. Research, 1920 American Educational Research Assn., 1931

Table 3-1 illustrates several historical interrelationships that have been taken from the history of education. For example, no matter whether the historian chooses for study the Jesuit Society, religious teaching orders, the Counter-Reformation, or Ignatius of Loyola, each of the other elements appears as a prominent influence or result and as an indispensable part of the account. The interrelationship of this institution, movement, and man would make the study of one in isolation from the others meaningless, if not impossible.

Those who wish to engage in historical research should read the works of historians regarding the methods and approaches to conducting historical studies in education (e.g. Best. 1983; Belington. 1975: Brickman. 1982; Gottschalk. 1950; Hocked. 1948; Warren. 1978).

The History of American Education

Historical studies deal with almost every aspect of American education. Such investigations have pointed out the important contributions, of both educators and statesmen. They have examined the growth and development of colleges and universities, elementary and secondary schools, educational organizations and associations, the rise and decline of educational movements, the introduction of new teaching methods, and the issues that have persistently confronted American education.

An understanding of the history of education is important to professional workers in this field. It helps them to understand the how and why of educational movements that have appeared and, in some cases, continue to prevail in the schools. It helps them to evaluate not only lasting contributions but also the fads and "bandwagon" schemes that have appeared on the educational scene only to be discarded.

An examination of many developments of the past seems to confirm the observation that little in education is really new. Practices hailed as innovative are often old ideas that have previously been tried and replaced by something else. Innovators should examine the reasons why such practices were discarded and consider whether their own proposals are likely to prove more successful. Several studies, briefly described, illustrate the historical background of some contemporary educational movements and issues.

Organized programs of individualized instruction introduced in a number of school systems in the 1960s seem to be similar in many respects to those introduced in a number of schools in the 1890s and in the first quarter of the twentieth century. First introduced at Pueblo, Colorado, and known as the Pueblo Plan, later modified and known as the Winnetka and Dalton Plans, these programs do seem to have common elements. Dispensing with group class activity in academic courses, students were given units of work to complete at their own rate before proceeding to more advanced units. Individual progress based upon mastery of subject matter units was the criterion for promotion or completion of a course. Search (1901) advocated this plan, and his influence upon Carleton Washburn in the elementary schools of Winnetka. Illinois, and Helen Park Hurst in the secondary schools at Dalton, Massachusetts, is generally recognized. Whether the

Pueblo, Winnetka, or Dalton plans were fads or sound programs, the fact remains that they disappeared from the schools before reappearing in the 1960s.

The place of religion in public education is an issue that concerns many people. In the period following World War II, in a series of Supreme Court decisions, religious instruction and religious exercises within public schools have been declared unconstitutional and in violation of the First Amendment of the United States Constitution. In 1963, in the case of Abington School District v. Schempp. The Court held that a Pennsylvania law requiring daily Bible reading was in violation of the First Amendment. Much resentment and criticism of the Supreme Court followed this decision and several efforts have been made to introduce amendments to the Constitution to permit religious exercises in the public schools.

The Bible reading issue was also a bitter one more than 100 years ago. The Philadelphia Bible Riots of 1840 (Lannie & Die thorn, 1968) resulted in the deaths of about 45 soldiers and civilians, serious injury to about 140, and property damage to homes and churches valued at nearly $500,000. Natives/foreign-born, and Catholic/Protestant conflicts produced the tense atmosphere, but the Bible reading issue precipitated the riots. It is apparent that Bible reading is not an issue of recent origin and that an understanding of previous conflicts places the issue in clearer perspective.

The contributions of Thomas Jefferson, Benjamin Franklin. Calvin Stowe, Catherine Beecher, Horace Mann. Maria Montessori, Henry Barnard, Ella Flag Young. William Holmes McGuffey, Daniel Coit Gilman, John Dewey, and many other eminent educators have been carefully examined in many studies, and their impact on American education has been noted.

Thurs field (1945) studied Henry Barnard's *American Journal of* Education, published in 31 massive volumes between 1855 and 1881. He points out the Journal's vital contribution to the development of American education. Through its comprehensive treatment of all aspects of education it provided a readily available medium for the presentation and exchange of ideas of many of the great educators of the period. It has been stated that almost every educational reform adopted in the last half of the nineteenth century was largely due to the influence of the Journal. Among its contributors were Henry Barnard, Horace Mann, Bronson Alcott, Daniel Coit, Gillman, William T. Harris, Calvin Stowe, and Herbert Spencer, in addition to many prominent foreign contributors.
Cremin (1961) examined the reason for the rise and decline of the Progressive Education movement, including the major changes in philosophy and practices that transformed American education and the forces that brought the movement to a halt in the 1950s. Although some historians differ with his conclusions, Cretin’s analysis is the definitive history of Progressive Education in America.

These historical studies are examples of but a few of the thousands of books, monographs, and periodical articles that depict the story of American education. In addition to examining these works, students are urged to consult the History of Education

Quarterly, in which scholarly book reviews and critical analyses of contemporary historical research are presented.

History and Science

Opinions differ as to whether or not the activities of the historian can be considered scientific or whether there is such a thing as historical research.

Those who take the negative position may point out the following limitations:

1. Although the purpose of science is prediction, the historian cannot usually generalize on the basis of past events. Because past events were often unplanned or did not develop as planned, because there were so many uncontrolled factors, and because the influence of one or a few individuals was so crucial, the same pattern of factors is not repeated.
2. The historian must depend upon the reported observations of others, often witnesses of doubtful competence and sometimes of doubtful objectivity.
3. The historian is much like a person trying to complete a complicated jigsaw puzzle with many of the parts missing. On the basis of what is often incomplete evidence, the historian must fill in the gaps by inferring what has happened and why it happened.
4. History does not operate in a closed system such as may be created in the physical science laboratory. The historian cannot control the conditions of observation nor manipulate the significant variables.

Those who contend that historical investigation may have the characteristics of scientific research activity present these arguments:

1. The historian delimits a problem, formulates hypotheses or raises questions to be answered, gathers and analyzes primary data, tests the hypotheses as consistent or inconsistent with the evidence, and formulates generalizations or conclusions.
2. Although the historian may not have witnessed an event or gathered data directly, he or she may have the testimony of a number of witnesses who have observed the event from different vantage points. It is possible that subsequent events have provided additional information not available to contemporary observers. The historian rigorously subjects the evidence to critical analysis in order to establish its authenticity, truthfulness, and accuracy.
3. In reaching conclusions, the historian employs principles of probability similar to those used by physical scientists.
4. Although it is true that the historian cannot control the variables directly, this limitation also characterizes most behavioral research, particularly non-laboratory investigations in sociology, social psychology and economics.
5. The observations of historians may be described in qualitative or quantitative terms depending on the subject matter and the approach of the historian. In general, the traditional approach is qualitative while the revisionists use quantitative analyses. The traditional, qualitative approach in many historical studies does not preclude the application of scientific methodology. As Brick man (1982) points out it simply requires “the synthesis and presentation of the facts in a logically organized form” (p. 91).

Historical Generalization

There is some difference of opinion, even among historians, as to whether or not historical investigations can establish generalizations. Most historians would agree that some generalizations are possible, but they disagree on the validity of applying them to different times and places. Gottschalk (1963) states the case of the comparative historian in this way:

Sooner [2]or later one or more investigators of a period or area begin to suspect some kind of nexus within the matter of their historical investigation. Though such "hunches," "insights," "guesses." "hypotheses" — whatever you may call them—may be rejected out of hand by some of them, the bolder or rasher among them venture to examine the possibility of objective reality of such a nexus, and then it is likely to become a subject of debate, and perhaps of eventual refinement to the point of wide recognition in the learned world. The process is not very different from the way analytical scholars in other fields precede—Darwin, for example, or Freud. If this process serves no other purpose, it at least may furnish propositions upon which to focus future investigations and debates....

But do not these historical syntheses, no matter what their author's intention, invariably have a wider applicability than to any single set of data from which they rose? If Weber was right, isn't it implicit in this concept of the Protestant ethic that where a certain kind of religious attitude prevails, their the spirit of capitalism will, or at least may, flourish? ... If Mahan was right, couldn't victory in war (at least before the invention of the airplane) be regarded as dependent on maritime control? If Turner was right, won't his frontier thesis apply to some extent to all societies that have frontiers to conquer in the future, as well as it have applied to American society in the past? (pp. 121-122)

Finely (1963) Comments on Generalization:

Ultimately the question at issue is the nature of the historian's function. Is it only to recapture the individual concrete events of a past age, as in a mirror, so that the progress of history is merely one of rediscovering lost data and of building bigger and better reflectors? If so, then the chronicle is the only correct form for his work. But if it is to understand—however one chooses to define the word—then it is to generalize, for every explanation is, or implies, one or more generalizations, (p. 34)

Aydelotte (1963) States the Argument for Generalization:

Certainly the impossibility of final proof of any historical generalization must be at once conceded. Our knowledge of the past is both too limited and too extensive. Only a minute fraction of what has happened has been recorded and only too often the points on which we need most information are those on which our sources are most inadequate. On the other hand, the fragmentary and incomplete information we do have about the past is too abundant to prevent our coming to terms with it; its sheer bulk prevents its being easily manipulated, or even easily assimilated, for historical purposes. Further, historians deal

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[2] From "Categories of Historical Generalization" in the Writing of History, Louis Gottschalk, ed. (Chicago: University of Chicago Press, 1963). 121-22. Used with permission of the publisher.

with complex problems, and the patterns of the events they Study, even supposing it to exist, seems too intricate (to be easily grasped. Doubtless, finality of knowledge is impossible in all areas of study. We have learned through works of popularization how far this holds true even for the natural sciences, and, as Crane Briton says the historian no longer needs to feel that "the uncertainties and inaccuracies of his investigation leave him in a position of hopeless inferiority before the glorious certainties of physical science." (pp. 156-157)

The foregoing quotations are presented in support of the position that the activities of the historian are not different from those of the scientist. Historical research as it is defined in this chapter includes, delimiting a problem, formulating hypotheses or generalizations to be tested or questions to be answered, gathering and analyzing data, and arriving at probability-type conclusions or at generalizations based upon deductive-inductive reasoning.

The Historical Hypothesis

Nevins (1962) illustrates the use of hypotheses in the historical research of Edward Channing in answering the question, "Why did the Confederacy collapse in April 1865?" Chinning formulated four hypotheses and tested each one in light of evidence gathered from letters, diaries, and official records of the army and the government of the Confederacy. He hypothesized that the Confederacy collapsed because of

1. The military defeat of the Confederate army
2. The dearth of military supplies
3. The starving condition of the Confederate soldiers and the civilians
4. The disintegration of the will to continue the war

Channing produced evidence that seemed to refute the first three hypotheses. More than 200,000 well-equipped soldiers were under arms at the time of the surrender, the effective production of powder and arms provided sufficient military supplies to continue the war, and enough food was available to sustain fighting men and civilians.

Channing concluded that hypothesis 4, the disintegration of the will to continue the war was substantiated by the excessive number of desertions of enlisted men and officers. Confederate military officials testified that they had intercepted many letters from home urging the soldiers to desert.

Although the hypothesis sustained was not specific enough to be particularly helpful, the rejection of the first three did claim to dispose of some commonly held explanations. This example illustrates a historical study in which hypotheses were explicitly stated.

Hypotheses in Educational Historical Research

Hypotheses may be formulated in historical investigations of education. Several examples are listed.

1. The educational innovations of the 1950s and 1960s were based upon practices that previously have been tried and discarded.
2. Christian countries whose educational systems required religious instruction have

had lower church attendance rates than those countries in which religious instruction was not provided in the schools.

3. The observation of European school systems by American educators during the nineteenth century had an important effect upon American educational practices.
4. The monitorial system had no significant effect upon American education.

Although hypotheses are not always explicitly stated in historical investigations, they are usually implied. The historian gathers evidence and carefully evaluates its trustworthiness. If the evidence is compatible with the consequences of the hypothesis, it is confirmed. If the evidence is not compatible, or negative, the hypothesis is not confirmed. It is through such synthesis that historical generalizations are established.
The activities of the historian, when education is his or her field of inquiry, are no different from those employed in any other field. The sources of evidence may be concerned with schools, educational practices and policies, movements, or individuals, but the-historical processes are the same.

Difficulties Encountered in Historical Research

The problems involved in the process of historical research make it a somewhat difficult task. A major difficulty is delimiting the problem so that a satisfactory analysis is possible. Too often, beginners state a problem much too broadly; the experienced historian realizes that historical research must involve a penetrating analysis of a limited problem rather than a superficial examination of a broad area. The weapon of research is the target pistol, not the shotgun.

Since historians may not have lived during the time they are studying and may be removed from the events they investigate, they must often depend upon inference and logical analysis, using the recorded experience of other rather than direct observation. To ensure that their information is as trustworthy as possible, they must rely on primary, or firsthand, accounts. Finding appropriate primary sources of data requires imagination, hard work, and resourcefulness.

Historians must also keep in mind the context in which the events being studied occurred and were recorded. It is necessary to keep the biases and beliefs of those who recorded the events in mind, as well as the social and political climate in which they wrote.

Sources of Data

Historical data are usually classified into two main categories:

1. Primary sources are eyewitness accounts. They are reported by an actual observer or participant in an event.
2. Secondary sources are accounts of an event that were not actually witnessed by the reporter. The reporter may have talked with an actual observer or read an account by an observer, but his or her testimony is not that of an actual participant or observer.
3. Secondary sources may sometimes be used, but because of the distortion in passing on information, the historian uses them only when primary data are not available.

Primary Source of Data

Documents. Documents are the records kept and written by actual participants in, or witnesses of, an event. These sources are produced for the purpose of transmitting information to be used in the future. Documents classified as primary sources are constitutions, charters, laws, court decisions, official minutes or records, autobiographies, letters, diaries, genealogies, census information, contracts, deeds, wills, permits, licenses, affidavits, depositions, declarations, proclamations, certificates, lists, handbills, bills, receipts, newspaper and magazine accounts, advertisements, maps, diagrams, books, pamphlets, catalogs, films, pictures, paintings, inscriptions, recordings, transcriptions, and research reports.

Remains or Relics. Remains or relics are objects associated with a person, group, or period. Fossils, skeletons, tools, weapons, food, utensils, clothing, buildings, furniture, pictures, paintings, coins, and art objects are examples of those relics and remains that were not deliberately intended for use in transmitting information or as records. However, these sources may provide clear evidence about the past. The contents of an ancient burial place, for instance, may reveal a great deal of information about the way of life of a people—their food. Clothing, tools, weapons, are religious beliefs, means of livelihood, and customs. Similarly, the contents of an institution for the mentally ill or mentally retarded can reveal a good deal of information about the way the clients were treated, including the quality of food, the opportunity for work and recreational activities, and whether abuses regularly occurred.

Oral Testimony. Oral testimony is the spoken account of a witness of, or participant in, an event. This evidence is obtained in a personal interview and may be recorded or transcribed as the witness relates his or her experiences.

Primary Sources of Educational Data

Many of the old materials mentioned in the preceding section provide primary evidence that may be useful specifically in studying the history of education. A number are listed here.

Official Records and Other Documentary Materials. Included in this category are records and reports of legislative bodies and state departments of public instruction, city superintendents, principals, presidents, deans, department heads, educational committees, minutes of school boards and boards of trustees, surveys, charters, deeds, wills, professional and lay periodicals, school newspapers, annuals, bulletins, catalogs, courses of study, curriculum guides, athletic game records, programs (for graduation, dramatic, musical, and athletic events), licenses, certificates, textbooks, examinations, report cards, pictures, drawings, maps, letters, diaries, autobiographies, teacher and pupil personnel files, samples of student work, and recordings.

Oral Testimony. Included here are interviews with administrators, teachers and other school employees, students and relatives, school patrons or lay dozens, and members of governing bodies.

Relics. Included in this category ore buildings, furniture, teaching materials, equipment, murals, decorative pictures, textbooks, examinations, and samples of student work.

Secondary Source of Data

Secondary sources are the reports of a person who relates the testimony of an actual witness of, or participant in, an event. The writer of the secondary source was not on the scene of the event, but merely reports what the person who was there said or wrote. Secondary sources of data are usually of limited worth for research purposes because of the errors that may result when information is passed on from one person to another most history textbooks and encyclopedias are examples of secondary sources for they are often several times removed from the original, firsthand account of events.

Some types of material may be secondary sources for some purposes and primary sources for another. For example, a high school textbook in American history is ordinarily a secondary source. But if one were making a study of the changing emphasis on nationalism in high school American history textbooks, the book would be a primary document or source of data.

Historical Criticism

It has been noted that the historian does not often use the method of direct observation. Past events cannot be repeated at will. Because the historian must get much to the data from the reports of those who witnessed or participated in these events, the data must be carefully analyzed to sift the true from the false, irrelevant, or misleading.

Trustworthy, usable data in historical research are known as *historical evidence.* That body of validated information can be accepted as a trustworthy and proper basis for the testing and interoperation of a hypothesis. Historical evidence is derived from historical data by the process of criticism, which is of two types: external and internal.

External Criticism

External criticism establishes the authenticity or genuineness of data. Is the relic or document a true one rather than a forgery a counterfeit, or a hoax? Various tests of genuineness may be employed.

Establishing the age or authorship of documents may require intricate tests of signature, handwriting, script, type, spelling, language usage, documentation, knowledge available at the time and consistency with what is known. It may involve physical and chemical tests of ink, paint, paper, parchment, cloth, stone, metals, or wood. Are these elements consistent with known facts about the person, the knowledge available, and the technology of the period in which they remain or the document originated?

Internal criticism

After the authenticity of historical documents or relics has been established, there is still the problem of evaluating their accuracy or worth. Although they may be genuine, do they reveal a true picture? What of the writers or creators. Were they competent, honest,

unbiased, and actually acquainted with the facts, or were they too antagonistic or too sympathetic to give a true picture? Did they have any motives for distorting the account? Were they subject to pressure, fear or vanity? How long after the event did they make a record of their testimony, and were they able to remember accurately what happened? Were they in agreement with other competent witnesses?

These questions are often difficult to answer, but the historian must be sure that the data are authentic and accurate. Only then may he or she introduce them as historical evidence, worthy of serious consideration.

The following examples describe ways in which evidence is tested for authenticity. The first is an example of historical criticism of a scholarly type, carried on by scientists and biblical scholars, in which historic documents were proven to be genuine.

The Dead Sea Scrolls. One of the most interesting and significant historical discoveries of the past century was the finding of the Dead Sea Scrolls. This collection of ancient manuscripts was discovered in 1947 by a group of Bedouins of the Ta'amere tribe. Five leather scrolls were found, sealed in tall earthenware jars in the Qumran caves near Alm Feshkha, on the northwest shore of the Dead Sea (Davies, 1956)[2]

The Bedouins took the scrolls to Metropolitan Mar Athanesius Yeshue Samuel, of St. Mark's monastery in Jerusalem, who purchased them after discovering that they were written in ancient Hebrew. A consultation with biblical scholars confirmed the fact that they were very old and possibly valuable. They were later purchased by Professor Sukenik, an archaeologist of Hebrew University at Jerusalem, who began to translate them. He also had portions of the scrolls photographed to send to other biblical scholars for evaluation. Upon examining some of the photographs. Dr. William F. Albright of Johns Hopkins University pronounced them “the greatest manuscript discovery of modern times.”

A systematic search of the Wadi Qumran area caves in 1952 yielded other leather scrolls, many manuscript fragments, and two additional scrolls of copper that were so completely oxidized that they could not be unrolled without being destroyed. By 1956, scientists at the University of Manchester, England, had devised a method of passing a spindle through the scrolls, spraying them with aircraft glue, baking them, and then sawing them across their rolled-up length to yield strips which could be photographed.

The origin, the age, and the historic value of the scrolls have been questioned. By careful and systematic external and internal criticism, however, certain facts have been established and are quite generally accepted by biblical scholars and scientists.

The scrolls are very old, probably dating back to the first century A.D. They are written in

2 From the Meaning of the Dead Sea Scrolls New York: New American Library of World Literature. 1956). p. 9. Used with permission of the publisher.

ancient Hebrew and probably originated in a pre-Christian monastery of one of the Jewish sects. The writings contain two versions (one complete and one incomplete) of the Book of Isaiah, a commentary or Midrash on the Book of Habakkuk, a set of rules of the ancient Jewish monastery, a collection of about twenty psalms similar to those of the Old Testament, and several scrolls of apocalyptic writings, similar to the Book of Revelation. The contents of the copper scrolls and other fragments have now been translated, it is possible that more scrolls and writings may be discovered in the area, and it is likely that these ancient documents may throw new light on the Bible and the origins of Christianity. It is interesting to note how these documents were authenticated, dated, and evaluated by:

1. Paleography, an analysis of the Hebrew alphabet forms used. These written characters were similar to those observed in other documents known to have been written in the first century.
2. A radiocarbon test of the age of the linen scroll covering conducted by the Institute of Nuclear Research at the University of Chicago. All organic matter contains radiocarbon 14, which is introduced by the interaction of cosmic rays from outer space with the nitrogen in the earth's atmosphere. The radioactivity constantly introduced throughout the life of the specimen ceases at death and disintegrates at a constant known rate. At the time of death, all organic matter yields 15.3 disintegration's per minute per gram of carbon content. The number of disintegration’s is reduced by one-half after 5568 years plus or minus 30 years. By measuring disintegration's by using a Geiger type counter, it is possible to estimate the age of specimens within reasonable limits of accuracy. Through use of this technique, the date of the scrolls was estimated at A.D. 33, plus or minus 200 years.
3. Careful examination of the pottery form in which the scrolls were sealed. These jars, Precisely shaped to fit the manuscripts, were the type commonly used during the first century.
4. Examination of coins found in the caves with the scrolls. These dated Roman coins provided convincing evidence of the age of the scrolls.
5. Translation of the scrolls. When translated, the scrolls compared to other writings, both biblical and no biblical, of known antiquity.

Although external criticism has now produced convincing evidence of the genuineness and age of the Dead Sea Scrolls, internal criticism of their validity and relevance will be pursued by biblical scholars for many years to come and may provide many new hypotheses concerning biblical Writings and the early history of Christianity and the pre-Christian Jewish sects.

Modern approaches to historical research have applied advanced technology emphasizing the usefulness of both qualitative and quantitative data. As we have seen in this example, researchers employed the radiocarbon 14 tests to verify the authenticity of the scrolls. The next example illustrates the use of the computer in archaeological and historical research.

Stonehenge (Hanging Stones). For centuries historians, and archaeologists have debated the origin and purpose of Stonehenge, a curious arrangement of stones and archways, each weighing more than 40 tons, located on the Salisbury Plain about 90 miles

southwest of London. From the beginning of recorded history, writers have speculated about the stones. Their construction and arrangement have been attributed to many tribes and national groups who invaded or inhabited England. Modern radiocarbon dating of a deer anther found in the stone fill seems, to date their erection at about 1900 to 1600 B.C Their purpose has been explained in many legends—a city of the dead, a place of human sacrifice, a temple of the sun, a pagan cathedral, and a Druid ceremonial place.

More recently some scientists and historians have suggested that Stonehenge was a type of astronomic computer calendar used by early Britons who were apparently sophisticated enough to compute the position of the sun and the moon at their various stages. Using an IBM 704 computer, Gerald's. Hawkins, an astronomer at the Smithsonian Astrophysical Observatory at Cambridge, Massachusetts, entered into the computer 240 stone alignments, translated into celestial declination's. Accomplishing in less than a minute a task that would have required more than 4 months of human calculator activity, the computer compared the alignments with the precise sun/moon extreme positions as of 1500 B.C. and indicated that they matched with amazing accuracy. Hawkins suggests that the stone arrangements may have been created for several possible reasons: They made a calendar that would be useful for planting crops; they helped to create and maintain priestly power, by enabling the priest to call out the people to see the rise and setting of the midsummer sun and moon over the heel stone and midwinter sunset through the great trilithon: or possibly they served as an intellectual exercise. Hawkins concludes:

In any case, for whatever reasons those Stonehenge builders built as they did their final completed creation was a marvel. As intricately aligned as an interlocking series of astronomical instrument (which indeed it was) and yet architecturally perfectly simple, in function subtle and elaborate, in appearance stark, imposing, awesome, Stonehey was a thing of surpassing ingenuity of design, variety of usefulness and grandeur—in concept and construction an eighth wonder of the world. (Hawkins & White. 1966. pp.117-118.
This interesting historical-archaeological controversy illustrates the use of sophisticated computer technology to test a hypothesis.

Example of Topic for Educational Historical Study
Brickman (1982) provides a number of possible topics by types of historical research in education and an example for each. We repeal his list here:

1. PERIOD. “Education during the First Half of the Fifteenth century.”
2. GEOGRAPHICAL REGION. “German Education under Frederick the Great.”
3. EDUCATIONAL LEVEL. “The Secondary Schools of Ancient Rome,”
4. INSTITUTION. “Amherst College in the Nineteenth Century.”
5. BIOGRAPHY. “Bronson Alcott as an Educator.” Biographical detail, as such, is of less importance for term-report purposes than an exposition of the man's educational ideas, work, and influence.
6. INNOVATIONS. “Three Decades of Audio-Visual Education.”
7. PHILOSOPHY. “Changing Concepts of American Higher Education in the Nineteenth Century.”

8. METHODOLOGY. “Herbartianism in American Educational Practice.”
9. CURRICULUM. “The Subject of Rhetoric in Ancient Greece.”
10. PERSONNEL. “The Role of the Teacher during the Renaissance.”
1. CHILDREN. “Changing Attitudes toward Corporal Punishment of Children in the United States.”
2. LEGISLATION. “Compulsory School Attendance Laws in Prussia During the Eighteenth Century.”
3. MATERIALS. “The Evolution of American School Readers, 1700-1830.”
4. NONSCHOOL AGENCIES. “The Development of the Library in Nineteenth-century America.”
5. ORGANIZATIONS. “History of the Public School Society of New York.”
6. FINANCE. “Methods of School Taxation in Pennsylvania. 1820-1880”
7. ARCHITECTURE. “The Evolution of the School Building in Illinois.”
8. ADMINISTRATION.” The Rise of the State Superintendence of Schools.”
9. LITERATURE. “A Century of Educational Periodicals in the United States.”
10. INFLUENCE. “The Influence of Rousseau upon Postalozzi.”
11. REPUTATION. “The Reception of Horace Mann's Educational Ideas in Latin America.”
12. COMPARISON. “A Comparative Study of Renaissance Theories of the Education of the Prince.”
13. TEXTBOOK ANALYSIS.”A Study of the Treatment of Primitive Education in Textbooks in Educational History”(pp 5-5)[3]

Obviously, these topics are too broad for a student project, and in some cases, would probably take most of a career. The processes of delimitation and hypothesis formation are needed to make these topics useful.

Writing the Historical Report

No less challenging than research itself is the writing of the report, which calls for creativity in addition to the qualities of imagination and resourcefulness already illustrated. It is an extremely difficult task to take often seemingly disparate pieces of information and synthesize them into a meaningful whole. Research reports should be written in a dignified and objective style. However, the historian is permitted a little more freedom in reporting. Hockett suggests that “the historian is not condemned to a bald, plain, unattractive style” and that “for the sake of relieving the monotony of statement after statement of bare facts, it is permissible, now and then, to indulge in a bit of color.” He concludes, however, by warning that “above all, embellishments must never become a first aim, or be allowed to hide or distort the truth” (Hackett, 1948, p. 139).

An evaluation of graduate students' historical-research projects generally reveals one or more of the following faults:

1. Problem to broadly stated.

[3] Used with the permission of Emeritus. Inc., Publisher.

2. Tendency to use easy-to-find secondary sources of data rather than sufficient primary sources, which are harder to locate but usually more trustworthy
3. Inadequate historical criticism of data because of failure to establish authenticity of sources and trustworthiness of data. For example, there .is often a tendency to accept the truth of a statement if several observers agree. It is possible that one may have influenced the other or that all were influenced by the same inaccurate source of information.
4. Poor logical analysis resulting from:

a. Oversimplification—failure to recognize the fact that causes of events are more often multiple and complex than single and simple.
b. Overgeneralization on the basis of insufficient evidence, and false reasoning by analogy, basing conclusions upon superficial similarities of situations.
c. Failure to interpret words and expressions in the light of there accepted meaning in an earlier period.
d. Failure to distinguish between significant facts in a situation and those that are irrelevant or unimportant.
e. Failure to consider the documents in the context of their time, that is, the existing beliefs, biases, and so forth.

5. Expression of personal bias, as revealed by statements lifted out of context for purposes of persuasion, assuming too generous or uncritical an attitude toward a person or idea (or being too unfriendly or critical), excessive admiration for the past (sometimes known as the "old oaken bucket" delusion), or an equally unrealistic admiration for the new or contemporary, assuming that all change represents progress
6. Poor reporting in a style that is dull and colorless, too flowery or flippant, too persuasive or of the "soap-box" type, or improper in usage.

It is apparent that historical research is difficult and demanding, The gathering of historical evidence requires long hours of careful examination of such documents as court records of legislative bodies, letters, diaries, official minutes of organizations, or other primary sources of data.. Historical research may involve traveling to distant places to examine the necessary documents or relics. In fact, any significant historical study would make demands that few students have the time, financial resources, patience, or expertise to meet. For these reasons, good historical studies are not often attempted for the purpose of meeting academic degree requirements.

Summary

History, the meaningful record of human achievement, helps us to understand the present and, to some extent, to predict the future. Historical research is the application of scientific method to the description and analysis of past events.

Historians ordinarily draw their data from the observations and experience of others. Because they are not likely to have been at the scene of the event, they must use logical inferences to supplement what is probably an incomplete account.

Primary sources may be "unconscious" testimony, not intended to be left as a record—relics or remains such as bones, fossils, clothing, food, utensils, weapons, coins, and an objects are useful. Conscious testimony, in the form of records or documents, is another primary source of information—examples are constitutions, laws, court decisions, official minutes, autobiographies, letters, contracts, wills, certificates, newspaper and magazine accounts, films, recordings, and research reports.

Historical criticism is the evaluation of primary data. External criticism is concerned with the authenticity or genuineness of remains or documents, and internal criticism is concerned with the trustworthiness or veracity of materials. The accounts of the Dead Sea Scrolls and Stonehenge illustrate the processes of historical criticism.

The historical research studies of graduate students often reveal serious limitations. Frequently encountered are such faults as slating the problem too broadly, inadequate primary sources of data, unskillful Historical criticism, poor logical analysis of data, personal bias, and ineffective reporting.

Exercises

1. Write a proposal for a historical study in a local setting. You may select a community, school, church, religious or ethnic group, or individual. State an appropriate title, present your hypothesis, indicate the primary sources of data that you would search, and tell how you would evaluate the authenticity and validity of your data.
2. Select a thesis of the historical type from the university library and analyze it in terms of
    a. hypothesis proposed or questions raised
    b. primary and secondary sources of data used
    c. external and Internal criticism employed
    d. logical analysis of data relationships
    e. soundness of conclusions
    f. documentation

John W. Best& James V. Kakn, (1992)	Research in Education, 6th ed. New Delhi, Prentice-Hall of India (Pvt.) Ltd. pp.76-109	2.4

ASSESSMENT EVALUATION AND DESCRIPTIVE RESEARCH

A descriptive study describes and interprets what is. It is concerned with conditions or relationships that exist, opinions that are held, processes that are going on, effects that are evident, or trends that are developing. It is primarily concerned with the present, although it often considers past events and influences as they relate to current conditions.

The term descriptive study conceals an important distinction, for not all descriptive studies fall into the category of research. In Chapter 1 the similarities and differences between assessment, evaluation, and research were briefly discussed. We will restate those similarities and differences in this discussion of descriptive studies.

Assessment describes the status of a phenomenon at a particular time. It describes without value judgment a situation that prevails; it attempts no explanation of underlying reasons and makes no recommendations for action. It may deal with prevailing opinion, knowledge, practices, or conditions. As it is ordinarily used in education, assessment describes the progress students have made toward educational goals at a particular time. For example, in the National Assessment of Education Progress program, the data are gathered by a testing program and a sampling procedure in such a way that no individual is tested over the entire test battery. It is not designed to determine the effectiveness of a particular process or program but merely to estimate the degree of achievement of a large number of individuals who have been exposed to a great variety of educational and environmental influences. It does not generally provide recommendations, but there may be some implied judgment on the satisfactoriness of the situation or the fulfillment of society's expectations.

Evaluation is a process used to determine what has happened during a given activity or in an institution. The purpose of evaluation is to see if a given program is working, an institution is successful according to the goals set for it, or the original intent is being successfully carried out. To assessment, evaluation adds the ingredient of value judgment of the social utility, desirability, or effectiveness of a process, product, or program, and it sometimes includes a recommendation for some course of action. School surveys are usually evaluation studies; educational products and programs are examined to determine their effectiveness in meeting accepted objectives, often with recommendations for constructive action.

Descriptive research, sometimes known as non experimental or correctional research, deals with the relationships between variables, the testing of hypotheses, and the development of generalizations, principles, or theories that have universal validity. It is

concerned with functional relationships. The expectation is that if variable A is systematically associated with variable B, prediction of future phenomena may be possible and the results may suggest additional or competing hypotheses to test.

In carrying out a descriptive research project, in contrast to an experiment i.e. researcher does not manipulate the variable, decide who receives the treatment, or arrange for events to happen. In fact, the events that are observed and described would have happened even though there had been no observation or analysis. Descriptive research also involves events that have already taken place and may be related to a present condition).

The method of descriptive research is particularly appropriate in the behavioral sciences because many of the types of behavior that interest the researcher cannot be arranged in a realistic setting. Introducing significant variables may be harmful of threatening to human subjects. Ethical considerations often preclude exposing human subjects to harmful manipulation. For example, it would be unthinkable for an experimenter to randomly decide who should smoke cigarettes and who should not smoke them for the purpose of studying the effect of smoking on cancer, heart disease, or other illnesses thought to be caused by cigarette smoke. Similarly, to deliberately arrange auto accidents, except when manikins are used in order to evaluate the effectiveness of seat belts or other restraints in preventing serious injury would be absurd.

Although many experimental studies of human behavior can be appropriately carried out both in the laboratory and in the field, the prevailing research method of the behavioral sciences is descriptive. Under the conditions that naturally occur in the home, the classroom, the recreational center, the office, or the factory, human behavior can be systematically examined and analyzed.

The many similarities between these types of descriptive studies may have tended to cloud the distinctions between them. They are all characterized by disciplined inquiry, which requires expertise, objectivity, and careful execution. They all develop knowledge, adding to what is already known. They use similar techniques of observation, description, and analysis. The differences between them lie in the motivation of the investigator, the treatment of the data, the nature of the possible conclusions, and the use of the findings. The critical distinctions are that the three types of studies have different purposes and, therefore, approach the problem differently and that only descriptive research studies lead to generalizations beyond the given sample and situation.

It is also possible for a single study to have multiple purposes. For instance, a study may evaluate the success/failure of an innovative program and also include sufficient controls to qualify as a descriptive research study. Similarly, an assessment study may include elements that result in descriptive research too.

Examples of these three types of descriptive studies are presented next. It is important to keep in mind that, while these examples are presented to illustrate each individual type of study (assessment, evaluation, or descriptive research), they are not mutually exclusive.

That is, for example, surveys are also used in descriptive research and case studies are also used in assessment studies.

ASSESSMENT STUDIES

The Survey

The survey method gathers data from a relatively large number of cases at a particular time. It is not concerned with characteristic of individuals as individuals. It is concerned with the generalized statistics that result when data are abstracted from a number of individual cases, it is essentially cross-sectional.

Ninety-four percent of American homes have at least one television set. About three out of five students who enter the American secondary school remain to graduate. Fifty-six percent of adult Americans voted in the 1972 presidential election. The average American consumes about 103 pounds of refined sugar annually. The ratio of female births to male births in the United States in 1974 was 946 to 1000. The population of Illinois according to the 1980 census, was 11,426,518. Data like these result from many types of surveys. Each statement pictures a prevailing condition at a particular time.

In analyzing political, social, or economic conditions, one of the first steps is to get the facts about the situation—or a picture of conditions that prevail or that are developing. These data may be gathered from surveys of the entire population. Others are inferred from a study of a sample group, carefully selected from the total population. And at times, the survey may describe a limited population, which is the only group under consideration.

The survey is an important type of study. It must not be confused with the mere clerical routine of gathering and tabulating figures. It involves a clearly defined problem and definite objectives. It requires expert and imaginative planning, careful analysis and interpretation of the data gathered, and logical and skillful reporting of the findings.

Social Surveys

In the late 1930s is an significant social survey was directed by the Swedish sociologist Gunner Myrdal and sponsored by the Carnegie Foundation. Myrdal and his staff of researchers made a comprehensive analysis of the social, political, and economic life of black persons in the United States, yielding a great mass of data on race relations in America (Myrdal, 1944).

The late Alfred Kinsey (1948) of Indiana University made a comprehensive survey of the sexual behavior of the human male, based on data gathered from more than 12,000 cases. His second study (Kinsey, 1953) of the behavior of the human female followed later. Although these studies have raised considerable controversy, they represent a scientific approach to the study of an important social problem and have many implications for jurists, legislators, social workers, and educators.

Witty (1967) has studied the television viewing habits of school children, and has published annual reports on his investigations. These studies were conducted in the Chicago area and indicate the amount of time devoted to viewing and the program preferences of elementary and secondary students, their parents, and their teachers. Willy attempted to relate television viewing to intelligence, reading habits, academic achievement, and other factors.

Shaw and McKay (1942) conducted a study of juvenile delinquency in Chicago yielding significant data on the nature and extent of delinquency in large urban communities.

Lang and Kahn (1986) examined special education teacher estimates of their students' criminal acts and crime victimizations. The data indicated that special education students seem to be victimized in the same way as others but to a greater degree. This preliminary study led to Lang's (1987) dissertation, an experiment aimed at reducing the rate of victimization of mentally retarded students.

The National Safely Council conducts surveys on the nature, extent, and causes of automobile accidents in all parts of the United States. State high school athletic associations conduct surveys on the nature and extent of athletic injuries in member schools.

Public Opinion Surveys

In our culture, where so many opinions on controversial subjects are expressed by well-organized special interest groups, it is important to find out what the people think. Without a means of polling public opinion, the views of only the highly organized minorities are effectively presented through the printed page, radio, and television.

How do people feel about legalized abortion, the foreign aid program, busing to achieve racial integration in the public schools, or the adequacy of the public schools? What candidate do they intend to vote for in the next election? Such questions can be partially answered by means of the public opinion survey. Many research agencies carry on these surveys and report their findings in magazines and in syndicated articles in daily newspapers.

Since it would be impracticable or even impossible to get an expression of opinion from every person, sampling techniques are employed in such a way that the resulting opinions of a limited number of people can be used to infer the reactions of the entire population.

The names Gallup, Roper, and Harris are familiar to newspaper readers in connection with public opinion surveys. These surveys of opinion are frequently analyzed and reported by such classifications as age groups, sex, educational level, occupation, income level, political affiliation, or area of residence. Researchers are aware of the existence of many publics, or segments of the public, who may hold conflicting points of view. This further analysis of opinion by subgroups adds meaning to the analysis of public opinion in general.

Those who conduct opinion polls have developed more sophisticated methods of determining public attitudes through more precise sampling procedures and by profiting from errors that plagued early efforts. In prediction of voter behavior several well-known polls have proved to be poor estimators of election results.

In 1936, a prominent poll with a sample of over 2 million voters predicted the election of Alfred Landon over President Roosevelt by nearly 15 percentage points. The primary reason for this failure in prediction was the poll's sampling procedure. The sample was taken from telephone directories and automobile registration lists, which did not adequately represent poor persons, who in this election voted in unprecedented numbers. Gallup, on the other hand, correctly predicted that Roosevelt would win, using a new procedure, quota sampling, in which various components of the population are included in the sample in the same proportion that they are represented in the population. However, there are problems with this procedure, which resulted in Gallup and others being wrong in 1948 (Babbie, 1973).

In the 1948 election campaign most polls predicted the election of Thomas E. Dewey over President Truman. This time the pollsters were wrong, perhaps partly because of the sampling procedure and partly because the polls were taken too far before the election despite a trend toward Truman throughout the campaign. Had the survey been made just prior to Election Day, a more accurate prediction might have resulted. In addition, most survey researchers (including pollsters) use probability sampling today instead of quota sampling. This results in all members of a given population having the same probability of being chosen for the sample. In the 1968 election the predictions of both Gallup and Harris polls were less than 2 percentage points away from Richard Nixon's actual percent of the vote with samples of only about 2000 voters. This accuracy was possible due to the use of probability sampling (Babbie, 1973).

In addition to the limitations suggested, there is a hazard of careless responses, given in an offhand way, that are sometimes at variance with the more serious opinions that are expressed as actual decisions.

Since 1969 the Gallup organization has conducted an annual nationwide opinion poll of public attitudes toward education. Using a stratified cluster sample of 1500 or more individuals over 18 years of age, the data have been gathered by personal interviews from seven geographic areas and four size of-community categories. The responses were analyzed by age, sex, race, occupation, income level, political affiliation, and level of education. A wide range of problem areas has been considered. In the 1975 poll such problem areas confronting education were the use of drugs and alcohol; programs on drugs or alcohol; behavior standards in the schools; policies on suspension from school; work required of students, including amount of homework; requirements for graduation from high school; federal aid to public schools; the non graded school program; open education; alternative schools; job training: right of teachers to strike; textbook censorship; and the role of the school principal as part of management (Elam, 1979). The 1982 poll indicated the public's clear support for education. Education was ranked first

among twelve funding categories considered in the survey—above health care, welfare, and military defense-with 55 percent selecting public education as one of their first three choices (Nation at Risk. 1983, p. 17).

National Assessment of Educational Progress

The National Assessment of Educational Progress was the first nationwide, comprehensive survey of educational achievement to be conducted in the United States. Originally financed be the Carnegie Foundation and the Fund for the Advancement of Education, with a supporting grant from the U.S. Office of Education, the Committee on Assessing the Progress of Education (CAPE) began its first survey in the spring of 1969. It gathered achievement test data by a sampling process such that no one individual was tested over the whole test battery or spent more than 40 minutes in the process. Achievement was assessed every 3 years in four age groups (9, 13, 17, and young adults between 26 and 35), in four geographical areas (Northeast, Southeast, Central, and West), for four types of communities (large city, urban fringe, rural, and small city), and for several socioeconomic levels and ethnic groups.

Achievement has been assessed in art, reading, writing, social studies, science, mathematics, literature, citizenship; and music. Comparisons between individuals, schools, or school systems have never been made,

The agency now conducting the assessment is the National Assessment of Educational Progress (NAEP), financed by the National Center for Educational Statistics, a division of the Department of Education. Periodic reports are provided for educators, interested lay adults, and for the general public through press releases to periodicals.

International Assessment

The international Association for the Evaluation of Educational Achievement, with headquarters in Stockholm, Sweden, has been carrying on an assessment program in a number of countries since 1964. The first study, The International Study of Achievement in Mathematics (Trosten, 1967]. Compared achievement in twelve countries: Austria, Belgium, England, Finland. France, West Germany, Israel, Japan, the Netherlands, Scotland, Sweden, and the United States. Short answer and multiple choice tests were administered to 13-year-olds and to students in their last year of the upper secondary schools, prior to university entrance. More than 132,000 pupils and 5000 schools were involved in the survey. Japanese students excelled above all others, regardless of their socioeconomic status, and United States students ranked near the bottom.

Although the purpose of assessment is not to compare school systems, the data lead observers to make such comparisons. Critics of the first assessment pointed out the inappropriateness of comparing 17-year-olds in the United States, where more than 75 percent are enrolled in secondary schools, with 17-year-olds in other countries in which those, enrolled in upper secondary schools comprise a small, highly selected population.

More recent assessments reveal that, although 10 percent of the top United States students surpassed similar groups in all other countries in reading, in science they occupied seventh place (Hechinger & Hechinger, 1974).

Other assessments have been carried out and the number of participating countries has been increased to twenty-two.

Activity Analysis

The analysis of the activities or processes that an individual is called upon to perform is important, both in industry and in various types of social agencies. This process of analysis is appropriate in any field of work and at all levels of responsibility. It is useful in the industrial plant, where needed skills and competencies of thousands of jobs are carefully studied, jobs ranging in complexity from unskilled laborer to plant manager.

In school systems the roles of the superintendent, the principal, the teacher, and the custodian have been carefully analyzed to discover what these individuals do and need to be able to do. The Commonwealth Teacher Training Study (Charters & Waples, 1929) described and analyzed the activities of several thousand teachers, and searched previous studies for opinions of writers on additional activities in which classroom teachers should engage. A more recent study (Morris, Crowson, Porterr-Gehrie, & Hurwitz, 1984) described and analyzed the activities of school principals. This study is described in some detail later in this chapter as an example of ethnographic research.

This type of analysis may yield valuable information that would prove useful in establishing

1. The requirements for a particular job or position
2. A program for the preparation or training of individuals for various jobs or positions
3. An in-service program for improvement in job competence or for upgrading of individuals already employed
4. Equitable wage or salary schedules for various jobs or positions.

Trend Studies

The trend study is an interesting application of the descriptive method. In essence it is based upon a longitudinal consideration of recorded data, indicating what has been happening in the past, what the present situation reveals, and on the basis of these data, what is likely to happen in the future. For example, if the population in an area shows consistent growth over a period of time, one might predict that by a certain date in the future the population will reach a given level. These assumptions are based upon the likelihood that the factors producing the change or growth will continue to exert their influence in the future. The trend study points to conclusions reached by the combined methods of historical and descriptive analysis, and is illustrated by Problems and Outlook of Small Private Liberal Arts Colleges:

Report to the Congress of the United States by the Comptroller Genera (1978). In response to a questionnaire sent to 332 institutions, 283 furnished data on facility

construction, loan repayments, enrollment, the effectiveness of methods used to attract more students, financial aid provided, and the general financial health of their institutions.

Based upon past and present experience, such influences as the growth of the community college, the effect of inflation on operating costs, tuition, living expenses and fees, and the decline in the number of college age students were projected for the years 1978 to 1985 and their impact upon the financial stability of the small liberal arts college assessed.

The following trend study topics would also be-appropriate:
1. The Growing Participation of Women in Intercollegiate Sports Programs
2. Trends in the Methods of Financial Support of Public Education
3. The Growth of Black Student Enrollment in Graduate Study Programs
4. The Minimum Competency Requirement Movement in American Secondary Education

EVALUATION STUDIES

School Surveys
What has traditionally been called a school survey is usually an assessment and evaluation study. Its purpose is to gather detailed information to be used as a basis for judging the effectiveness of the instructional facilities, curriculum, teaching and supervisory personnel, and financial resources in terms of best practices and standards in education for example, professional and regional accrediting agencies send visitation teams to gather data on the characteristics of the institution seeking accreditation. Usually, following a self-evaluation by the school staff, the visiting educators evaluate the institution's characteristics on the basis of agency guidelines.

Many city, township, and county school systems have been studied by this method for the purpose of determining status and adequacy. These survey-evaluations are sometimes carried on by an agency of a university in the area. Frequently a large part of the data is gathered by local educators, with the university staff providing direction and advisory services.

Program Evaluation
The most common use of evaluation is to determine the effectiveness of a program and sometimes the organization. The school surveys described above are evaluations only of the organization. Program evaluations, while often including the organization, focus primarily on program effectiveness results. As Kaufmnn and Thomas (1980) put it: Evaluation deals with results, intended and unintended. The questions asked during evaluation are usually the same. Regardless of the context, evaluation seeks to answer the following questions:
1. What are the goals and objectives of the organization?
2. What should be the goals and objectives of the organization?

3. What results were intended by the program, project, activity, or organization?
4. What results were obtained by the program, project, activity, or organization?
5. What were the value and usefulness of the methods and means used to achieve the results?
6. How well was the program, project, activity, or organization administered and managed?
7. What, if anything, about the program project, activity, or organization should be changed?
8. What, if anything, about the program, project, activity, or organization should be continued?
9. Should the organization project, program, or activity exist at all?

These questions are basic. They probe the issue of activities and the worth of these activities in terms of what they accomplished.
Evaluation is more than testing or measuring: it includes asking and answering basic questions about efforts and results, (pp. 1—2)[1]

There are a number of evaluation models that evaluators use. Some models are actually research approaches to evaluation Ruttman (1977) used the term evaluation research to describe evaluation procedures that use rigorous research methodology. Other models are less rigorous. The mode! selected should depend on the purpose for the evaluation. Kaufman and Thomas (1980) describe eight possible models.

Assessment and Evaluation In Problem Solving
In solving a problem or charting a course of action several sorts of information may be needed. These data may be gathered through assessment and evaluation methods.
The first type of information is based upon present conditions. Where are we now? From what point do we start? These data may be gathered by a systematic description and analysis of all the important aspects of the present situation.

The second type of information involves what we may want. In what direction may we go? What conditions are desirable or are considered to represent best practice? This clarification of objectives or goals may come from a study, of what we think we want possibly resulting from a study of conditions existing elsewhere, or of what experts consider to be adequate or desirable.

The third type of information is concerned with how to get there. This analysis may involve finding out about the experience of others who have been involved in similar situations. It may involve the opinions of experts, who presumably know best how to reach the goal.

1 Used with the permission of the authors

Some studies emphasize only one of these aspects of problem solving. Others may-deal with two, or even three, of the elements. Although a study does not necessarily embrace all the steps necessary for the solution of a problem it may make a valuable contribution by clarifying only one of the necessary steps—from description of present status to the charting of the path to the goal.

Assessment and evaluation methods may supply some or all of the needed information. An example will illustrate how they can be used to help solve an educational problem.

Washington Township has a school building problem. Its present educational facilities seem inadequate, and if present developments continue, conditions may be much worse in the future The patrons and educational leaders in the community know that a problem exists, but they realize that this vague awareness does not provide a sound basis for action. Three steps are necessary to provide such a basis.

The first step involves a systematic analysis of present condition. How many school-age children are there in the township? How many children are of preschool age? Where do they live? How many classrooms now exist? How adequate are they? What is the average class size? How are these present buildings located in relation to residential housing? How adequate are the facilities for food, library, health, and recreational services? What is the present annual budget? How is it related to the tax rate and the ability of the community to provide adequate educational facilities?

The second step projects goals for the future. What will the school population be in 5, 10, or 20 years? Where will the children live? How many buildings and classrooms will be needed? What provisions should be made for special school services, for libraries, cafeterias, gymnasiums, and play areas to take care of expected educational demands?

Step three considers how to reach those goals, which have been established by the analysis of step two. Among the questions to be answered are the following: Should existing facilities be expanded or new buildings constructed? If new buildings are needed, what kind should be provided? should schools be designed for grades 1 through 8, or should 6-year elementary schools and separate 2 or 3-year junior high schools be provided how will the money be raised? When and how much should the tax rate be increased? When should the construction program get underway?

Many of the answers to the questions raised in step three will be arrived at by analysis of practices of other townships, the expressed opinions of school patrons and local educational leaders, and the opinions of experts in the areas of school buildings, school organization, community planning, and public finance. Of course, this analysis of school building needs is but one phase of the larger educational problem of providing an adequate educational program for tomorrow's children. There remain problems of curriculum, pupil transportation, and school personnel. Using similar methods of assessment and evaluation can also attack these problems.

The Follow-Up Study

The follow up study investigates individuals who have left an institution after having completed a program, a treatment, or a course of study. The study is concerned with what has happened to them, and what has been the impact upon them of the institution and its program. By examining their status or seeking their opinions, one may get some idea of the adequacy or inadequacy of the institution's program. Which courses, experience, or treatments proved to be of value? Which proved to be ineffective or of limited value? Studies of this type enable an institution to evaluate various aspects of its program in light of actual results.

Dillon's (1949) study of early school leavers has yielded information that may lead to the improvement of the curriculum, guidance services. Administrative procedures, and thus the holding power of the American secondary school.

Project talent (U.S. Office of Education, 1965) was an educational survey conducted by the University of Pittsburgh with support from the Cooperative Research Program of the U.S. Office of Education, the National Institutes of Health, the National Science Foundation, and the Department of Defense. The survey consisted of the administration of a 2-day battery of aptitude, ability, and achievement tests, and inventories of the background characteristics of 440,000 students enrolled in 1353 secondary schools in all parts of the United States. Five basic purposes of the survey were stated:

1. To obtain an inventory of the capacities and potentialities of American youth
2. To establish a set of standards for educational and psychological measurement
3. To provide a comprehensive counseling guide indicating patterns of career success
4. To provide information on how youth choose their life work
5. To provide better understanding of the educational experiences which prepare students for their life work.

In addition to the testing program, questionnaire follow-up studies have been conducted, and are planned at regular intervals, to relate the information gathered to patterns of aptitude and ability required by various types of occupations The vast amount of data stored in the data bank, now available in the computer tiles, will make significant educational research possible and may provide a basis for possible changes in the educational patterns of American secondary schools.

Project talent, described as an example of an educational survey, also provides an illustration of a follow-up study. One phase of the longitudinal study reported by Combs and Cooley (1968), Involved the follow-up of the ninth-grade group who failed to complete the high school program. This group, which represented a random sample of the ninth-grade secondary school population, provided an estimate of the characteristics of the drop-out population, compared with those of a random sample of students who graduated but did not enter a junior college or 4-year institution of higher learning. These two samples were compared on a number of characteristics, such as academic achievement, participation in extracurricular activities, work experiences, hobbies, contacts with school counselors, and self reported personal qualities.

The students who graduated scored significantly higher on most of the characteristics, except self-reported qualities of leadership and impulsiveness. One unusual finding indicated that the dropouts earned as much as those who had finished high school and had been earning it longer. It was pointed out, however, that the economic advantages of finishing high school could not be adequately evaluated until later in life.

Project Talent, funded by the National Institute of Education, maintained contact with the original students and has completed the eleventh year follow-up survey. Many of the students expressed dissatisfaction with their schooling and regretted that they had not gone on to college or vocational school and that they had married too early. More than half still live within 30 miles of their high schools, a surprising observation in a society that is believed to be extremely mobile. The more mobile half were the high academic achievers. Eighty percent of the men, but only 65 percent of the women expressed satisfaction with their jobs in meeting their long-range goals.

Descriptive Research

The examples discussed up to this point in the chapter have been designated as assessment studies and evaluation studies. Descriptive research studies have all of the following characteristics which distinguish them from the type previously described and from those described in the next chapter.

1. They involve hypothesis formulation and testing.
2. They use the logical methods of inductive-deductive reasoning to arrive at generalizations.
3. They often employ methods of randomization so that error may be estimated when inferring population characteristics from observations of samples.
4. The variables and procedures are described as accurately and completely as possible so that other researchers' can replicate the study.
5. They are non experimental, for they deal with the relationships between non-manipulated variables in a natural rather than artificial setting. Since the events or conditions have already occurred or exist, the researcher selects the relevant variables for an analysis of their relationships.

Quantitative and Qualitative Research

Descriptive research can be divided into two broad categories: quantitative research and qualitative research. Quantitative research consists of those studies in which the data concerned can be analyzed in terms of numbers. An example of quantitative research might be a study comparing two methods of teaching reading to first-grade children, because the data used to determine which method is more successful will be a test score. The average score of the children receiving one method will be compared to the average score of children receiving the other method. This example would be an experimental study (discussed in Chapter 5) if the experimenter randomly assigned the children to the methods, or a descriptive study if the children had already received the instruction and the experimenter was merely examining the results after the fact (sec ex post facto studies later in this chapter). In either case the study wooed one considered quantitative.

Research can also be qualitative, that is, it can describe events, persons, and so forth scientifically without the use of numerical data. A study consisting of interviews of mothers of handicapped infants to determine how their lives and beliefs were affected by the birth of their handicapped children is an example of qualitative research. Such a study would carefully and logically analyze the responses of the mothers and report those responses that are consistent as well as areas of disagreement.

Each of these types of research has advantages and disadvantages. In quantitative research, the experimenter has carefully planned the study including the tests, or other data collection instruments, to be used. Each subject is studied in an identical manner and there is little room for human bias to create problems with the data. Qualitative research is also planned carefully. Yet, qualitative studies leave open the possibility to change, to ask different questions, and to go in the direction that the observation may lead the experimenter. Quantitative research is based more directly on its original plans and its results are more readily analyzed and interpreted. Qualitative research is more open and responsive to its subject. Both types of research are valid and useful. They are also not mutually exclusive. It is possible for a single investigation to use both methods. For instance, a study of mothers of handicapped infants might include interviews, as mentioned earlier, and measures of religiosity and knowledge regarding their child's handicap. Such a study would interpret the interview data qualitatively and the measures of religiosity and knowledge quantitatively. While studies combining these approaches are rare and difficult, the benefits can outweigh the difficulties.

Of the types of descriptive research that follow, the first three, document analysis, case studies, and ethnographic studies, are types of qualitative research. The ex-post-facto studies in this chapter and the experimental and quasi-experimental designs in Chapter 5 are quantitative research.

Document or Content Analysis

Documents are an important source of data in many areas of investigation, and the methods of analysis are similar to those used by historians. The major difference between this type of research and historical research is that, while historical research often uses document analysis, it deals solely with past events. ‘When document analysis is used as descriptive research, current documents and issues are the foci. The analysis is concerned with the explanation of the status of some phenomenon at a particular time or its development over a period of time. The activity may be classified as descriptive research, for problem identification, 'hypothesis formulation, sampling, and systematic observation of variable relationships may lead to generalizations. It serves a useful purpose in adding knowledge to fields of inquiry and in explaining certain social events. Its application to educational research is suggested in some of the studies listed as examples.

In documentary analysis, the following may be used as sources of data: records, reports, printed forms, letters, autobiographies, diaries compositions, themes or other academic work. Books, periodicals, bulletins or catalogues, syllabi, court decisions, pictures, films, and cartoons.

When using documentary sources, one must bear in mind that data appearing in print are not necessarily trustworthy. Documents used in descriptive research must be subjected to the same careful types of criticism employed by the historian. Not only is the authenticity of the document important, but also the validity of its contents is crucial. It is the researcher's obligation to establish the trustworthiness of all data that he or she draws from documentary sources.

The following purposes may be served through documentary analysts (examples of actual studies are given as illustrations). The first five purposes are of a descriptive research nature while the subsequent three are historical in nature:

1. To describe prevailing practice or condition. Entrance Requirements of Ohio Colleges as Revealed by an Analysis of College Bulletins Criteria for Primary Pupil Evaluation Used on Marion County Report Cards
2. To discover the relative importance of, or interest in, certain topics or problems, Public Information an Education as Measured by Newspaper Coverage in Three Indianapolis Daily Newspapers during the Month of December, 1958
   Statistical Concepts Presented in College Textbooks in Educational Research Published since 1940.
3. To discover the level of difficulty of presentation in textbooks or in other publication.
   The Vocabulary Level of Intermediate Science Textbook Abstract Concepts Found in First-grade Readers
4. To evaluate bias, prejudice, or propaganda in textbook presentation. The Soviet Union as Presented in High School History Textbooks The Free Enterprise System as Pictured in High School Social Problems Textbooks Racial and Religious Stereotypes in Junior High School Literature Textbooks
5. To analyze types of errors in Students' work.
   Typing Errors of First Semester Typing Students at Shortridge High School Errors in English Usage Found in Letters of Application for Admission to the University of Wisconsin.
6. To analyze the use of symbols representing persons, political parties or institutions, countries, or points of view.
   Great Britain as a Symbol, as Represented in New York City Newspaper Cartoons in the Decade, 1930-1940.
   The New Dealer as Depicted in the American Press from 1932 to 1942
7. To identify the literary style, concepts, or beliefs of a writer Shakespeare's Use of the Metaphor
   Alexander Campbell's Concept Of the Trinity, as Revealed in is Sermons John Dewey's Interpretation of Education as Growth
8. To explain the possible causal factors related to some outcome, action, or event. The Effect of Media Coverage upon the Outcome of the 1976 Presidential Election
   The Influence of Newspaper Editorials upon the Action of the State Assembly on Sales Tax Legislation.

Content or document analysis should serve a useful purpose in yielding information that is helpful in evaluating or explaining social or educational practices. Since there are so many significant areas to be investigated, setting up studies for the pure joy of counting and tabulating has little justification. “The Uses of Shall and Will in the Spectator Papers” or “The Use of Too. Meaning also, in the Works of Keats” would seem to add little useful knowledge to the field of literature.

The Case Study

The case study is a way of organizing social data for the purpose of viewing social reality. It examines a social unit as a whole. The unit may be a person, a family, a social group, a social institution, or a community. The purpose is to understand the life cycle or an important part of the life cycle of the unit. The case study probes deeply and analyzes interactions between the factors that explain present status or that influence change or growth. It is a longitudinal approach, showing development over a period of time.

The element of typical ness, rather than uniqueness, is the focus of attention, for an emphasis upon uniqueness would preclude scientific abstraction and generalization of findings. As Bromley (1986) notes. “A 'case’ is not only about a 'person' but also about that 'kind of person”. A case is an exemplar of, perhaps even a prototype for, a category of individuals” (p. 295). Thus, the selection of the subject of the case study needs to be done carefully in order to assure that he or she is typical of those to whom we wish to generalize.

Data may be gathered by a wide variety of methods, including

1. Observation by the researcher or his or her informants of physical characteristics, social qualities, or behavior
2. Interviews with the subject (s), relatives, friends, teachers, counselors, and others
3. Questionnaires, opinionates, Psychological tests and inventories
4. Recorded data from newspapers, schools, courts, clinics, government agencies, or other sources.

A single case study emphasizes analysis in depth. Though it may be fruitful in developing hypotheses to be tested, it is not directed toward broad generalizations. One cannot generalize from a number (N) of 1. To the extent that a single case may represent an atypical situation, the observation is sound. But if the objective analysis of an adequate sample of cases leads researchers to consistent observations of significant variable relationships, hypotheses may be confirmed, leading to valid generalizations.

The individual case study has been a time-honored, procedure in the field of medicine and medical research. Sigmund Freud was a pioneer in using case study methods in the field of psychiatry. In an effort to treat his psychoneurotic patient, he began to discover consistent patterns of experience. Under his careful probing, patients recalled long-forgotten, traumatic incidents in their childhood and youth. Freud hypothesized that these incidents probably explained their neurotic behavior (Starchey, 1964).

His famous case history of Sergei Petrov, “the Wolf Man,” published in 1918 under the title From the History of an Infantile Neurosis, is one of the classic examples of Freud's use of the case study. He believed that these case studies confirmed his hypothesis, leading to psychoanalysis as a method of treatment. He also used them to demonstrate how theoretical models could be used to provide concrete examples.

Case studies are not confined to the study of individuals and their behavioral characteristics. Case studies have been made of all types of communities, from hamlet to great metropolis, and of all types of individuals—alcoholics, drug addicts, juvenile delinquents, migratory workers. Sharecroppers, industrial workers, members of professions, executives, army wives, trailer court residents, members of social classes, Quakers, Amish, members of other religious sects and denominations, black Americans, American Indians, Chinese-Americans, Hispanics, and many other social and ethnic groups. Such institutions as colleges, churches, corrective institutions, welfare agencies, fraternal organizations, and business groups have been Studied as cases. These studies have been conducted for the purpose of understanding the culture and the development of variable relationships.

For example, a community study is a thorough observation and analysis of a group of people living together in a particular geographic location in a corporate way. The study deals with such elements of community life as location, appearance, prevailing economic activity, climate and natural resources, historical development, mode of life, social structure, goals or life values and patterns, the individuals or power groups that exert the dominant influence, and the impact of the outside world. It also evaluates the social institutions that meet the basic human needs of health, protection, making a living, education, religious expression, and recreation.

The early community studies of Lynda and Lynda are well known. The first, *Middletown* (1929), and the second, Middletown in Transition (1937), described the way of life in Muncie, Indiana, a typical Midwestern, average-size city, tracing its development from the gas boom of the 1890s through World War I, the prosperity of the twenties, and the depression of the thirties. West (1945) described the nature of a very small community in the Ozark region in Plainville. USA. Sherman and Henry {1933} studied the way of life in five “hollow” communities, hidden in the Blue Ridge Mountains, *in Hollow Folk.*

Some community studies have singled out particular aspects for special investigation. Drake and Cayton (1945) described life in the black section of Chicago in Black Metropolis. Hollingshead (1949) portrayed the life of adolescents in a small Illinois community in Elmtown’s Youth. Warner and Lunt (1941) developed a hypothesis of social class structure in a New England community in their study of Newburyport, Massachusetts, in Social Life in a Modern Community. Lucas (1970) compared the way of life in three Canadian communities in Mine town, Milltown, Rail town: Life in Canadian Communities of Single Industry.

Although the case study is a useful method of organizing research observations, certain precautions should be considered:

1. The method may look deceptively simple. To use it effectively, the researcher must be thoroughly familiar with existing theoretical knowledge of the field of inquiry, and skillful in isolating the significant variables from many that are irrelevant. There is a tendency to select variables because of their spectacular nature rather than for their crucial significance.
2. Subjective bias is a constant threat to objective data gathering and analysis. The danger of selecting variable relationships based upon preconceived conviction and the apparent consistency of a too limited sample of observations may lead the researcher to an unwarranted feeling of certainty about the validity of his or her conclusions.
3. Effects may be wrongly attributed to factors that are merely associated rather than cause-and-effect related. While the case study process is susceptible to this post hoc fallacy, it is also a hazard associated with other types of non-experimental studies.

Ethnographic Studies

*Ethnograph*y, sometimes known as cultural anthropology or more recently as naturalistic *inquiry*, is a method of field study observation that became popular in the latter part of the nineteenth century. It has continued to show significant development, suggesting promising techniques for the study of behavior in an educational situation. In its early application, it consisted of participant observation, conversation, and the use of informants to study the cultural characteristics of primitive people: African, South See Island, and American Indian tribes. These groups were small in number. Geographically and culturally isolated, with little specialization in social function, and with simple economies and technology. Such cultural features as language, marriage and family life, child-rearing practices, religious beliefs and practices, social relations and rules of conduct, political institutions and methods of production were analyzed.

The data gathered consisted of observation of patterns of action, verbal and nonverbal interaction between members of the tribe as well as between the subjects and the researcher and his or her informants, and the examination of whatever records or artifacts were available.

Many early studies were subsequently criticized on the grounds that the anthropologist spent too little time among the people of the tribe to get more than a superficial view, didn't learn the native language and had to depend too much on the reports of poorly trained informants, and relied too much on his or her own cultural perspective, reaching ethnocentric, judgmental conclusions that resulted in stereotyped theories of the development of the primitive society.

Later investigators realized that studies of this type would be invalid unless the observer

1. Lived for a much more extensive period of time among the tribe and became an integrated member of the social group.
2. Learned the native language, enabling him or her to develop the sensitivity to think, feel, and interpret observations in terms of the tribes concepts, feelings, and values, while at the same time supplementing his or her own objective judgment in interpreting observations.
3. Trained his or her informants to systematically record field data in their own language and cultural perspective.

This refinement of participant observation resulted in more objective and valid observation and analysis. Some studies were directed toward the examination of the total way of life of a group. Other studies singled out a particular phase of the culture for intensive analysis, taking into account those elements that were relevant to the problem.

In her classic study, Coming of Age in Samoa, Mead (1928) observed the development of 53 adolescent girls in a permissive Samoan society. She concluded that there were no differences in the physical processes of adolescent growth between Samoan and American girls: The differences were differences in response. The difficulties of this period of development, a troublesome feature of American life, do not occur in Samoa. She attributed the difference to Samoa's more homogeneous culture, a single set of religious and moral beliefs, and a wider kinship network that conferred authority and affection. The difficulties of American girls were attributed to cultural restraints, not nature.

Many of the time-honored techniques of the ethnograpl study involving integration into the group and observation are being applied to psychology and education, as well as anthropology and sociology. An excellent example of this methodology applied to an educational issue is a recent study of school principals. Morris, Crowson, Porter-Gehrie, and Hurwitz (1984) were interested in determining exactly what principals actually do and how much time is spent on those activities. Their procedure was to have each principal observed for up to 12 full work days. The observers followed the principal wherever he or she went. The authors “were interested in whom the principal interacted with and by what means (verbal face to face, written word, telephone, etc.). We wanted to know which party initiated each interchange, whether it was planned or spontaneous, how long it lasted, and where it took place. Most important, we warned to follow the changing subject matters of these conversations, not only to see what topics consumed the principal's time but also to trace the rhythm of the principal's working hours” (Morris, et al. 1984. p. v).[2] One of the conclusions of this study was that principals usually spend less than half their workday in their offices, That they have a good deal of discretion in their decision-making, and that the principal's behavior “affects four distinct 'constituencies “: teachers and students, parents and others in the community, superiors, and the principal him or herself (Morris, et al. 1984. p.v).

The ethnographic study is a qualitative approach, employing few, if any, quantitative data-gathering instruments. Using the method of observation. The researcher observes, listens to, and sometimes converses with the subjects in as free and natural an atmosphere as possible. The assumption is that the most important behavior of individuals in groups is a dynamic process of complex interactions and consists of more than a set of facts, statistics, or even discrete incidents. The strength of this kind of study lies in the observation of natural behavior in a real-life setting, free from the constraints of more conventional research procedures.

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Another assumption is that human behavior is influenced by the setting in which it occurs. The researcher must understand that setting and the nature of the social structure: its traditions, values, and norms of behavior. It is important to observe and interpret as an outside observer but also to observe and interpret in terms of the subjects—how they view the situation, how they interpret their own thoughts, words, and activities, as well as those of others in the group. The researcher gets inside the minds of the subjects, while at the same time interpreting the behavior from his or her own perspective.

The relationship of researchers to their subjects is based upon trust and confidence. Researchers do not allow themselves to be aligned with either the authority figures or the subjects. A position of neutrality is essential to objective participant observation.

Unlike conventional deductive quantitative research, participant observers begin without preconceptions and hypotheses. Using inductive logic, they build their hypotheses as they are suggested by observations. They periodically reevaluate them on the basis of new observations, modifying them when they appear to be inconsistent with the evidence. They look for negative evidence to challenge their temporary hypotheses. In a sense, this type of research has the characteristics of a series of consecutive studies. Unlike the conventional research study, the interpretation is not deferred to the conclusion but is a constant ongoing process of testing tentative hypotheses against additional observations in a real situation.

Ethnographic methods of research have been used to investigate such problems as:

1. Student Leadership Roles in an Urban, Racially Integrated High School
2. Pupil-Teacher Relationships in a Suburban Junior High School
3. Social Relationships in a Class of Emotionally Disturbed Children
4. Changes in Attitudes and Behavior in a Drug Abuse Rehabilitation Center
5. The Social Class Structure of a Florida, Cuban-American Community
6. Staff-Parent Interactions in an Individualized Education Plan (IEP) Staffing

Post Facto or Causal-Comparative Studies

Descriptive research seeks to find answers to questions through the analysis of variable relationships. What factors seem to be associated with certain occurrences, outcomes, conditions, or types of behaviors? Because it is often impracticable or unethical to arrange occurrences, an analysis of past events or of already existing conditions may be the only feasible way to study causation. This type of research is usually referred to as ex post facto or causal-comparative research or, when correlational analyses are used, it may be referred to as *correlational research.*

For example, one would not arrange automobile accident in order to study their causes. The automobile industry, police departments, safety commissions, and insurance companies study the conditions associated with the accidents that have occurred. Such factors as mechanical faults or failures excessive speed, driving under the influence of alcohol, and others have been identified as causal.

However, while studies of past events may be the only practicable way to investigate certain problems, the researcher needs to be aware of the problems inherent in this type of research. The researcher must be cognizant of the fact that the information used in ex post facto studies may be incomplete. That is the researcher may not have sufficient information about all of the events and variables that were occurring at the time being studied. This lack of control or even of knowledge regarding what variables were controlled makes causal statements based upon this type of research very difficult to make.

Research on cigarette smoking has had a tremendous effect on society Laws banning television advertising and cigarette smoking in certain areas resulted from the U.S. Surgeon General's reports (1964.1979). These reports compiled the research of epidemiologists on the effects of smoking on a person's health. Epidemiological research methods are used to study trends and incidences of disease and are descriptive in nature. The epi-demonological research on smoking included two types of descriptive meth-odology: retrospective studies relate personal histories with medical and mortality records; prospective studies follow a group of individuals for an indefinite period or until they die. The early studies, from 1939 to the early 1960s, were primarily retrospective. These studies found that persons who had Jed of lung cancer were more likely to have been cigarette smokers than nonsmoker.

TABLE 4-1 Expected Death Rates for Smokers

UNDERLYING CAUSE OF DEATH	EXPECTED DEATHS	OBSERVED DEATHS	MORTALITY RATIO
Cancer of lung (162-3)	170.3	I,833	10.3
Bronchitis and emphysema (502,	89.5	546	5.1
521.1)	14.0	75	5.4
Cancer of larynx (161)	37.0	152	4.1
Oral cancer (140-8)	33.7	113	3.4
Cancer of esophagus (150)	105.1	294	2.8
Stomach and duodenal ulcers (540,	254.0	649	2.6
541)	169-2	379	2.2
Other circulatory diseases (451-68)	111.6	216	1.9
Cirrhosis of liver (581)	5,430.7	11,177	1.7
Cancer of bladder (181)	526.0	868	1.7
Coronary artery disease (420)	409.2	631	1.5
Other heart diseases (421-2, 430-4)	210.7	310	1.5
Hypertensive heart (440-3)	79.0	120	1.5
General arteriosclerosis (450)			
Cancer of kidney (180)	15,653.9	23,223	1.68
All causes			

(Surgeon Generals Report, 19&4).

A number of prospective studies, begun in the 1950s, found a greater likelihood of a variety of health problems among smokers than nonsmokers. Table 4-1 (Table 2 in Chapter 4 of the U.S. Surgeon General's [1964] report) shows the expected number of deaths, based on the overall death rates for persons, the ages of the subjects, and the actual number of deaths for seven prospective studies combined. Mortality ratio is simply observed deaths divided by expected deaths. As the Surgeon General's report states:
The mortality ratio for male cigarette smokers compared with non-smokers, for all causes of death taken together, is 1.68 representing a total death rate nearly 70 percent higher than for non-smokers. (This ratio includes death rates for diseases not listed in the table as well as the 14 disease categories shown.)

In the combined results from the seven studies, the mortality ratio of cigarette smokers over non-smokers was particularly high for a number of diseases: cancer of the lung (10.8). bronchitis and emphysema (6.I) cancer of the larynx (5.4), oral Cancer (4.1), cancer of the esophagus (3.4) peptic ulcer(2.8), and the group of other circulatory diseases (2.6). For coronary artery disease the mortality ratio was 1.7.

Expressed in percentage-form, this is equivalent to a statement that for coronary artery disease, the leading cause of death in this country, the death rate is 70 percent higher for cigarette smokers. For chronic bronchitis and emphysema, which are among the leading causes of severe disability, the death rate for cigarette smokers is 500 percent higher than for non-smokers. For lung cancer, the most frequent site of cancer in men, the death rate is nearly 1,000 percent higher, (pp. 28-29)

While this evidence appears overwhelming, it is not totally convincing by itself. Since the researchers could not randomly assign persons to the smoking and nonsmoking groups, it is possible that persons who decide to smoke are particularly nervous individuals and that it is their nervousness, not their smoking, that causes their greater incidence of illness and early death. Of course this research, along with chemical analyses indicating carcinogens in cigarette smoke and animal studies, is convincing to the vast majority of scientists and the public.

Studies of juvenile delinquency may compare the social and educational backgrounds of delinquents and non delinquents. What factors, if any, were common to the non-delinquent group? Any factors common to one group, but not to the other, might serve as a possible explanation of the underlying causes of delinquency.

Some efforts have been made to associate good or poor teaching with the type of educational institution in which the teachers prepared. Those studies have proved inconclusive, possibly for a number of reasons. In addition to the difficulty of finding valid and satisfactory criteria of good and poor teaching, many factors other than type of college attended seem to be significant. Such variables as quality of scholarship, socioeconomic status, personality qualities, types of non school experiences, attitudes toward the teaching profession, and a host of others have possible relevancy.

Sesame Street studies. Minton (1975) studied the effect of viewing the children's television program, "Sesame Street," on the reading readiness of kindergarten children. Of three sample groups, a 1968, a 1969, and a 1970 group, only the 1970 group had viewed the program.

Reading Readiness and "Sesame Street"

SAMPLE GROUP	N	WHITE	BLACK	SPANISH-SPEAKING
1968	482	431	51	18
1969	495	434	61	9
1970	524	436	88	25

From impact of Sesame Street on Reading readiness" by J M Minton, Sociology of Education, 1975, 48. l41-51, Reported by permission.

Scores on the Metropolitan Reading Readiness Test battery, consisting of six subtests (word meanings, listening, matching, alphabet letter recognition, numbers, and copying text) were used to measure readiness. Using pretest- posttest design, the mean gain scores of the 1970 group were compared with those of the 1968 and 1969 groups.

No significant differences at the 0.05 levels were observed in total scores. On only one of the subtests, letter recognition, was a significant difference observed, favoring the 1970 group. In a classification by socio-economic status, advantaged children watched more and scored higher than disadvantaged children. The hypothesis that viewing "Sesame Street" would help to close the gap between advantaged and disadvantaged children was not supported; rather, the gap was widened.

Anderson and Levin (1976) studied the effect of age on the viewing attention of small children to a 57-minute taped "Sesame Street" program, consisting of 4.1 bits, each ranging in length from 10 to 453 seconds. Six groups of five boys and five girls, ages 12, 18, 24, 30, 36, 42, and 48 months were observed by video tape recordings. In a viewing room, in the presence of parents, toys were provided as alternatives to viewing. The following observations were reported:

1. Length of attention increased with age. The younger children appeared to be more interested in the toys and interacting with their mothers.
2. Length of attention decreased as bit length increased.
3. Attention to animals increased to 24 months but dropped thereafter.
4. Children showed more interest in the presence of women, lively music, puppets, peculiar voices, rhyming, repetition, and motion.
5. Children showed less interest in the presence of adult men, animals, inactivity, and still drawings.

Replication and Secondary Analysis

Replication, a combination of the terms repeat and *duplicate*, is an important method of challenging or verifying the conclusions of a previous study. Using different subjects at a

different time and in a different setting, arriving at conclusions that are consistent with those of the previous study would strengthen its conclusions and justify more confidence in its validity. Replication is essential to the development and verification of new generalizations and theories.

Another useful procedure, known as secondary analysis, consists of reanalyzing the data gathered by a previous investigator, and may involve different hypotheses, different experimental designs, or different methods of statistical analysis. The subjects are the same and the data are the same. The difference is that of alternative methods of analysis. Secondary analysis has a number of advantages that commend its use:

1. The new investigator may bring an objectivity, a fresh point of view, to the investigation and may think of better questions to be raised or hypotheses to be tested. For example, the viewpoint of a psychologist rather than that of a sociologist (or vice versa) may find greater meaning in the data already available.
2. Secondary analysts may bring greater expertise to the area of investigation and greater skill in experimental design and statistical analysis.
3. The reanalysis would involve less expense in both time and money. Because the data are already available, a more modest appropriation of funds would be possible. It would not be necessary to intrude upon the time of subjects (teachers and students) whose primary activities had been diverted in the original investigation.
4. Secondary analysis may provide useful experience for students of research methodology by enabling them to use real data, rather than simulated or inferior data, for the purposes of the exercise.

Secondary analysis has played an important part in educational research. Probably no investigation has been subjected to as great a degree of secondary analysis as the Equality of Educational Opportunity study described next.

Equality of Educational Opportunity study. In 1964, the Congress of the United States passed the Civil Rights Act. which directed the United States Commissioner of Education to carry out a study of "the lack of educational opportunity by reason of race, color religion, or national origin in public educational institutions at all levels in the United States, its territories and possessions, and the District of Columbia."

This authorization assumed that educational opportunity for members of minority groups was unequal to that available for white students. This study was one of the largest of its type ever conducted. The report of its findings, commonly known as the Coleman Report, was tilled Equality of Educational Opportunity (Coleman, et al., 1966).

The nationwide investigation selected, by a two-stage probability sample, 640,000 public school pupils in grades 1, 3, 6, 9, and 12, and 60,000 teachers in more than 4000 schools. Data were also gathered from parents, school principals, school district superintendents, and prominent community members. In addition, case studies of individual cities were conducted be educators, lawyers, and sociologists. For comparative purposes he data were organized by geographic location as northern, northern metropolitan, southern and southwestern, southern metropolitan, and mid-western and western. Individuals were classified as white, black, Asian, Indian, Mexican-American, and Puerto Rican.

As much as possible, data-gathering instruments were checked for validity and reliability. Methods of data analysis included multiple correlation and factorial analysis of variance and covariance.

Although it would not be feasible to present a detailed account of the findings of the study, a few of the major conclusions are included:

1. The report rejected the assumption that the educational opportunities provided for minority children were unequal. There seemed to be little difference in almost all school facilities that would relate to equality of opportunity. In some areas, minority schools seemed to be more adequate than predominantly white schools.
2. Family background, rather than the characteristics of the school, appeared to be the major influence on school achievement. It was apparent that, over the years, the school experience did little to narrow the initial achievement gap.
3. The socioeconomic composition of the student body was more highly related to achievement than any school factor.
4. The achievement level in rank order was white. Asian -American, American Indian, Mexican- American, Puerio Rican, and black. While white students scored significantly higher than any other group. Asian Americans excelled in nonverbal and mathematics achievement.
5. Inequalities of educational opportunity ware more closely related to regional differences, rather than to differences between predominantly black and white schools. Schools in the North, Midwest, and West seemed to have better facilities than those in the South and Southwest.
6. Social class differences within all groups appeared to be more significant them the differences between ethnic groups.

The Coleman Report has been subjected to criticism both by experienced researchers and by members of special interest groups. The findings were unacceptable to some, who pointed out flaws in the gathering of data and their interpretation. Others found procedural defects in sampling and statistical analysis of the data.

Of 900.000 pupils solicited, only about 640,000, or about two-thirds of the invited sample, were tested. Twenty-one metropolitan school districts refused to participate in the study, including such large cities as Boston. Chicago, Indianapolis, and Los Angeles. In addition, twenty-three other school districts, who participated to a limited degree, refused to test their pupils. The provision for an equal number of white and nonwhite participants in the sample introduced a possible element of invalidity in the statistical analysis of the data.

The questionnaires were criticized for their lack of what has been termed a “qualitative bite,” the effort to get beneath the surface for more meaningful responses. There was also a high degree of non-response to the questionnaires, particularly on some items of an emotional or controversial nature. For example, one-third of the principals failed to answer questions on the racial composition of their faculties.

Some critics believed that the report did not make a highly significant contribution to education, but most agreed that it did stimulate interest in further research concerning the relationship of the family, the school, and the community.

The fact that no previous study has generated so much controversy is not surprising considering the complexity of the problems involved and the sensitive nature of the issues. For example, both advocates and opponents of school busing viewed the data in the light of their own established positions.

A number of studies using secondary analysis were authorized by various government agencies, special commissions, and philanthropic foundations. Using the Coleman Report data, various aspects of the problem were examined more closely, using different statistical procedures and raising different questions. Some confined their investigations to data relating to a single geographic area while others considered a wider range of data analysis. Helpful resumes of several of these studies are included in the publication, On Equality of *Educational Opportunity,* edited by Mosteller and Moynihan (1972).

Meta Analysis. A relatively recent innovation that allows a researcher to systematically and statistically combines the findings of several previous studies is known as meta-analysis, research synthesis, or research integration. There are a number of quantitative techniques, ranging from fairly simple to quite complex, by which the data from previously published studies can be combined. Glass (1978) and his colleagues (Glass, Smith, & Barton, 1979), have developed and described some of these techniques. Walberg (1986) discusses the relative advantages of the traditional review of the literature and the statistical research synthesis. He suggests that a combination of these approaches can be useful in estimating the effects of a number of studies. Walberg and his colleagues have conducted a number of studies using these techniques. See the special issue of Evaluation in Education, 1980, Vol. 4, pp. 1–142, edited by Walberg and Haertel, for a selection of these and other research integration efforts.

The Post Hoc Fallacy

One of the most serious dangers of ex post facto and causal comparative research is the post hoc fallacy, the conclusion that because two factors go together one must be the cause and the other the effect. Because there seems to be a high relationship between the number of years of education completed and earned income, many educators have argued that staying in school will add x number of dollars of income over a period of time for each additional year of education completed. Although there may be such a relationship, it is also likely that some of the factors. That influence young people to seek additional education are more important than the educational level completed. Such factors as socioeconomic status, persistence, desire, willingness to postpone immediate gratification, and intelligence level are undoubtedly significant factors in vocational success. Staying in school may be a symptom rather than the cause.

Some critics of cigarette-cancer research have advanced a similar argument. The case that they propose follows this line of reason: Let us suppose that certain individuals with a type of glandular imbalance have a tendency toward cancer. The imbalance induces a certain amount, of nervous tension. Because excessive cigarette smoking is a type of

nervous tension release, these individuals tend to be heavy smokers. The cancer could result from the glandular imbalance rather than from the smoking, which is only a symptom. This error of confusing symptoms or merely associated factors with cause could lead researchers to deduce a false cause-an d-effect relationship.

This illustration is not presented to discredit this type of cancer research. Substantial evidence does suggest a significant relationship. Laboratory experiments have supported a causal relationship between the coaltar products that are distilled from cigarette combustion and malignant growth in animals. The association explanation, however, is one that should always be examined carefully.

Ex post facto and causal-comparative research is widely and appropriately used, particularly in the behavioral sciences. In education, because it is impossible, impracticable, or unthinkable to manipulate such variables as aptitude, intelligence, personality traits, cultural deprivation, teacher competence, and some variables that might present an unacceptable threat to human beings, this method will continue to be used.
However, its limitations should be recognized:

1. The independent variables cannot be manipulated.
2. Subjects cannot be randomly, or otherwise, assigned to treatment groups
3. Causes are often multiple rather than single.

For these reasons scientists are reluctant to use the expression cause and effect in no experimental studies in which the variables have not been pears, variable B is consistently associated, possibly for reasons not completely understood or explained.
Since there is a danger of confusing symptoms with causes, ex post facto research should test not just one hypothesis but other logical alternate or competing hypotheses as well. Properly employed and cautiously interpreted, it will continue to provide a useful methodology for the development of knowledge.

Students who have completed a course in research methods should be sensitive to the operation of extraneous variables that threaten the validity of conclusions. Glass (1968) cautions educators of the need for critical analysis of reported research. He cites a number of interesting examples of carelessly conducted studies that resulted in completely false conclusions. Unfortunately, these conclusions were accepted by gullible readers and widely reported in popular periodicals and some educational psychology textbooks.

The authors trust that the experience of the introductory course in educational research will help students and educators to read research reports more carefully and to apply more rigorous standards of judgment.

Summary

The term descriptive studies have been used to classify a number of different types of activity. This change points out the distinctions between three, major categories: assessment, evaluation, and descriptive research.

Assessment describes the status of a phenomenon at a particular time without value judgment, explanation of reasons or underlying causes, or recommendations for action.

Evaluation adds to the description of status the element of value judgment, in terms of effectiveness, desirability, or social utility, and may suggest a course of action. No generalizations are extended beyond the situation evaluated.

Descriptive research is concerned with the analysis of the relationships between non-manipulated variables and the development of generalizations, extending its conclusions beyond the sample observed.

Assessment type of studies described are surveys, public opinion polls, the National Assessment of Educational Progress, the International Assessment of Educational Achievement, activity-analysis, and trend studies.

Evaluation studies included are school surveys and follow-up studies. The application of evaluation findings to social problem solving is discussed.

Descriptive research studies include document or content analysis, case studies, community studies, ethnographic studies, and Ex post facto or explanatory observational studies. These methods have been described and examples provided. The hazards of the post hoc fallacy have been emphasized.

Exercises

1. Why is it sometimes difficult to distinguish between an assessment studies, an evaluation study, and a descriptive research project? Illustrate with an example.
2. Public opinion polls base their conclusions on a sample of approximately 1500 respondents. Is this an adequate sample for a nationwide survey?
3. In a 1974 study, the West Virginia State Department of Education reported that counties with the highest per-pupil expenditure were the counties with the highest level of academia achievement, and that this "shows for the first time the clearest possible relationship between student achievement and the amount of money invested in the public schools." Can you suggest several competing hypotheses that might account for high academic achievement?
4. What is the difference between a study and a research project?
5. In what ways does conducting longitudinal studies run the risk of the violation of confidentiality of personal information?
6. How can a study of money and investment trends help you provide for your future financial security?
7. Draw up a proposal for a follow-up study of your high school graduating class of 5 years ago. Indicate what information you believe would be helpful in improving the curriculum of the school.
8. Of what value are the findings of the annual Gallup poll of public attitudes toward education?
9. How could the survey type of study be helpful in arriving at solutions to the crime problem in large cities?

J.C. Aggarwal. (1991)	*Educational Research: An Introduction*, New Delhi, Atya Book Depot, pp.178-188	2.5

METHODS OF EXPERIMENTAL RESEARCH

> If we are to advance beyond the dark ages of educational pre-science, we must emulate the experimental proficiency and zeal of colleagues in other behavioral sciences.
>
> ***JULIAN C. STANLEY***

Significance of Experimental Work

Experiment has proved to be an essential and powerful tool in leading man towards progress. There would have been very little progress, as we find it today, without systematic experimentation.

The goal of all experiments is progress and good life. In so far as good education is recognized as the basis of adequate individual and social development, need for experimentation in education to improve educational practices and policies is being realized increasingly. The educationists are constantly searching for more effective methods of instruction, more satisfactory techniques of evaluation, richer learning materials, more efficient systems of administrative organization. This search is assuming greater urgency in India because of the very rapid expansion and democratization of education. A number of new educational problems have arisen. For a successful solution of the multitude of problems and for the full realization of the educational aims set up, experimental work, adequate both in quality, should be carried out in varying degrees by all those who are engaged in the teaching profession.

Meaning of Experimentation—Experimentation differs from normative or descriptive survey methods and from other techniques of research in that the experimenter has some degree of control over some variables involved and the conditions under which variables are observed.

According to J. W. Best, "Experimental research is the description and analysis of what will be, or what will occur under carefully controlled condition."

Basic Assumption behind Experimentation

The basic assumption behind the experimentation is the law of the single variable formulated by John Stuart Mill. The principle reads as "If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur have every circumstance in common save one, that one occurring only in the former, the circumstances in which alone the two instances differ is the effect, or the cause, or an indispensable part of the cause, of the phenomenon."

Stated in a simple language, if two situations are alike in every respect, and one element is added to or removed from one but not the other, any difference that develops is the result of the operation of that element added or removed.

Experimental research describes 'what will be' when all relevant conditions are carefully controlled.

Educational Experimentation

Meaning—W. S. Monore and M. D. Engelhard describe as "Experimentation" is the name given to the type of educational research in which the investigator controls the educative factors to which a child or group of children is subjected during the period of inquiry and observes the resulting achievement...In the simplest type of educational experiment the investigator seeks to evaluate the influence of someone educative or "experimental" factor on a single group of children. He must start the experiment with some measurement of the initial attainment of the children in the trait or ability to be influenced. He then subjects the group to the experimental factor, such as particular type of drill material in arithmetic, for the duration of the experiment. At the end, the investigator applies a final test for the purpose of determining the gain in achievement that has resulted from the application of the experimental factor"

Jahoda and others, regard social experiment as a method of testing hypothesis. Greenwood suggests that an experiment is the proof of a hypothesis which seeks to take up two factors into causal relationship through the study of contrasting situations which have been controlled on all factors except the one of interest the latter being either the hypothetical cause or the hypothetical effect. According to Festinger, "The essence of an experiment may be described as observing the effect on a dependent variable of the manipulation of an independent variable."

Five Types of Experiments

Greenwood has mentioned following five types of experiments:

1. Trial and Error Experiment.
2. Controlled Observational Study.
3. Natural Experiment.
4. Ex-post facto Experiment.
5. Laboratory Experiment.

Experimentation and Laboratory Method

According to Travers, "Experimentation may occur within the laboratory or outside it Laboratory studies usually require relatively small numbers of subjects and the careful control of many factors that cannot be controlled in other situations. When experimentation requires equipment or complex apparatus, it may be necessary to work within the laboratory. Of course, the laboratory itself introduces variables, which it may be desirable to control but which cannot be controlled easily. For instance, human subjects who are introduced into a laboratory except to behave in a certain way, or at least feel that the situation calls for certain kinds of responses."

Walter R. Borg. thinks "The experiment is the ultimate form of research design, providing the most rigorous test of hypothesis that is available to the scientist".

According to John W. Best, "Experimental research is the description and analysis of what will be, or what will occur, under carefully controlled situation."

Georg. G. Mouly describes this method as, “Experimentation can be considered a “technique of deliberately staging a situation designed to force nature to provide a 'yes' or 'no' answer to Specific hypothesis concerning the phenomenon under discussion. “The same writer thinks that an experiment 'must be self-contained’ and this in turn, calls for the satisfaction of three basic interrelated conditions:

(i) Control.
(ii) Randomization,
(iii) Replication.

An experiment cannot be interpreted accurately unless these conditions are fulfilled.

Main Features of the Experimental Method

1. Experimentation involves an attempt to control all essential factors except a single variable, which is manipulated with a view to determine and measure the effects of its operation.
2. It has been applied with considerable success in the classroom by controlling significant factors within certain limits.
3. In educational research, the basic condition of other things being equal’ is difficult for fulfillment. In education we deal with those subjects i.e., human beings who are complex.
4. The control group and experimental group are never as identical as they ought to be for an exact experiment.
5. Experimental studies in education though never strictly empirical can yet approximate strictly empirical research in many areas.
6. All experiments in education are ultimately experiments with children. It is, therefore, very important from ethical point of view that they are not subjected to conditions that may harm them.

History of Educational Experimentation

The second half of the nineteenth century saw the beginning of educational experimentation. Wundt set up a psychology laboratory at Leipzig in 1879 where he studied experimentally the learning process and tried to clarify and define learning patterns. In the 1880’s Ebbinghaus invented methods of measuring association and memory, which affected teaching techniques. Thereafter, the experimental work of Thorndike, Judd and Freeman paved the way for further experimental research in education. The work of Rice and Cornmad during the last decade of the 19^{th} century that was done on spelling achievement among students may be called the beginning of strict educational experimentation.

Uses of Experimentation in Education

Main uses of experimentation in education are:

1. Determining and evaluating the adequacy and effectiveness of educational aims and objectives through the measurement of outcome.
2. Serving as a basis for the formulation, execution and modification of educational policies and programmes.
3. Ascertaining the effect of any change in the normal educational practices and programmes.

Major Steps in the Experimental Method

1. Selecting and delimiting the problem.
2. Reviewing the literature.
3. Defining the population.
4. Planning the experiment.
5. Conducting the experiment.
6. Measuring the outcomes.
7. Analyzing and interpreting the outcome.
8. Drawing up the conclusions.
9. Reporting the results.

I. **Selecting and Delimiting the Problem. This involves;**
   i. Investigating the needs in the field of action and deciding upon a problem.
   ii. Conversion of the problem into a hypothesis that can be verified or refuted by the experimental data.

II. Reviewing the Literature- This implies the study of the literature related to similar problems.

III. Defining the population- It is necessary to define the population precisely so that there can be no question about the population to which the conclusion are to apply.

IV. Planning the Experiment. This includes;
   (i) Determining the methods of experimentation.
   (ii) Place of the experimentation.
   (iii) Duration of the experiment.
   (iv) Determining the materials of the experiment.
   (v) Conducting a pilot study.
   (vi) Selecting the subjects and groups.

V. Conducting the Experiment- This includes the following sub steps:
   (a) Control of variables and non-experimental factors.
   (b) Keeping a careful record of steps in the procedure.
   (c) Applying the experimental factor or factors.

VI. Measuring the Outcome—This implies giving a careful consideration to the selection of the criterion on the basis of which the results are to be measured.

VII. Analyzing and Interpreting the Outcomes—This implies the need for competence in statistical procedures.

VIII. Drawing up the Conclusions—Care must be taken to restrict the conclusions to the conditions actually present in the experiment. The conclusions of the study must be restricted to the population actually investigated and care must be exercised not to over generalize the results.

IX. Reporting the Results—The study should be reported in such a way that the reader can make a judgment as to its adequacy.

General Description of an Experimental Method

Control Factor—The customary method or device of doing a job is known as the control factor.

Experimental Factor—This is the new method, arrangement or device, which is being introduced to develop pupil growth in skills and knowledge in a new setting.

A comparison is made between the results of these situations and the difference between the control pupil mean and the experiment pupil mean would determine the relative superiority of the method or factor showing the greatest pupil gain.

The various steps in a simple experiment of this type can be represented thus:

Experimental Group	**Control Group**
1. Pretest	1. Pretest.
2. Application of experimental factor	2. Application of control factor.
3. Final test.	3. Final test.
4. Measurement of pupil mean gain (Final test scores minus pretest scores.)	4. Measurement of pupil mean gain (Final test scores minus pretest scores.)

Experimental Designs

1. The single individual or single group design.

2. The parallel-group design (two or more).
   a. Equated by random sample.
   b. Equated by mean score.
   c. Equated by matched pairs
   d. Co-twin method.

3. Rotational method.
   a. Single group.
   b. Parallel, equated groups.

4. The single Individual or single group design—This type is probably the most elementary and less rigorous design. This type of experiment is carried on in comparing the growth of a single individual or growth under two-sets of conditions. The group is subjected to an experimental and a control factor for equivalent periods of time and then outcomes are compared. The procedure may be listed as follows;
   a. Test the group.
   b. Introduce Method A.
   c. Test and group again.
   d. Note the gains.

e. Allow for a period of transition.
f. Test the group again.
g. Introduce Method B.
h. Test the group again and note the gain.
i. Compare the games in (d) and (h).

Advantages

1. It is simple to plan and operate.
2. It requires no equation or rotation of groups.
3. It is well suited to classroom use and provides a stimulus to better classroom teaching.

Limitations

1. The teacher may not necessarily be equally effective and enthusiastic about both the methods.
2. Gains Due to practice efforts are generally greater in the second testing than the first one.
3. In the second phase of this experiment, students involved are a little older and a little mature than they were when they entered the first phase.
4. The very novelty of the new method may produce greater gain, irrespective of its real merit

Some Important Points to be Considered while Applying this Method

1. The unit of work should be of equal difficulty.
2. The unit of work should be equally interesting.
3. Each unit of work should be given the same time.
4. The tests produce scores of equate scale value.

Parallel or Equivalent Group Method

This method of grouping is more complex than the one-group experiment but more accurate. In this, two or more groups of subjects equivalent in all significant respects are selected one of these parallel groups serves as the control group and the experimental factor or factors are applied to the other groups, one by one for a specified period of time. The difference observed at the end of the period between. The control and the experimental groups is expected to be due to the introduction of experimental factor.

i. The main steps in this method are:
ii. Securing equivalent groups.
iii. Applying the experimental factor.
iv. Comparing the results.
v. Interpreting and reporting the results.

Factors Leading to the Formation of Equating Groups

i. Chronological age.
ii. Intelligence quotient.

iii. Sex.
iv. Race.
v. Physical conditions.
vi. Previous achievement.
vii. Study habits.
viii. Personality traits.

Four Ways of Equating Groups

a) By random selection—This consists of selecting groups by some system of random selection
b) By equating on the basis of mean scores and standard deviations—Groups are selected whose mean ages, intelligence scores and other factors considered significant are the same.
c) By matched pairs—Pairs of students are formed whose characteristics are as nearly alike as possible in respect of age, sex, intelligence, home back ground, race, etc.
d) By co-twin method— Pairs of identical twins are placed in the control and the experimental factor.

Limiting Factors

i. Equating groups,
ii. Tremendous administrative problems involved in recognizing classes.
iii. Teacher's competency and enthusiasm.
iv. Problem of satisfactory validity and reliability of the measuring instruments.

Rotational Methods—Groups are rotated at periodical interval. For example, Groups A and B may use methods A and B, respectively for a particular period and then exchange methods for the same period. A comparison is then made of the relative gains of each of the groups under two methods.

This method enables us to minimize the influence of uncontrolled factors and to provide a more convincing test of the superiority of the particular method under investigation.

Need for a Cautious Approach to Experimentation

1. The subjects should be representative as to the age, sex, grade, intelligence, etc.
2. Such subjects should be selected as are reasonably expected to be available throughout the period of the experiment.
3. The number of subjects be adequately large to allow for losses for elimination on account of absences from one or more tests.
4. The materials must be appropriate to the subjects and the experimenter.
5. The place in which the experiment is to be conducted must be typical of the situations to which the results of the experiments are expected to apply.
6. Appropriate measuring instruments should be used.
7. Since the effectiveness of teaching learning in any classroom situation can rarely be

attributed to a single factor, it is very essential to exercise great caution in interpreting the 'resulting experimental conclusions. The basic conditions of ‘other things being equal' is difficult of fulfillment in educational research. Besides the control group and the experimental group are never as identical as they ought to be for an exact experiment.

Advantages of Experimental Method

1. Establishing direction of causality—The most important advantage of the experiment is that the relationship that you actually observe is clear in its casual direction.
2. Low cost—Compared to that of alternative research methods, the laboratory cost of a laboratory experiment can often be low.
3. Convenience—An experiment can be done whenever you like, to suit your convenience.
4. Adjustability of variables and parameters—Unlike a survey, an experiment permits us to arrange the parameters and vary the variables in whatever fashion we desire, to look for whatever effects interest us.
   In experimentation we can systematically refine the relationship we are investigating.
5. Replication— By repeating (replicating) an experiment, we can obtain an average result; our conclusion is not based on a single observation that might be unusually high or unusually low. Replication is one of the most useful tools in obtaining valid results.
6. Unraveling Multivariable Causation—If two independent variables are closely related in the world outside the laboratory, a survey cannot easily determine which of them causes variation in the dependent variable. A laboratory experimenter can track down the extent to which each is responsible for change in the independent variable because the laboratory experiment holds some factors constant as it varies others and vice versa.

Disadvantage of Experiments

1. Lack of Reality—The most important disadvantage of the laboratory experiment is that we can never be sure that the analogy between the experiment and the real world really holds.
2. Unrepresentative Samples—Subjects on whom the experiment is run in the laboratory may be very unlike the people in the real world about whom we wish to draw conclusions.
3. Expensive—Some experiments may be very costly than other research methods.
4. Hazardous Outcomes—Most of the sex experiments may be-unethical or objectionable to good taste.

Limitations of Experimental Method

Experimental method suffers from a score of limitations:

Extraneous Variables—In educational experiments, a number of extraneous variables are present in the situation or are generated by the experimental design and procedures, which influence the results of the experiment in ways, which are difficult to evaluate.

Concept of Causation—Causation means an invariant one-to-one relationship between

certain antecedents and certain consequents. It is almost impossible to equate into situations in all respects except for the factor whose effect is being investigated.

Experimental Control—Imposed control in an educational situation tends to make it artificial.
Maturation—There is every possibility that between initial and subsequent observations, children may become tired or wiser or influenced by incidental learning's and experiences that they encounter through normal maturation.

Testing-Testing may sensitize children by making them more .aware of the concealed purposes of the researcher and may serve as a stimulus to change.

Unsuitable Instruments—Use of unsuitable instruments or techniques to describe and measure various aspects of behavior of children is likely to affect the validity of an experiment.

Differential Selection—Selection bias is represented by the non-equivalence of control and experimental groups.

Contamination—Contamination is a type of bias introduced when a. researcher has some previous knowledge about the children involved in an experiment.

Problems for Discussion

1. Bring out clearly the need for experimental research. What are its chief characteristics and limitations?
2. What precautions should be taken in an experiment in education to obtain reliable results?

REFERENCES

Abingotn School District v. Schempp. 374 U.S. 203(1965)

AVDELOTTE. W.O. (1965). Notes on the problem of historical generalization. In L., Gottschalk.

(F.d). Generalization in the writing of history. Chicago: University of Chicago Press.

BEST, J. H. (Ed.). (1983). Historical injuring in education: A research agenda Washington. D.C.: American Educational Research Association.

BILLINGTON, R. A. (1975), Allan Nevins on history. New York: Charles Scribner's Sons.

BRICKMAN. W. W. (1982). Educational Historiography: Tradition, theory and technique Cherry Hill. NJ: Emeritus

CREMIN. L (1961). The Transformation of the school: Progressivism in America education, New York: Alfred A. Knopf.

DAVIES, A.P. (1956). The meaning of the Dead Sea Scrolls. New York: New American Library of world Literature.

FINLEY.M. I. (1963.) Generalizations in ancient history. In L. Gottschalk (Ed,) Generalizations in the writing of history. Chicago. University of Chicago Press.

GOTTSCHALK, L. R. (1950). Understanding history. New York: Alfred A. Knopf.

GOTTSCHALK. L R. (1963). Categories of historical generalizations. In L Goltschatk (Ed.),

Generalizations in the writing of history. Chicago: University of Chicago Press.

HAWKINS, G. S. & WHITE. J. B. (1965). Stonehenge decoded, Garden City. NY: Doubleday.

HOCKETT. H. C. (1948). Introduction to research in Amercing history New York: Macmillan.

LANNIE. V. L. & DIETHORN, B. C. (1968). For the honor and glory of God; The Philadelphia Bible riots of 1840 history of Education Quarterly, 8, 44-106.

NEVINS, A (1962). The gateway to history (Rev. ed.). Boston: Raytheon Education Co.

SEARCH. P. W. (1901). An IDEAL SCHOOL: Looking forward. New York Appleton-Century-Crofts.

THURSFIELD, R. E. (1945). Henry Bernard's American Journal of Education. Baltimore: Johns Hopkins University Press.

WARREN, D. R. (Ed.). (1978), History education, and public policy: Recovering the America past. Berkeley: McCutchan.

Additional Readings

BARTUN, J. & GRAFF. H. F. (1977). The MODERN researcher (2nd Ed.). New York. Harcourt Brace Jovanovich.

NORDIN. V. D. & TURNER. W. L. (1980), More than segregation academics: The growing Protestant fundamentalist school. Phi Delta Kappan, 61, 391-194.

ZIRKEL F. A. (1979). A digest of Supreme Court decisions affecting education. Bloomington. IN: Phi Delta Kappa.

Unit–3

HISTORICAL RESEARCH

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CONTENTS

INTRODUCTION

The scientific method of problem-solving, sonic common characteristics of research, major steps in carrying out a research and the format commonly used for writing research reports, have been discussed in this course. While the scientific approach permeates all research, different types of research adopt methods and techniques most suited to the type of problems they have to tackle. The researcher needs to acquaint himself with various types of research and the methods most suited to each. In this unit an attempt has been made U describe historical research and its methodology units 4 and 5 shall deal with experimental and descriptive research respectively.

The discussion on historical research has been divided into the following sub-units:

i) What is History?
ii) Scope of Historical Research.
iii) Formulation of Problem in Historical Research
iv) Historical Sources:
    - Primary and Secondary
v) Criticism:
    - External and Internal
vi) Examples of Criticism in Historical Research.
vii) Examples of Historical Research.

OBJECTIVES

It is expected that on the completion of the unit you will be able to:

1. describe the concepts of history and historical research;

2. apply scientific method in historical research;

3. distinguish primary sources from secondary sources of data;

4. distinguish internal criticism from external criticism in the process of data analysis; and

5. conduct historical researchers in the area of educational planning and management.

3.1 What is History?

History is a meaningful record of man's achievements, it is not merely a list of chronological events, but truthful integrated account of the relation this between persons, events, times and places. Man uses history to understand the past and to try-to understand the past in the light of past events and developments. Historical analysis may be directed towards an individual, an idea, a movement or an institution However, none of these objects of historical observation' can be considered in isolation. No man can be subjected to historical investigation without some consideration of his interaction with the ideas, movements, or institutions of his bais. The focus merely determines the point of emphasis towards which the historian directs his attention. (Best: 94)

According to Travers, history is not just a reconstruction of the past. It must reflect the spirit of critical inquiry that aims to achieve a faithful representation of past events.

Viewed as a research, history may be defined as an integrated narrative or description of past events or written in the spirit of critical inquiry, to find the whole truth and report it. (Good: 115)

A newspaper or a journalistic report of some current event or a debate in congress or a state legislature, is not history, because it is not typically an inquiry into the whole truth.

The historical novel, like "Khak-o-Khoon" is not history even though incorporating certain events and threads of historical truth, but rather it seeks to entertain the reader.

Biography or autobiography becomes history when adequate perspectives enable the author to see the individual in relation to the society and events of his time, but it is not history when the account is limited to a single life in isolation.

A writing does not become history merely through the process of preserving material or records in almanac or museum like fashion. (Good: 115-116)

Activity No. 1

Go through the books on educational research and collect a few definitions of history. Then develop a definition of your own.

3.1.1 Is History a Science?

Whether history is a science or not, is an issue. Those who do not think history to be science, give the following arguments:

i) Although the purpose of science is prediction, the historian cannot always generalize on the basis of the past events. Because past events were unplanned, because there were so many uncontrolled factors in the past events-and because a few persons or individuals were so crucial and important in the past events, hence the same pattern cannot be repeated.

ii) The 'historian must depend upon the observations of others and these observations are not as reliable as the self- observation.

iii) The historian has to complete many gaps in-between the facts. These gaps exist because certain parts of information are missing the historian has to fill in these gaps by inferring what has happened and why did it happen?
iv) The historian cannot control the conditions and variables as does a natural scientist in his science laboratory.

Those who are the advocates of history being a science, give the following arguments:
i) The historian delimits his problem; formulates hypotheses, collects and analyses primary data, tests the hypotheses as consistent or inconsistent with the evidence and formulates the generalizations and conclusions.
ii) Although the historian may not have witnessed an event or collected the data through primary resources, he may have met a number of witnesses, who observed the event from different points of view. The collection and analysis of so many evidences may give a result more accurate and more authentic as one observer may fail to grasp the information of the event from all points of view. Hence the information collected through so many secondary sources may be more true and more reliable as compared to one observer, getting information from primary sources.
iii) In order to reach the conclusions, the historian uses the same scientific method as applied by a scientist i.e. definition of problem, development of hypotheses, collection of data, and drawing conclusions, rejecting some hypotheses and retaining one hypothesis, collection and analysis of more data, drawing conclusions and formulation of generalizations.
iv) Although it is not possible to control all the conditions and variables as is the case in natural sciences, but this objection stands true in the case of other social sciences and yet we include them in sciences. (Best: 98-99)

In brief, history is a science in the sense that its methods of inquiry are critical and objectives and that the results are accepted as organized knowledge by a consensus of trained investigators. The research aspects of history in dealing with sources are scientific in approach while narration and historiography commonly involve the art of expression and philosophy of author. (Good: 116)

History is science because it adopts scientific method of inquiry in searching the truth about the historical events and drawing conclusions. The problem is formulated, the source materials are collected and criticised, the hypotheses are developed and the findings are reported after proper interpretation of the data.

In general, a historian becomes involved in the following procedures:
a. Formulation of problem;
b. Collecting the source materials,
c. criticizing the source materials,
d. Formulating hypothesis to explain events or conditions, and
e. Integrating and reporting the findings.

These are not necessarily separate or successive processes, but for the sake of convenience and clarity, they are considered separately. (Van Dalen: 161)

History differs in method from natural sciences, since it is not a discipline of direct observation or experimentation but utilizes reports of observations that cannot be repeated; historian cannot recall the actor of the past to reproduce the famous scenes of history on the stage of today. Instead of direct observation used in science, the historian usually must depend on the observations of others. Therefore, the historical method involves a procedure supplementary to observation a process by which the historian seeks to test the truthfulness of the reports of observations made by others. Both historian and the scientist examine data, formulate hypotheses and test the hypotheses against the evidence until acceptable conclusions are reached. (Godd: 116)

History is also related with the social science. For example, an economist while citing numerical data or handling other quantitative materials such as population growth, etc. introduces quantitative emphasis into modern history. History and sociology with all the differences are interrelated, as both the areas seek to explain the past. In the same way history is related with other subjects. (Good: 117-118)

3.2 Scope of Historical Research

History embraces the entire field of human past and is as broad as life itself. Our human past includes many areas of social experiences and activities that frequently have proved more significant than political history or military campaigns; for example culture, ideals, institutions, law, religion, literature, art, travel, engineering, industry, technology, medicine, science, philosophy, economics, education, psychology, anthropology and sociology There is general agreement among modern historians concerning the richness of the content of history, including social, cultural, economic and intellectual developments and on a broad view of past events extending far beyond the study of politics, diplomatic, constitutions and war materials. (Good: 116)

When undertaking a historical study, a scholar engages in some activities that are common to all investigation but the nature of his subject matter presents him with some peculiar problem and requires him to apply some special standards and techniques.

3.3 Formulation of Problem for Historical Research

The selection and development of the problem for study is the first step in the historical research. The beginner in this respect chooses too broad a topic. (Good: 124)

The experienced historian realizes that the historical research must be confined to a penetrating analysis of a limited problem, rather than involve only a superficial examination of a broad area. The weapon of research is the rifle not the shotgun. (Best: 102)

Historical inquiry begins when some event, development or experience of the past is questioned. Sometimes the historian discovers new source material, the meaning of

which when interpreted will provide answers about past events; sometimes he questions an old interpretation of existing data and devises a new hypothesis that will provide a more satisfactory explanation of past events. Begin-thug with a rather general, diffused or even confused notion of the problem, he isolates one by one the crucial points that gave rise to his initial doubts or concerns about gaps in knowledge and that formulates a simple, dear, complete description of the problem. Before proceeding further he checks whether this problem is answerable by available methods of inquiry and by the available sources of data.

A historian can investigate individuals, institutions, organizations, curricula, administrative structures and processes textbooks, teacher preparation, equipment, facilities, important concepts and ideas that have influenced education o other educations phenomena during a specific period of time in given culture ancient or modern - in a sub-culture determined by nationality, colour, religion, sex, age, work or social class. He may confine his study to one era and one sequence of events in local, national, or regional setting or he may compare events in different areas, different societies or different civilizations. Wan Dalen: 161-2)

In brief, the historical research like any scientific inquiry stems from a problematic situation wl.ich starts the, investigator on his quest fort solution.

Historical research and historiography Involves three major steps, processes or aspects:

i) Collection of data, with consideration of sources a documents and remains or relies as primary and secondary. Discussed in detail in pares 5.1 to 5.6.
ii) Criticism of data including the process of external criticism (questions to authorship, time, place, genuineness, and actual language or text of the original document) and the process of internal criticism (questions of accuracy and value of statements made). Discussed in detail in paras 6.1 to 6.4.
iii) Presentation of facts in readable narrative form, including problems of organization, composition, exposition and lnt,rproa1 (Goo&121) Some hints in this regard are given in para 8.

3.4 Historical Sources

A large number of historical sources are used in research. These sources have been classified in a number of ways. Some of these classifications are given below:

3.4.1 Classification No. 1

A classification of sources appropriate for history as well as other social fields is as follows:

a. i) Physical remains: Historic sites, roads, pyramids, fortifications, buildings, furniture.
   ii) Human remains: Clothing, food, utensils, pottery, implements, weapons, machinery, industrial processes, fine arts and museum pieces of many kinds.
b. Orally transmitted material: Folklore, legends, ballads, tales, anecdotes, traditions, customs, manners, burials, ceremonials, social institutions and languages.

c. More elementary and durable kinds of representative or artistic materials not written in the ordinary sense such as inscriptions baked upon clay, stones, monuments, stamped coins, vases, portrait sculptures, historic paintings, and portraits.
d. Handwritten material (sometimes in print) including papyri, vellum or parchment manuscripts and such more recent documents as biographies and diaries.
e. Printed books, papers, and literature. Action picture film, microfilm and recordings, including radio and television.
f. Personal observation by the writer or by the people he interviewed. (Good: 122-23)

3.4.2 Classification No. 2

Another classification of historical sources is comparatively simpler i.e. documents and remains or relics or the records kept and written by actual participants in or witnesses of an event. These sources are produced for the purpose of transr4itting information to be used in future.

Documents: Documents are the reports of events consisting of impressions made on some human brain by past events and consciously or deliberately recorded for the purpose of transmitting information. The observer's eye witness impression of the event is illustrated by such documents as the opinion of adjudge, minutes prepared by the Secretary of a Board of Education, a Superintendent's annual report, the Director's report of a school survey, a college catalogue prepared by a Dean or a course of study developed by the Chairman of a particular curriculum committee. (Good: 123)

Remain; or relics are physical objects produced without the conscious intention of imparting connected information. Through documentary s6urces one sees not the event of the past but what the eye witness thought, the act was In remains and relics, one sees the actual objects as handed down from the past Sometimes man more nearly reveals the truth unconsciously through these physical objects or remains than through the documents that he deliberately records. (Good: 124-4) In brief remains or, relics are associated with a person, group or period. (Best: 103)

The difference between the documents and remains can be clarified with the help of an example. A school, master may write, in his annual report or diary, about the human and kindly methods of discipline employed. These reports or diaries will serve *as* the documents. The remains or the relics will be the actual devices used by the teacher for the physical punishment. These may include the whip or the ruler, etc. There remains may reveal the truth or the inaccuracy of the documentary source.

A list of these sources (i.e. documents and remains) used in educational history is presented below.

Documents

a. Legislative acts such as constitutions, laws, charters.

b. Court decisions.

c. Executive and other official records:
   i) Proceedings of administrative officers and bodies.
      - Minutes of the Board of education.
      - Reports and orders of Principals.
      - Reports of committees including recommendations for executive actions.
      - Systems of student records and salary lists.
   ii) Proceedings of deliberative bodies such as University Academic Staff Association, Pakistan Lecturers Association, Anjuman-e-Fazaleen, Tanzeem-e-Asateza, Pakistan.
   iii) Reports of commissions such as report of the Commission on National Education 1959, Nur Khan's Proposals for a New Education Policy 1969, The New Educational Policy, 1972-80, National Education Policy, 1978, the documents on Education in 89 and thereafter if any.
   iv) Reports of school surveys.
   v) Courses of studies and curricula outlines.
   vi) Catalogues, prospectuses, advertisements.

d. Newspapers and periodicals.
   i) Articles.
   ii) New notices.
   iii) Advertisements.

e. Personal materials.
   i) Autobiographies, memoirs and biographies.
   ii) Histories written by actors in the events narrated.
   iii) Letters.
   iv) Legal instructions executed by individuals in personal capacity, wills, contracts and deed.
   v) Legal instructions conferring powers upon individuals, for example; certificates.
   vi) Lecture notes.

Remains

a. School buildings and their furnishings.
b. Photographs of buildings or furnishings or of children, teachers, parents engaged in educational activities.
c. Forms of diplomas, attendance, and certificates.
d. Various physical devices of the school for teaching, punishment, exercise or health.
e. Textbooks, manuscripts, exercise-books made by pupils and pupils maps and drawings.
f. Under certain conditions all kinds of written materials, if the problem is to observe what people unconsciously reveal about themselves rather than to determine what they consciously or deliberately say about themselves.

In the writing of history physical remains usually have been considered more valuable for social and economic history than for political history and more useful for descriptive than analytical, phases of history.

Some remains or relics are called "memorials" with characteristics of both remains and documents. A gravestone including only a name is a relic, but with the addition of dates of birth and death, and possibly other information, it becomes a memorial. The corner-stone of a school building, including identifying dates, architect or school board, has the characteristics of both remains and documents.

The same source at different times may be classified as a document or remain, when Used for different purposes. For example, when letters written by different people are studied to determine variations in spellings; rather than the message recorded in the letter, these letters' serve the purpose of remains and are classified as such. If the historian searches the same letters to identify the attitudes of writer towards public education and the message recorded in the letter is emphasized; the letter serves the purpose of 'document and is categorized as such. A printed diploma, certificate or report card in blank is a remain, but when the name of the pupil and his attainments are entered in the proper blanks, the source presents a message and becomes a document. School text-books are remains as they do not deliberately or consciously record information concerning school practice or teaching procedure although they throw light on such problems for particular period of time. Author's preface in text-bow comments on certain curricula is a documentary source. The report of a researcher about the test-books used in the schools during a particular period of time will be a documentary source as it is a deliberate effort to transmit information about the text-books.

3.4.3 Classification No. 3

Under this system all sources for the collection of data are classified as primary or secondary. The definitions of primary and secondary sources are as follows:

a) *Primary sources:* Primary sources for the collection of data are the original documents or remains, the first witness to the event, with only the mind of observer or eye witness coming between the original event or the user of the source. (Good: 126) They are the eye-witness accounts. They are reported by an actual observer of participant in an event. (Best: 102)

b) *Secondary Sources:* Secondary sources are accounts of an event that were not witnessed by the reporter. He may have t 1kM with the actual observer or read an account written by an observer, but his testimony is not that of an actual participant or observer, (Best:82) The writer of the secondary source was not on the scene of the event but surely reports what the person who was there said or wrote.

3.4.4 Examples to Distinguish/Primary and Secondary Sources

The following are a few examples to illustrate the difference between the primary and secondary sources for the collection of data for a research.

i) The secretary's minutes of a meeting are primary, but the newspaper editor's comments on the meeting, even though based on the minutes of the

meeting, is secondary, since both the secretary and the editor have come between the event and the person who reads the newspaper comments. If the editor is present in person at the meeting of the school board, then his comments are primary.

ii) The official registration cards for students in a. school are a primary source for analysing age, sex and geographical distribution but a newspaper report based on this analysis is a secondary source.

iii) The text books in the history of education are secondary sources as most chapters and sections of the book are reproduced from other sources. The information in books provided by another author as a result of the author's own observation will serve as the primary source.

Activity No. 2

Think out a few examples to distinguish primary and secondary sources of data.

1. _____

_____

2. _____

_____

3. _____

_____

3.4.5 Primary Sources of Data

a) *Documents* are reports kept and written by actual participants in or witnesses of an event. Those sources are produced for the purpose of transmitting information to be used in the future. Documents classified as primary sources are constitutions, chapters, laws, court decisions, official minutes or records, autobiographies, letters, diaries, contracts, deeds, wills, permits, licences, affidavits, dispositions, declarations, proclamations, certificates, lists, handbills, bills,, receipts, newspaper and magazine accounts, advertisements, maps, diagrams, books, pamphlets, catalogues, films, pictures, paintings, inscriptions, recordings, transcriptions and research reports.

b) *Remains or relics* are associated with a person, group or period. Tools, weapons, food utensils, clothing, buildings, furniture, Pictures, paintings, coins and arts objects, are examples of those relics and remains that were not deliberately intended for use in transmitting information or as record. However, these sources may provide clear evidence about the past. The contents of an ancient burial place, for Instance, may reveal a great deal of information about the way of life of a people their food, clothing, tools, weapons art, religious beliefs, means of livelihood and customs:

c) *Oral Testimony is* the spoken account of a witness of or participant in an event. This evidence is obtained in a persona interview or may be related or transcribed as the witness relates his experiences.

3.4.6 Primary Sources of Educational Data for Historical Research

Included in this category are: records and reports of legislative bodies and departments of education/Public instruction, headmasters, principals, vice-chancellors, deans, department heads, educational committees; minutes of school in raging committees, boards of trustees; surveys, charters, deeds, schools/colleges, University newspapers, annual bulletins, catalogues, courses of study, curriculum guides, athletic game records, certificates, text-books, examinations, report cards, pictures, drawings, maps, letters, diaries, autobiographies, teachers and pupil personal file, sample of student work and recordings. Some of the main material reports on education in Pakistan are as under.-

1. Report of the Commission on National Education, 1959.
2. Curriculum Committee Report, 1960
3. Report of the Commission of Students Problems and Welfare.
4. Proposals for the New Education Policy, 1969 by Nur Khan.
5. Education Policy 1972-80
6. National Education Policy - 1978
7 Curriculum outlines for classes I to X,P.T.C., C.T, B. Ed. in various subjects by different curriculum committees under the supervision of Central Bureau of Curriculum and Text-Books, Federal Ministry of Education, Islamabad, 1974-78 and 1983-84,and thereafter
8. Five Year Plans, Ist 1955-60 .
   2nd 1960-65
   3rd 1965-70
   4th 1970-75
   5th 1978-83
   6th 1983-88
   7th 1988-93 and perspective Plan 1988 to 2003

Oral Testimony: Included here are interviews with administrators, teachers arid other school employees, students and relative, school patrons, bodies of the private autonomous institutions in Education. The T.V. and Radio interviews with the experts Id education also serve as primary source for the collection of data.

Relics: Included in this category are buildings, furniture, teaching materials, equipment, memorial, decorative pictures, text-books, examinations and samples of students work. The examples for the buildings in this respect may be the houses of Quaid-e-Azam Muhammad All Jinnah and Allama Iqbal for studying the role of those preminent figures in the history of Pakistan.

3.4.7 Secondary Sources of Data

Secondary sources are the reports of a person who relates the occurrence of eye witness of or participant in an event Secondary sources of data are usually of limited worth for research purposed because of the errors that may result when information is passed on from person to person. Sometimes it is of more value when the information is collected from so many primary sources after witnessing the occurrence from different aspect and the information becomes complete and meaningful. History textbooks and encyclopedia

are the examples of such secondary sources. Collection of the traditions of the Holy Prophet Muhammad (Peace be upon him) may be presented as good examples of such sources which are secondary in nature and more valuable as compared to the primary sources of information in this respect.

Sometimes it is essential for the historian to depend upon the secondary sources. The historical events/occurrences cannot be repeated like the experiments in a laboratory. The Battle of Panipat or the Battles of 1965 and 1971 (between Pakistan and India) cannot be repeated for the historian. The historian has to depend upon the information provided by the people relating the occurrence the basis of their eye witnesses.

Some types of material may be secondary sources for some purposes and primary sources for another. For example, a high school text book in Pakistan Studies is ordinarily a secondary source. But if one were making a study of the change in the style of writing textbooks with the change of various ruling regime: in Pakistan, the textbooks will serve as a primary source of information.

3.5 Historical Criticism

The historian does not often use the firsthand knowledge based on his own observations. It is impossible for the historian to repeat the past occurrences as it can be done in the case of experiments in natural sciences, where the occurrences can be repeated at will. Since the historian gets most of his data from the reports of those who participated in these occurrence or witnessed those events, the information he uses in his researches Issicondaty or secondary to secondary; thus his information is second-hand. The historian, therefore, analyses this knowledge carefully to sift the true from the false and relevant from the irrelevant Thus he gets the usable, trustworthy, authentic and genuine data, which are known as historical evidence and which is derived from the historical data by the process of criticism. This criticism is of two types, i.e., external and internal.

3.5.1 External Criticism (authenticity)

External criticism deals with the genuineness of the document i.e. whether the document is what ii seems to be & reads true to the original (Good: 136). This criticism establishes the authenticity of the data and tries to establish whether a document or relic is true and not a *forgery.* (Best--104) Through external criticism the historian checks the genuineness, authenticity or textual integrity of the source material - whether it is what it appears or claims to be - to determine whether it is admissible as evidence.

To discover the origin of the source materials, the historian asks many questions. When and where was the document produced? Who was the creator or author? Did the credited author or creator produce it? Is this an original or accurate copy of the author's work? From what sources were the contents derived and how dependent upon them was the author? (Van Dalen: 167).

The problem of establishing age or authorship of documents may involve intricate tests of signature, handwriting, script, types, spelling, language usage, documentations knowledge

available at the time and consistency. It may involve physical and chemical tests of ink, paint, paper, parchment, cloth, stone, metals or wood. Are these elements consistent with known facts about the person, the knowledge available and the technology of period in which the remain or the document originated? Problems of external criticism, in testing the genuineness of a document or remain, involve questions about the characteristics of the author and his qualifications, factors or conditions that may have influenced the production of the document such as time, place, purpose and circumstances of composition, and the extent to which the document and its parts read true to the original (Good: 131).

The work of external criticism has been greatly facilitated through the development of science, printing and photography especially in dealing with the sources. A partial list of the important aux lary aids or fields includes, anthropology, archaeology, astronomy, chemistry, chronology, diplomatics, economics, education, epigraphy, exact science, geography, geology, historical method and philosophies, language, law literature, military affairs, natural history, pcho1ogy, politics, pre-history and philosophy. Before the invention of printing, when manuscripts were copied by hand, there were frequent errors in the form of unintentional errors, omission or insertions or deliberate changes in the text. During recent years microphotography has made it possible to reproduce and transmit entire books, bulky records, newspapers and other manuscript for projection in some distant library or research centre, thus obviating the type of error that arises in copying.

Although there may not be any great incentive to do frauds and forgeries in the modern literature of social fields and in education likewise, there is ill the question of authorship (External criticism) in determining the extent to which chairman of a committee has written the report rather than the other members of that committee or other assistants whose names were not mentioned in the report. The motives for deception in the preparation of older documents were the use of well know name to increase the sales or prestige of the manuscript, enhancement of the reputation of prominent person and use of pseudonyms to stimulate the curiosity of the public.

Establishing authorship and the data and place of publication are common tests performed by a historian. Some documents do not carry the name of the, writer, conceal his identity with a pseudonym or present a man as the author also who wrote little or none of the work. In Pakistan, Commissions on Education, Committees on Curriculum Development, reports on educational issues and reports by the Vice-Chancellors, heads and deans sometimes do not reveal the names of the actual authors and contributors who helped in the compilation of the documents. Although the committee members sign the report, only one of them may have written the report. To ascertain the authorship of the Report of the Commission on National Education - 1959 in Pakistan, for example, a historian may have to investigate several things.

Did the chairman of the commission write it, or was it a compilation of report made by the heads of various sub-committees. If the Chairman used the material provided by the sub-committees, did he alter, correct, omit, suppress or expand Parts of their reports?

3.5.2 Internal Criticism (credibility)

Internal criticism deals with the meaning and trustworthiness of statements remaining within the document in other words it weighs the testimony of document in relation to the truth. (Good: 137)

After the authenticity (external criticism) of a historical document or relic has been established, there is still a problem of evaluating its accuracy or worth.

i) Although it may be genuine, does it reveal a true picture?
ii) What about the writer?
iii) Was he competent, honest, unbiased and actually acquainted with the facts or was he too antagonist or too sympathetic to give a true picture?
iv) Did he have any motive for distorting the accounts?
v) Was he subject to pressure, fear or vanity?
vi) How long alter the event did he made record of his testimony?
vii) Was he able to remember accurately what happened?
viii) Was he in agreement with other competent witnesses?

These questions are difficult to answer, but the historian must be sure that his data are authentic and accurate before he introduces them as historical evidence, worth;' of serious consideration (Best: 105)

These questions of accuracy and value of the statements made (credibility) normally come in sequence after questions of

a) authorship,
b) genuineness,
c) time,
d) place, and
e) actual language or text of the original document, have been answered through the process of external criticism. The shift of emphasis in internal criticism is from document (Good: 137).
f) There is no sharp dividing line between the external and internal phases of historical criticism and the two processes may progress simultaneously, with a considerable amount of overlapping. Internal criticism may confirm external evidence concerning authorship or ti.ve and place of writing, and in determining the truthfulness and accuracy of the statements made in the document. The terms external or internal refer to the purpose of the criticism and not to the looks within or without the document for evidence to complete the particular purpose.

Activity No. 3

Think out two examples to illustrate the difference between the external and internal criticism.

1. _____
   _____
   _____

2. _____
   _____
   _____

3.5.3 Principles of Internal Criticism

The following are, in brief, the main principles of internal criticism:

a. Do not read into earlier documents the conceptions of later times.
b. Do not judge an author ignorant of certain events necessarily, because he fails to mention them or they did not occur, for the same reason.
c. Under-estimating a source is no less error than over- estimating it in the same degree and there is no more virtue in placing an event too late than in dating it too early by the same number of years or centuries.
d. A single true source my establish the existence of an idea but other direct, competent independent witnesses are required to prove the reality of events or objective facts.
e. Identical errors prove the dependence of sources on each other or a common source.
1. If witnesses contradict each other on a certain point, one or the other may be true or both maybe in error.
g. Direct, competent independent, witnesses who report the same central fact, can also report peripheral matters in a causal way and maybe accepted for the points of their agreement.
h. Official testimony - oral or written - must be compared with unofficial testimony, whenever possible, for neither one nor the other is alone sufficient.
i. A document may provide, competent and dependable evidence on certain points, yet carry no weight in respect to others it mentions.

3.5.4 Examples of Historical Criticism

Following are some of the examples of hoaxes, frauds and forgeries from different fields to illustrate the range and complexity of problems of genuineness in historical criticism.

a) Cardiff Giant

The "Real Story of Cardiff Giant" by Alen Hynd, reproduced by Best, is a good example of external criticism. The Cardiff Giant was a figure of a man weighing about 3000 pounds, found in 1869, buried three feet under the surface of a farmer's field near Cardiff, New York, about 13 miles south of Syracuse.

It was examined by two scientists from Yale University, who pronounced it a fossilized human figure whereas the clergymen were of the opinion that it were fossilized man of biblical times. The Archaeologists of the New York State Museum were of the opinion that the figure was an old statue while Dr. Oliver, the Harvard anatomist declared that it was a statue of great antiquity.

The local owner turned down the offer by Barnum to buy the figure, where upon Barnum commissioned a sculptor who made an exact copy of the Giant, which was exhibited in New York City as the original Cardiff Giant was. The Cardiff owner filed a case in the court against Mr. Barnum and the judge decided that the original Cardiff Giant was only a fake.

A newspaper reporter traced the shipment of a huge box labelled "machinery" to the farm near Cardiff nearly a year before the Giant's discovery. He traced that Mr. Hull had acquired a huge block of gypsum at Iowa and had shipped a box labelled "machinery" weighing exactly what the block of gypsum had weighed to Chicago.

From hotel railroad and Drayage Company records, he traced the shipment to a barn in the 900 block of North Clark Street in Chicago. The owner of the harn confessed his part in the scheme and it was investigated that Mr. Hull, a stone cutter, had fashioned the figure.

It was revealed that Mr. Hull while visiting his sister in Iowa, heard that a clerg while preaching about the sixth chapter of Genesis had described the "Giants in Earth" mentioned there Seeing it chance to make money. Hull planned to the Giant and secretly planted it in the ground of his cousin and accidently discovered it while digging anew well with the help of well diggers. The clergyman and the experts made claims and controversy .gate the giant a fame, and the experts were also be fooled.

The activities of the reporter represent a simple example of external criticism, for, by following his hypothesis that the figure was recently man-made and not an ancient statue, the reporter exposed the facts, whereas the experts, the scientists and the scholars, had been completely be fooled by the hoes.

b) *Fake Art Piece*

In the same way, a painting was brought to United States labelled as a self-portrait done by a great Dutch artist. The authenticity of the painting was challenged 'by the artist's nephew 'and a battle developed between art experts in the United States, in Europe and in the U.S. Treasury Department. The custom officers were interested because original work of art were duty-free, whereas the copies and reproductions were not. One group of experts on art, handwriting, pigment and language decided that the picture was genuine, so it was admitted duty-free, but another group of specialists was unwilling to accept the painting as an original work by the Dutch artist.

c) *Lincoln's Letter*

In a letter, under 1834 date, attributed to Lincoln, is an expression "that North East Quarter of Sector 40" of which 'Lincoln as an experienced surveyor or could hardly have been guilty, since he knew quite well that a congressional township was made up of 36 sections. The same letter included the geographical term "Kansas", the territory of Kansas was not organised and open for settlement until 1854 and the term probably was not in use as early as-1834. The fact that the handwriting bore no resemblance to Lincoln's authenticated style helped establish the letters as forgeries. One of the letters attributed to Ann Rutledge mentions a Spencerian copy book not in use until 1848; Ann died in 1835.

d) *The Diary of James Gallatin*

An interesting example of a hoax or fraud is "The Diary of James Gallatin, Secretary to Albert Gallatin", a great peace maker, 1813.1827, edited by Count Gallatin and published in London and New York late in 1914. The authenticity of the diary was questioned for the following reasons:

i) Critics observed that the text of diary is not pure and contains a number of "abbreviations".
ii) Many of the persons described in the Diary as having been at a particular place on a given date are known, on the basis of standard sources, to have been elsewhere at the time.
iii) Members of the family and others were unable to find any trace of the Original manuscript of the Diary or of anyone who had ever seen it.
iv) The diary does not cheek with other sources, for example it includes many obvious inaccuracies about the French political and social scene.
v) There are many discrepancies in the matters of dates and events.

The author of the fraud was "Count Gallatin" who singed its preface.

3.6 The Historical Hypothesis

3.6.1 Hypothesis in History

The historian also formulates hypothesis like the physical scientist. But the type of hypothesis and procedures for testing it differ in the two fields because of the differences in the nature of the subject matter. The historian deals with a much more complex phenomenon than that dealt with by the physical scientist, who also experiences greater difficulty in ascertaining, the cause of the historical event under investigation. Since the scientist deals with relatively stable elements, he is able to speak of its cause. For the historian it is much more difficult to hypothesize a cause because some of the factors associated with a post event may be unmeasurable or unrecorded. Historical phenomena may have a greater number of antecedents and a more complicated pattern of interaction among them than the physical phenomena. A historian, therefore, often resorts to multiple hypotheses. Because of the complexity of his field of study, because of non availability of complete data and because of his inability to recreate past events under laboratory conditions, the historian is unable to-draw conclusions that are as conclusive and decisive as those of the physical sciences.

The use of hypothesis in historical research is amply demonstrated in Edward Channing's study of the collapse of confederacy (union of southern states during the American Civil War). Channing formulated the following four hypotheses and tested each one in the light of the evidence gathered by him:

a) The military defeat of the Confederate army
b) The dearth of military supplies.
c) The starving condition of the Confederate soldiers and the people.
d) The disintegration of the will to continue the war.

Channing produced evidence that seemed to result the first three hypotheses and concluded that the collapse of morale and the will to fight was substantiated by the excessive number of desertions and interception of letters from home urging soldiers to desert. (Best: 100-1).

Other well-known historical hypotheses include Carlyle's thesis that great men are the major causal factors in important events (he ignored the effect of the times, challenges and crises in producing powerful leaders or heroes). Gibbon proposed the hypothesis that the fall of the Roman Empire was caused by the refusal of the Roman Soldiers to wear armour, disintegration of the Roman army through staffing with barbarians officers and moral corruption.

It may be of interest to know that once the historical hypothesis has been tested satisfactorily it may become a centre] thesis, unifying theme or the principle of interpretation used by-the historian—The-renowned British historian-Toynbee, who viewed history as the study of rise and fall of civilizations, regarded creative response to challenges or difficulties as the cause of the flowing out of civilization. To test this hypothesis he studied the history of North American settlement under extremely in hospitable conditions. After establishing his hypothesis he used it as a central principle to interpret entire human history.

3.6.2 Hypothesis in Research in Educational History

Although hypotheses are not always explicitly stated in historical investigations, they are usually implied, Hypotheses may be formulated in historical investigation of education. Several examples are listed below:

a) The educational innovations of the 1950s and 1960s were based upon practices that previously had been tried and discarded.
b) Christian countries whose educational systems required religious instruction have had lower church attendance rates than those countries in which religious instruction was not provided in the schools.
c) The observation of European school systems by American educators during the nineteenth century had an important effect upon American educational practices.
d) The monitorial system had no-significant effect upon American education. (Best:101)

Some of the hypotheses which may be tested in historical investigations into the Pakistan education system are suggested below:

a) The British deliberately prevented the spread of education in areas from where large number of-soldiers were recruited.
b) The land-owning gentry in Pakistan created obstacles in the spread of education in their areas.
c) Christian missions were given financial support by the British and American governments for weakening the will of the Muslims to resist inroads by christianity.
d) The emergence of a national system of education has been resisted by the bureaucracy.
e) The system of grants-in-aid was introduced to stifle the madrasah system of education.

3.7 The Historical Report

In reporting the findings of historical research also the format described in unit one should be broadly followed. However, in view of, the special nature of historical research, the report makes certain demands on the investigator. The report includes "a statement- of the problem, a review of literature, the basic assumptions underlying the hypothesis, the methods employed in testing the hypothesis, the results obtained, the conclusions reached and a bibliography." (Van Dalen: 185)

It may be reiterated that the hypothesis deter mines what facts are relevant and what are irrelevant to the study. Similarly it is the hypothesis that provides the framework for stating the conclusions of the study ma meaningful way. In writing out the research report the investigator will pattern his material in some systematic order, such as chronological, geographical, topical, or a combination of the three. Generally experienced historians in modern days adopt topical arrangement of material both to make the narrative interesting and to keep the focus on major issues. Reporting all the evidence collected during the investigation would make the account dull and uninteresting. The historian must use his judgment in determining the amount of emphasis or space to give to various evidence. A reappraisal of the hypothesis and the purpose of the study would help decide which data are most significant for the study and how to organize or integrate them. The narrative should try to realize the twin objectives of maintaining accuracy and interest. This requires creativity as well as imagination and resourcefulness. The research report should be written in a style that is dignified as well as objective.

SELF-ASSESSMENT QUESTIONS

Part-1

Following are statements. Tick 'T' if the statement is true and tick 'F' if it is false.

1.	History is a meaningful record of man's achievements.	T	F
2.	According to Best, History is not just a reconstruction of the past It must reflect critical inquiry.	T	F
3.	Historical inquiry begins when some event, development or experience of the past is questioned.	T	F
4.	Remains are physical objects produced without conscious interaction of imparting connected in formation.	T	F
5.	When a person talks with the actual observer of an event, the testimony is named as primary source.	T	F
6.	The text book in history for a class is the primary source for the knowledge of history.	R	F

7. External criticism deals with the credibility of a document T F

8. Internal criticism deals with the trustworthiness of a document T F

Part-11

1. Distinguish primary sources of data from the secondary sources of data. Give examples to illustrate your answer.

2. Distinguish external criticism from internal one. Give examples where necessary.

3. List some topics/problems for a historical researcher in the field of educational planning and management

3.8 Concluding Remarks

In this unit you have studied about the historical research, the sources for the data collection and about the authenticity and credibility or the research data. This unit will help you in designing the historical research; whereas the coming units will deal with the descriptive and experimental designing.

KEY to SAQ

1	**T**	2	**F**	3	**T**	4	**T**	5	**T**
6	**F**	*7*	F	8	F				

REFERENCES

1. Best J.W. and James V. Kahn, *Research in Education, Englewood* Cliffs, 1986.

2. Entwistle N. J., *The Nature of Educational Research,* UK Open University, The Open University Press, 1973.

3. Good, Carter V., *Introduction to Educational Research,* New York Asppleton - Century Crafts, 1959.

4. Rummel J. Francis, *An Introduction to Research Procedures in Education,* New York, Harper and Brothers, Publishers, 1958.

5. Van Dalen, Deobold B., *Understanding Educational Research,* New York McGraw Hill Look Company, 1985.

Unit–4

EXPERIMENTAL RESEARCH

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CONTENTS

INTRODUCTION

In this unit an effort has been made to introduce the concept of experimental research in the field of educational planning and management. The meanings and definition of an experiment have first been discussed and various experimental designs have been presented so that an educational manager may be able to design various experiments in the areas of his interest. The concepts of control and experimental groups and dependent and independent variables have also been discussed in the unit.

The method of experimentation had its origin in science laboratories to which it is ideally suited. However, in recent years it has come to be applied in a variety of areas of human learning. Science aims at explaining, predicting and controlling behaviour and events. It is necessary for it to establish causal connections between an antecedent condition, factor or cause and -an event, phenomenon or effect. To be able to do so it is necessary to be able to identify, isolate and control all factors and to vary the one under study and to observe changes in the phenomenon. Experimentation is a systematic and logical method of hypothesis testing.

An experimental research starts with the identification and rigorous logical analysis of the problem. The issue is brought in sharp focus by the formulation of a hypothesis and by deducing the consequences that are implied logically by it. The experiment itself is the situation designed to test the hypothesis.

OBJECTIVES

By the time you have completed this unit you are expected to be able to:

1. distinguish experimental research from non-experimental type research studies;
2. state the conditions under which experimental studies can proposed in the area of educational planning and management;
3. distinguish various types of designs of experimental researches;
4. discuss the advantages and limitations of the experimental designs described in the unit;
5. recognise that the increased control of extraneous variables requires a comparable increase in complexity of design;
6. compare the internal and external validity of an experiment and state the extent to which the results of an experiment can be generalized;
7. read technical reports of experimental research studies with increased understanding and analyse the results of two research experiments.

4.1 What is An Experiment?

An experiment is a scientific device for obtaining an answer to the question, "If this is done, under carefully controlled conditions, what will happen?" An experiment is a situation in which the relationship between cause and effect is determined. The underlying logic being: If two situations are alike in every respect and if one element is added to one but not to the other, the resultant difference may be considered to be the effect of the element added. Similarly, if two situations are alike in every respect and one element is removed from one situation but not from the other, any observable difference may be attributed to the element removed.

4.1.1 Law of Single Variable

The earliest assumptions of experimental research were based upon the law of the single variable. The law, in its simplest form, has been stated in the preceding para. The law provided the base for experimental ion in early stages. Boyle's Law and Charle's Law are the examples to understand this concept of experimentation. Boyle's Law states that when temper cure is constant, the volume of an ideal gas is inversely proportional to the pressure exerted upon the gas. In other words when pressure is increased, volume decreases i.e. $\frac{V1}{V2} = \frac{P2}{P1};$ where V is volume and P is pressure.

According to Charle's Law the volume of an ideal gas is proportionate to the temperature ii when temperature increases, volume increases. Symbolically $\frac{V1}{V2} = \frac{T1}{T2};$ where V is volume and T is temperature.

4.1.2 Major Components of an Experiment

In a simple conventional experiment, reference is usually made to an experimental group and to a control group. *The Experimental group is* exposed to the influence of the factor under consideration and *the control group is* not exposed to it. Observations are then made to determine what difference appears or what change or modification occurs in the experimental group as contrasted with the control group. For example, an educational administrator wants to recommend the purchase of some special type of furniture for primary school students in the schools under his/her supervision. But before he makes such recommendations, he/she wants to we the superiority of this special furniture over two traditional type of furniture in these schools. We can very easily conduct an experiment on random by selected students and dividing them in two unbiased groups and exposing one group to that special type of furniture and not exposing the other group to the special furniture (i.e. continue use of the old type of furniture). The effect of the new furniture on the desired aspect i.e. the physical growth of the students or on the achievement level of the students over a period of time can be observed. In case there is some difference in the effect, the recommendations can be made by the educational administrator for the purchase of the new type of furniture.

Now in this case, the group "A" which was exposed to special type of treatment will be named as experimental group, whereas the other group which was made to sit on the same traditional furniture will be named as control group.

4.1.3 Variables

The dictionary meaning of the word variable is that characteristic which is able to assume different numerical values. In research terminology "variables" are the conditions or characteristics that an experimenter manipulates, controls or observes. A researcher studying the effect of the use of audio- visual aids on academic achievement manipulates and controls the use of audio-visual aids and observes the academic achievement of students. For this purpose he selects two unbiased groups of students and provides instruction to one group through the usual lecture methods and to the other through the use of audio-visual aids. This is what is meant by controlling or manipulating. Then the researcher records the academic achievement of the two groups of students. This is what we mean by observation. In this experiment 'audio-visual aids' and 'academic achievement' are the two variables. In the context of Boyles' Law 'volume of gas' and 'pressure' were the two variables whereas in case of Charles' Law 'volume of gas' and 'temperature' were the two variables.

a) *Independent Variables*

An independent variable is the condition or characteristic that the experimenter himself manipulates or controls in order to observe and ascertain its impact on the phenomenon to be observed. In the educational researches cited above (in para 2.2) 'special type of furniture' and 'audio-visual aids' are the independent variables. In laboratory experiments which established Boyle's Law, for example pressure of different quantitative value (independent variable) was applied on the gas and the volume of the gas was measured.

(b) *Dependent Variable.*

A dependent variable is that condition or characteristic that appears, disappears or changes as the experimenter introduces, removes or changes the independent variable. The experimenter is free to assign any value to the independent variable but he can only observe or record the resultant value of the dependent variable. In the research on the efficacy of the use of audio-visual aids the experimenter can vary the extent of the use of audio-visual aids during teaching, but he can only record the academic achievement of students which is perhaps dependent on the teaching methods used. In establishing his law, Boyle could freely vary the amount of pressure to be exerted on the gas and would then observe/record the volume of the gas corresponding to each value of the pressure.

In educational research independent variables may be a particular teaching method, amount and types of reinforcement (reward), curricular organization, type of teaching material, frequency and duration of any activity, etc. The dependent variables may be performance on tests, number of errors, speed and accuracy in performance of any task, and any other behavioural change which can be observed/quantified.

(c) *Intervening Variables*

In many types of researches specially in behavioural sciences, the relationship between the independent and dependent variables is not a simple stimulus-response type relationship. Certain variables intervene between the stimulus and the response or between the independent and the dependent variable. These are known as intervening variables. For example, in an experiment conducted to investigate the impact of a certain type of training on the administrative performance is the dependent variable. But the efficiency of the headmaster may be affected by his family background, socio-political conditions, his motivation for work, his will to implement desired changes, etc. These and other factors may intervene in determining the effect of training on his' management performance. In behavioural sciences, such intervening variables cannot be avoided. However, it is important that the experimenter should be conscious of these intervening variables and should adopt the experimental design most suited for controlling these variables as far as possible.

(d) *Extraneous Variables*

Extraneous variables are those uncontrolled variables which are not manipulated by the researcher but they may have a significant influence upon the results of a research study. In a study about the "democratic versus authoritarian control in the educational institutions and their relative effect on the performance of the teachers," there may be certain extraneous variables which cannot be manipulated by the experimenter but they do affect the results of the experiment. The inborn competence of the educational managers, the enthusiasm on their part, their missionary zeal or their socio-economic levels are such variables which cannot be manipulated by the researcher but which may affect the performance of teacher (dependent variable).

4.2 Techniques of Controlling Extraneous Variables

Although the extraneous variables cannot be completely controlled by the experimenter, but there are certain measures and techniques which can as used to minimize the effect of extraneous variables. Some of these techniques are discussed below.

(a) *Removing the variable:*

Extraneous variable may be controlled by eliminating such variable completely. For example, if in a study on education managers, wide differences are expected in male and female behaviour, that is if sex is an extraneous variable, the study may be deliminted to one sex only. In an experimental research on the impact of noise on computational errors it may be expected that noise may have greater impact on the performance of men than that of women. In that case the study may be restricted to either male subjects or to female subjects. This will help eliminate the sex variable. Similar decisions may be made to eliminate other extraneous variables.

(b) *Randomization:*

Randomization is the method of selection of subjects for the study. Randomization ensures that every member of the population has an equal chance of being selected and of being assigned to the experimental and the control group. Randomization can be achieved by a pure chance selection of subjects from the population. Randomization provides an effective method of eliminating systematic bias and of minimizing the effect of extraneous variables. Randomization is also an effective method of equating groups.

To test the relative efficacy of regular drill and spaced drill in improving spelling, an investigator used the method of regular drill in one school in Dadu and the method of spaced drill in another school of the same area. In this experiment the subjects taught by the two methods might have had different intelligence level, spelling competence, motivation and overall teaching-learning atmosphere even before the experiment started. Thus a large number of extraneous variables would affect the dependent variable and the conclusion reached world be of questionable validity. Instead, the researcher should have assigned students to the two groups through randomization. For each student, he should have tossed a coin and placed him in one group if 'head' appeared and in the other if 'tail' appeared. It could then be assumed that intelligent students from both the classes would he assigned equally to the two group. Similarly, students assigned to the two group were most likely to be equal in respect of their spelling, competence, motivation and other extraneous variables and that the effect of these variables was more likely to have been neutralized.

Matching cases:

Another method of controlling extraneous variables is that of assignment of subjects with identical or nearly identical characteristics to the two groups. This method is used is cases where assignment of cases through randomization is either not feasible or not appropriate.

In the research on the impact of regular drill or spaced drill on the spelling competence, another researcher wanted to have two groups with equal spelling competence. He first gave the two available classes a spelling test and assigned students to the two groups so that for each student in the regular drill group there was a student in the spaced drill group with the same or almost the same score on the spelling test. This methods assir'd that the two groups had the same spelling ability at the beginning of the experiment and that any difference found after exposing the two groups to the two methods of drill was due to the method of drill itself.

"Matching cases method" can only match groups on the basis of one variable and can thus control only one extraneous variable. Another limitation for the use of this method is that some individuals are likely to be excluded from the experiment if a matching subject is not available.

(d) *Balancing cases:*
This method consists of assigning subject to the experimental and control group s in such a way that the mean and variance of the two groups are as nearly equal as possible. Because identical balancing of groups is impossible, the experimenter has" to decide how much departure from equality can be tolerated without loss of satisfactory control. This method also suffers from the limitation pointed out in the matching methods; namely the difficulty of equating groups on the basis of more than one characteristic.

(e) *Analysis of co-variance:*
It is possible, with the help of statistical methods, to eliminate initial differences on more than one variable. This method is preferable to the conventional method of matching but it involves use of analysis of covariance which has been be described in unit 12.

SELF-ASSESSMENT QUESTIONS No. 1

At this stage it would be desirable to do the following sell-assessment exercises to check the extent to which you have learned the concept discussed. Define:

a) Experiment.

_____

_____

b) Experimental Group.

_____

_____

c) Control Group.

_____

_____

d) Variables.

_____

_____

e) Independent Variables.

_____

_____

f) Dependent Variables.

_____

_____

g) Intervening Variables.

_____

_____

h) Extraneous Variables.

Activity No. 1

Read the abstract of an experiment given below and answer the questions given at the end:

"133 students were evaluated before and after they had experienced their first college speech course. The three judges used a rating scale with nine facets of speech proficiency each of which was rated on a one to nine scale. The mean gain on each of the nine facets was, at least, one point with the exception of language skills, which were apparently not much improved by speech instruction.

Nine facets were

1) Poise and confidence
2) Movement
3) Directness
4) Enthusiasm
5) Vitality and involvement
6) Organisation
7) Support and development of ideas
8) Interest values of a content and
9) Clarity of ideas and language.

Sample:- It was randomly selected from each of the twenty sections and the total came to 133, (44 males 89 females) mean age was 18 years 9 month.

Each student rated his/her speech back - ground on a one-to-five scale, with one representing no speech experiences and five telling extensive experiences in both curricular and extra- curricular speech experiences. The mean of this variable was 2.19 and S.D. 1.11.

Of special interest was the lack c. correlation between variables and speech ratings. For example there was no significant relationship between high school rank and speech ratings. The amount of high school speech background correlated significantly, though not very high, poise, movement and enthusiasm.

No practical relationship between scores on the Edward Personal Preference Inventory or speech ratings were determined to exist. Correlation = .01.

One of the objectives of the study was to determine the feasibility of exempting some college freshmen from *the* first course in speech based upon demonstrated ability in oral communication. The available evidence suggested that this is not yet feasible."

Q. 1 What is the objective of the experiment?

_____

_____

Q. 2 What is the number of cases in the ample?

_____

_____

Q. 3 How was the sample taken?

_____

_____

Q. 4 Is it an experiment?

_____

_____

4.3 Experimental Validity

In most experimental researches carried outside the laboratory a number of extraneous variables tend to confound the result in such a way that, it is difficult to evaluate their influence on the result. When such extraneous variables are affecting the results it becomes difficult to conclude that changes observed in the dependent variable are caused by the independent variable. The extraneous variables in effect introduce rival hypotheses which could account for the observed changes not attributable to the experimental variable under consideration. Although these extraneous variables cannot be completely eliminated a researcher should be able to identify and anticipate them, and take possible measures to minimize their influence through appropriate research design and careful execution. In order that the conclusions arrived at through an experimental research are accepted as true, the experiment must have internal and external validity.

4.3.1 Internal Validity

Internal validity is the basic minimum limit necessary to make the results of the experiment interpretable. Internal validity questions whether the experimental treatment really makes a difference in the dependent variable. An adequate answer to this question requires adequate internal validity. Before it can be answered, the researcher must be confident that extraneous variables have not produced an effect that is being mistaken as an affect of the experimental treatment. According to Best, an experiment has internal validity to the extent that the factors that have been manipulated (independent variables) actually have a genuine effect on the observed consequences (dependent variables) in the experiment setting.

4.3.2 External Validity

The value of an experimental research lies in its ability to provide a basis for generalizing from a sample to the total population. The conclusion of a research study that spaced drill improved spelling more quickly among ten students of class IV in Pir Sohawa than regular drilling has very little practical value unless the research enables us to generalize to all primary school children.

External validity concerns the power of the experiment to generalize variable relationship Lu a wider population of interest and to non - experimental settings. Achieving external validity is difficult but sound experimental design, appropriate statistical analysis and many replications with varied population samples in a variety of settings, may minimize the problem. (Best: 153)

Experimental validity is an ideal to aspire to, for it is unlikely that it can ever be completely achieved. Internal validity is very difficult. to achieve in the non laboratory setting of the behavioural experiment where there are so many extraneous variables to attempt to control. When experimental controls are tightened to achieve internal validity, the more artificial, less realistic situation may prevail, reducing the external validity or generalizability of the experiment.

Some comparison is inevitable so that a reasonable balance may be established between control and generalizability between internal and external validity.

In order to gain maximum experimental validity, some efforts are made in improving the experimental designs, which are rarely, if ever, prefect. According to William Wersma, both internal and external validity are important, and through experimental design we attempt to embrace adequate validity. Since enhancing one type of validity may tend to jeopardize the other, we often attempt to secure an adequate compromise. The compromise is essentially that of attaining sufficient control to make the result interpretable while maintaining enough realism so that the results will generalize adequately to the intended situations.

SELF-ASSESSMENT QUESTIONS No. 2

I. Define:

a) Internal validity of an experiment _____

_____

_____

b) External validity of an experiment _____

_____

_____

II. Answer the following questions:

a) Is it possible to completely achieve:

i. Internal validity? Yes No

ii. External validity Yes No

b) What can we do to achieve the maximum experimental validity?

_____

_____

4.4 Experimental Designs

Experimental design is the blueprint of the procedures that enable the researcher to test hypotheses by reaching valid conclusions about relationship between independent and dependent variables. Selection of a particular design i based upon the purposes of the experiment, the type of variables to be manipulated, and the conditions or limiting factors under which it is conducted. The design deals with such practical problems as how subjects are to be manipulated and controlled, the way extraneous variables are to be controlled, how observations are to made, and the type of statistical analysis to be employed in interpreting data relationships.

There are different designs for conducting experimental research in the area of educational planning and management all of which cannot be studied in this short unit. However an attempt has been made to discuss thirteen simpler designs under four major heads. In describing, the following abbreviations have been used:

T = Treatment
0 = Observation
E = Experimental group
C = Control group
R = Randomly selected

4.4.1 Pre-Experimental Designs

a) *Design No. 1 - The simplest design (One-shot case study).*

A large number of research studies in social sciences have used the one- shot case design. In this design a single individual or group is studied in detail only once and the observations are attributed to exposure to some prior situation. This design may be represented as

T	O

Where T is the 'treatment', 0 is the 'observation' of the outcome, and the direction of time flow is from left to right; i.e. T precedes 0. The treatment (what the investigator does with the group) might be a sequence of carefully controlled directions, or exposure to a particular experience, such as an educational visit, or a reorganization of office routine. The observation might be the scores the educational managers obtained on some observation following the treatment, or merely an impression that the treatment has been successful in producing results seen as desirable.

For example a group of headmasters of secondary schools in a province is taken on a study tour of some well managed educational institutions. Sometimes later an experienced educational manager visits their educational institutions to observe how well their institutions were being managed. As a result of what he observes during his visit he feels satisfied that the purpose of arranging the study tour has been fully met.

It may be pointed out that many researchers do not consider one-shot case design to be an experimental design at all. They argue that in order to provide useful

scientific information atleast two observations should be made which could provide a basis for comparison. If there is any basis for comparison in this design it is the observer's general expectation of the outcome of the treatment. In the case cited in the preceding para, the experienced educational manager may have had some preconceived notions of what he would have observed had the study tour not been arranged and compared with what he actually observed to arrive at this judgment of the efficacy of the treatment (study tour). Although Design 1 is not to be dismissed as ineffective but it is clearly defective and open to criticism on the ground that it provides no clear-cut standard of comparison by which to judge whether the subsequent observation is, in fact, related to the preceding treatment.

b) *Design No.2 - (Pretest-Post test Design).*
It is on the basis of the criticism on Design No.1 that a pre- test is added to Design 1. Hence Design 2 will be symbolized as under:

O_1	T	O_2

where O_1 is the observation based on the pre-test and O_2 is the observation based on post-test.*

In our example about the training of secondary school headmasters, pre-test and post-test might be similar or paralled tests/measures/devices to assess managerial competence. It means that if we measure the efficiency of the headmasters before we send them for training (O) and then we use, the same or similar device to measure the efficiency of the headmasters after the training period is over (O_2) the difference between these two observations (i.e. O_1 O_2 is most likely to be attributable to the training component which is an independent variable manipulated by the researcher. In this way design No. 2 is an effort to do away with the criticism made about design No. 1".

In the case of pure sciences like Physics or chemistry, this Design No.2 is more efficient as compared to Design No.1, as it manages to exclude extraneous variables and other irrelevant sources of variation. For example, in an experiment in Physics, a student can very easily measure the length of a metal rod before and after heating and can confidently attribute the expansion he/she observes to the treatment i.e. rise of temperature in this experiment. But in an experiment, arranged in the field of educational planning and management, we cannot be so sure n inferring cause and effect relationship even in this design and the location of the treatment between the pre-test (O_1) and post- test (O_2) affords no warrant that this treatment alone is responsible for any gain or difference between the two observations i.e. ($d = O2 – O_1$)

* The terms pro-test and post-test are commonly used in connection with experimental design. Pro-test refers to an observation (a measure or test) given prior to the experimental treatment and post-test is a measure taken after the experimental treatment.

It is evident that during the Intervening period between pre-test and post-test, events other than the treatment will also have occurred and may have caused O_1 to increase upto O_2. Particularly if the period between O_1 and O_2 is long, the change may reflect the maturation and experience of the headmasters even in the absence of the treatment i.e. training component.

Besides this intervening variable of experience or maturation, another variable may be affecting the O_2 other than training component and that is the act of measuring itself. In this "O_1 T 02" design, we cannot ignore the influence of the pre-test itself on the post-test scores. With most tests of cognitive skills, the individu.ls taking the same test for a second time, or taking a similar or parallel test, frequently do better on the second occasion than they did the first time. If this "practice" effect is present, it may be mistakenly attributed to the treatment (T) or the effect of (T) may be inflated by the practice effect.

There is another weakness of this "O_1 T O_2" Design. This weakness may be due to the sampling mistake with the result that the observed gain may be spurious. Suppose that the group of headmasters, in our example, consists of those headmasters who have long experience with the result that they do not show significant difference between O_1 and O_2. In case a group of newly promoted headmasters is taken and given the same observation (O_1) and then the same treatment (T), and thereafter are subjected to the similar observation (O_2), the difference (d) between O_1 and O_2 may not be same as the difference between the O_1 and O_2 of the first group of headmasters.

c) *Design No.3 (Static Group Comparison Design).*

It is due to this criticism on Design No.2 that we need to trace out some better experimental design. Design No.3 given below, may provide an answer to this criticism as it provides two groups for comparison. One group is the experimental group (E), which is given the treatment and is to be subsequently compared on the basis of performance on some post-test with the second group, the control group (C), which has not been exposed to the treatment. There is no pre-test. This design may be symbolized as under:

E	=	T	O_1
C	=	–	O_2

An example would be the comparison of the results obtained with the one group of headmasters provided training in the techniques of school management (E group) with the results obtained from another group of headmasters not exposed to the treatment of training in the techniques of management **i.e.** the control group (C).

This design does provide an external standard of reference against which to measure the effect of the experimental treatment O_1 being the observation of experimental group after treatment (training) and O_2 being the observation of control group. Other things being equal, it can be safely concluded that any difference observed between O_1 and O_2 can be attributed to the training (treatment) provided to the headmasters.

Absence of pretest is a major weakness in this design with the result that information lacks as to the equivalence of the experimental and control group in the first place. Suppose that in our example about the training of headmasters, the experimental group comes out with a higher mean post-test score than the control group. Before attributing the difference to the effect of treatment (training in this example) the possibility that one group was better initially than the other must be discounted. It is therefore, necessary to take such measures which equate the two groups initially. The techniques of randomization as discussed in unit No. 7 "Sampling Designs" can be helpful for this purpose. However it is suggested that if number of cases is small, the simple processes of tossing and matching can be used and in case the number of the cases is high, the random tables may be used.

In brief, the advantage claimed for Design 3 is that the presence of treatment in one group and its absence in the other makes possible a valid estimate of the treatment affect provided that the groups were equivalent initially. In the example under discussion, if we use a process of random assignment of headmasters, the two group are likely to be statistically equivalent and the possibility of error is controlled.

SELF-ASSESSMENT QUESTIONS No. 3

In the following designs, what do the symbols stand for? Also give the description of the design in one or two sentences.

1. T O

T = …….

O = ……

Description of the design:

_____

_____

_____

2.

O_1	T	O_2

O_1 = …….

T = …….

O_2 = …….

Description of design:

_____

_____

_____

3.

E =	T	O_1
C =	–	O_2

E = …….
C = …….
T = …….
O_1 = ……
O_2 = ……
Description of design:

_____

_____

_____

Activity No. 2

Propose an experimental research study in the area of educational planning and management and write down your proposal under the given headings.

a) Topic of your study:_____

_____

_____

b) Population _____

c) Sample _____

d) Design to be used _____

e) Independent variable _____

f) Dependent variable_____

4.4.2 True Experimental Designs

The designs discussed in 5.1 may be named as pre-experimental designs as they provide either no control group or no way of equating the groups that are used with the result that these designs are least effective. Design No. 1 does not provide for any pre-treatment observation and does not have any external and explicit standard of reference for the purpose of comparison. Design No. 2 provided for a pre-treatment observation as a standard for comparison with the post-treatment observation but it does not provide for a control group as an external standard of reference for comparison. Design No. 3 does provide control group as an external standard of reference for the purpose of comparison but does not provide for pre- treatment observation in either of the groups.

This situation, therefore, demands a design which should have a control group as well as provide for a pre-treatment observation for both the' experimental and control groups so that the design may be a true experimental one. In a true experiment, according to Best,

the equivalence of the experimental and control groups are provided by random assignment of subjects to experimental and control groups. Although it is difficult to arrange a true experimental design in behavioural sciences like educational planning and management, it is the strongest type of design and should be used whenever possible. Although there are a number of such true experimental designs but only a few of them are being discussed below

a) *Design No. 4 (Post test-only, Equivalent Groups Design)*
Following is the symbolic representation of this design:

R	E	=	T	0_1
R	C	=	-	0_2

Where R = Randomly selected
E = Experimental group
C = Control group. 0 = Observation T = Treatment

This design is one of the most effective in minimizing the threats to experimental validity. It differs from Design 3 in that, experimental and control groups are equated by random a segment. At the end of experimental period, the difference between the mean test scores of the experimental and control groups are subjected to a test of statistical significance, at-test or an analysis of variane.* The assumption is that the means of randomly assigned experimental and control groups from the same population will differ only to the extent that random sample means from the same population will differ as a result of sampling error If the difference between the means is too great, to attribute to sampling error, the difference may be attributed to the treatment variable effect.

Let us take the same example about the training of headmasters, in the area of educational planning and management. In case the researcher selects 16 headmasters from a population of 100 headmasters in a division, they are randomly assigned to experimental and control treatments using eight of them as experimental group and eight as the control group. The experimental group is provided an intensive training in the techniques of management for a period whereas the control group is not provided any training and they continue working in their original schools running their schools on the pattern of administration as they already did. All the other factors are equated. At the end of the period "F" the experimental and control groups are administered a test and the difference between the mean scores is subjected to a test of statistical significance. In case the statistically significant difference is found in favour of the experimental group, we can safely conclude that this effect in the efficiency of the headmasters is due to the training variable and, in this way the cause effect relationship is determined between the training (treatment) and efficiency (observation). In case the difference

* These concepts have been discussed in a later unit in Block No. 3.

between the mean scores is found to favour the experimental group, but not to the extent of being statistically significant, we can conclude that the superiority of experimental group (E) over the control group (C) could well have been the result of the sampling error and that there was no evidence of the superiority of the training component over those headmasters who were not provided training. For the purpose of actual examples in experiments along-with statistical analysis, you are referred to unit No.13 of this course.

However there is one drawback in this design and that is the nonexistence of a pre-test. If a pre-test is added to both the groups, we can arrive at another design which we can name as Design No. 5.

b) *Design No. 5 - (Pretest-Post test Equivalent Groups Design).*
Following is the symbolic representation of the design.

R	E	=	O_1	T	O_2
R	C	=	O_3	–	O_4
^{d}RE		=	O_2	–	O_1
^{d}RC		=	O_4	–	O_3

D	=	^{d}RE	–	^{d}RC

This design is similar to Design 4 except that pre-tests are administered before the application of the experimental and control treatments and post- tests at the end of the treatment period. The difference between the scores on pre-test and post-test for the experimental group is denoted as ^{d}RE and is calculated by the use of formula "$^{d}RE=O_2,–O_1$" whereas the difference between the scores on pre-test and post-test of control group is ^{d}RC and is calculated by the use of formula "$^{d}RC=O_4,–O_3$" Thus the gains in experimental and control groups are dRE and dRC respectively and can be compared by calculating the net difference between these two gains i.e. with the help of the formula "D = d - dRC" It is reasonable to attribute the difference between these two gains (i.e. capital D) to the treatment (Training to headmasters in the example under discussion) that one group received and the other group did not. The gain scares may also be compared and subjected to a test of significance of the difference between means. Pre-test scores can also be used in the analysis of co-variance to statistically control for any cerences between the groups at the beginning of the study. The standard concepts and techniques will be discussed later.

Let us take the example of training headmasters as discussed in Design 4, where in each of the experimental and control groups had eight headmasters. According to Design 5 each group is to be subjected to a pre-test (the same or parallel) before the conduct of the experiment. Then the training component is planned to be given to the experimental group and the control group is not to be exposed to' treatment (training). After the experimental treatment is over, the same or parallel test (post-

test) is to be conducted for both the group. The gain (0_2 - 0) named as dRE in the experiment group now has its counterpart dRC (which is equal to O— 0_3) in the control groups and these gains can be compared. Their difference is D which is equal to dRE - dRC or (0_2 - 0) - (0_4— 0_3). It is reasonable to attribute the difference between these gains (1)) to the treatment or training received by experimental group and not by the control group.

This design is clearly an improvement over Design No. 4 wherein no pretest was provided and the group had been equated only statistically. This design is also an improvement over Design No.2 in which there was no assurance that the treatment alone was responsible for any gain observed. The presence of control group in Design No.5 now makes it possible to control maturation and practice effects. In brief Design 5 has an advantage over the previous designs that the pre-test affords an opportunity to check on the initial equivalence of the groups. Thus this is a strong and a true experimental design but there may be possibility of the influence of the effect of testing and the interaction with the experimental variable.

Activity No. 3

a) In column No.1 enter symbolic representation of Design 2

Column No. 1	Column No. 2

b) In column No. 2 add a control group with observations before and after the experiment.
c) See what new design has emerged. Is it Design No. 5? ..... Yes/No.
d) What can we conclude from this activity about the difference between Design No. 2 and Design No.5?

c) Design No.6 (The Solomon Four-Group Design).

The symbolic representation of this design is as follows:

R	E	O_1	T	O_2
R	C	O_3	-	O_4
R	E	-	T	O_5
R	C	-	-	O_6

In this design

i) Subjects are randomly assigned to four groups
ii) Two groups receive the experimental treatment (T)
iii) One experimental group receives a pretest (O_1)
iv) Two groups (control) do not receive treatment (C)
v) One control group receives a pretest (O)
vi) All four groups receive post tests (O_2, O_4, O_5, O_6).

The design is really a combination of the two group designs previously described, (the post test only and the pretest-post test). It is possible to evaluate the effects of training. Analysis of variance is used to compare the four posttest scores and, analysis of co-variance to compare gains in 02 and 0_4 (reference Unit 13).

Because this design provides for two simultaneous experiments, the advantages of a replication are incorporated. A major difficulty is finding enough subjects to assign randomly to four equivalent groups.

Activity No. 4

In the block given below write Design No.5 in the first two rows and write Design No. 4 in the third and fourth row.

Row No.	Design
1	
2	
3	
4	

Do you think that if we read these four rows together, it looks like Design No. 6 .... Yes/No

What result can you draw from the shape of the formula that emerges from the combination of Design No.4 and 5?

_____
_____
_____

SELF-ASSESSMENT QUESTIONS No. 4

a) Write, at least, one main draw-back of each of the following designs:
Design-4

_____
_____

Design-5

_____
_____

Design-6

_____

_____

b) Write at least, one merit of each of the following designs:
Design-4

_____

_____

Design-5

_____

_____

Design-6

_____

_____

4.4.3 Quasi Experimental Designs

These experimental designs provide control of when and to whom the measurement is applied. Out of a number of Quasi-experimental designs only a few are briefly discussed here.

a) Design No. 7 - (The Pretest-Posttest Non-equivalent Groups Design). The symbolic representation of this design is as under:

E	=	O	T	O_2
C	=	O_3	–	O_4

Where O_1 and O_3 are the observations on pretests and O_2 and O_4 are those of posttests.

Obtaining equivalent groups through randomization for experimental and control groups may sometimes become difficult because this would involve splitting classes, disturbing class schedule or assembling scattered subjects at one place. Hence there is need to have a design which could use pre-assembled subjects for experimental and control groups. The difference between the mean of the O_1 and O_2 scores and the difference between the mean of the O_3 and O_4 scores are tested for statistical significance. Analysis of co-variance may also be used. Because this design may be the only feasible one, the comparison is justifiable but the results should be interpreted with care.

This Design No 7 makes use of intact groups or groups which are formed on the basis of some natural grouping. Thus experimental and control groups are formed neither by randomly assigning scores nor by matching.

This Design - 7 may be confused with two other experimental designs i.e. Design No 2 (The one group, pretest posttest design) and Design No. 5 (The-pretest-posttest-equiva1ent-control-group-deign with randomization).

The addition of a control group is the major advantage of the Design No. 7 over design No.2 although randomization is to be preferred over the selection of intact classes. Nevertheless there may be times when randomization is not possible and you may have to use existing groups. Even if you decide to match the subjects of experimental group and control group, Design No. 5 (The pretest - posttest equivalent control group Design with randomization) is still to be preferred. Matching can only equate groups on a few variables, but randomization can perform two functions: (1) It can assure you that there are no systematic biases in groups containing randomly assigned individuals and (2) in cases, where the individuals are already matched it can determine, which individuals are already matched. It can determine, which individual is to receive treatment (T) and which is not to receive; thus eliminating systematic differences between the groups.

A basic requirement of Design No 7 is that pre-test scores for experimental and control groups are as similar as possible and that the initial assignment of individuals to the groups does not reflect biases.

b) Design No. 8 (the Time-Series Design). The time series experiment is a type of longitudinal research where subjects undergo repeated measurements both before and after the introduction of the experimental variable. It can be diagrammed in the following way:

O_1 O_2 O_3 O_4 O_5 O_6 O_7 O_8

In other words, there are four observation periods (the actual number may vary considerably) preceding and following T. You hypothesize that changes occurring between O_1 …….. O_4 and O_5……. O_8 are due to the presence of T.

Let us take an example of how this design can be employed. Suppose that you hypothesize that a salary increase will motivate the university professors to produce more research articles. Before the salary increase is granted you as an experme1iter, keep a record of the research articles produced by the university professors (The subject of the experiment) during the period "*P"*. A pay rise is given and you keep on recording the number at research articles produced by the professors under research.

Although this Design No. 8 (The time series design) is simple to execute but the analysis and the interpretation of a data are complex and difficult to handle. Suppose, for a example, that the mean number at research articles prior to pay rise for the period "p" were less number, but this frequency of research articles increased after the pay rise. Are we justified in concluding that the salary rise was responsible for the increase in the number of the research articles during the period of then "p" The answer is partially affirmative if we are certain that the effects of

history[1] are absent. This means that you must be by sure that no other event was present which could amount for the increase in the number of research articles. In case other events intervened between 0_4 and 0_5 besides those produced by the treatment (T), the effects of "T" alone cannot be evaluated. An extraneous variable might be the publication of a research article in a magazine of international repute, which motivated the professor under research to increase the frequency of the period "P" after the treatment.

Other than history, the only threat to the validity of design is instrumentation.[2] Bias is especially likely if professors under research were aware of the fact that an experiment was in progress and that the rise of their pay depended on the number of research articles produced by them. Maturation[3] is eliminated in most time series design.[4] Testing is also absent because the effects of repeated measurements can be determined. Because the same subject is used over and over again selection cannot be used to explain differences before and after the introduction of treatment (T).[5] Experimental mortality[6] will not ilay an important role in this design (time series design), if you keep a record of the response of each individual in the sample, so that the absence of an individual can be detected.

The statistical analysis required to interpret a time-series design (Design o. 8) can be highly complex. Some statisticians reject the possibility of comparing 0_4 and 0_5 to determine the effects of treatment (T), because all changes in this design are highly variable. They also reject the possibility of combining pre-treatment observations with post-treatment observations. They suggest that in the analysis of the data collected on this design, the statistical technique of trend analysis needs to be used.

c) Design No. 9 - (Equivalent Time Sample Design): Instead of taking equivalent samples of subjects, you may use one and the sante group both as experimental and control groups. In this design the experimental condition (T) is presented between some observations and not presented (To) between others. This may be diagrammed as under:
0. $T_{1\,02}$ T_0 0_3 T_i 0_4 T_0 0_5
(where to means treatment not presented)

---

[1] History means the conditions in the environment other than experimental treatment, which intervene between the initial selection of the subjects and the measure of the dependent variable.
[2] *In*stru*mentation* means the changes in the standards employed by the observers as a result of fatigue, boredom or changes in efficiency.
[3] *Maturation* means the changes taking place within the subjects as a result of becoming older or more sophisticated.
[4] *Testing.* This is also a threat to the experimental validity. This means: the differential effect produced by one test affecting another
[5] *Selection* means initial differences between the groups.
[6] *Mortality* means the effects produced by taking measurements on a sample of subjects who differ from those employed at the outset of an experiment.

In this design the number of observations and interventions vary and the alterations of the experimental condition with the control condition would normally be random rather than systematic as shown in the diagram of the design.

This design has a number of weaknesses. Although the effect of history is minimized in this design but it is possible that there is increase in the influence of maturation, unsuitable instrumentation, experimental mortality and testing.

d) *Design No. 10 (The Equivalent Materials Pretest Posttest Design):* Following is the diagram of this design.
T_{MA} 0203 $T0_4$

Where T_{1jA} = Management Method No. 1

T = Management Method No. 2

O_1 and O_2 are pre-tests

O_3 and 0_4 are post-tests

The design used the same subjects/class for both experimental and control groups but it involves two or more than two cycles. The class may be used as a control group in the first cycle and as an experimental group in the second cycle. The order of exposure to treatment and control may be reversed i.e. experimental treatment in the first cycle and control in the second cycle. It is essential that in this design, the learning material selected for the group, though different, should be as nearly equal as possible in the interest of the individuals and in the difficulty of comprehension.

Although this design is simple and logical but it is a weak design when tested on the criteria of experimental validity, as given below:

a) Selection
It is often difficult to select equated material.

b) Maturation
When the individuals (subjects) enter the second cycle, they are older and more mature.

c) History
Outside events are more likely to affect the experience in one cycle than in the other.

d) Testing
There would be an influence of prior treatment carrying over from the first cycle to the second.

e) Instrumentation
The effects of testing would be more likely to have a greater impact on the measurement of gain in the second cycle.

f) Mortality
The loss of subjects from the experiment would be more likely in an experimental design spread over a longer period of time.

g) When your judgment is a factor in evaluation, contamination i.e. your knowledge of individuals performance in the first cycle, could possibly influence evaluation of performance in the second cycle.

It is one the basis of these weaknesses that we cannot recommend this experimental design as a model design and we are again in the search of some other design.

e) *Design No. 11 - (Four Cycle Experimental Design):*
Some of the limitations of equivalent material single group pretest-posttest design can be partially minimized by a series of replications in which the order of exposure to experimental ad control groups is reversed. This process known as rotation can be diagrammatically shown in a four-cycle experimental design shown as under:

I	C_1	T	O_2
II	O_3	C	O_4
III	O_5	C	O_6
IV	O_7	T	O_3

Where O_1, O_3, O_5 and O_7 are pre-tests and O_2, O_4, O_6 and O_8 are post-tests.

If the experimental treatment yielded significantly greater gains, regardless of the order of exposure, its effectiveness could be accepted with great confidence. However, there are certain weaknesses of this design also as it is difficult to equate materials and individuals in the group. It also does not equate the experimental conditions.

f) *Design No. 12- (Counter-balanced Design):*
This design is suitable in cases where random assignment of subjects is not possible and intact groups of subjects/classes must be used. This design is most commonly used when a limited number of subjects is available and more than one treatment is to be tested. Each group of subjects receives each of the treatment condition at different times. The number of subject groups and the number of treatments is the same. Thus if two varieties of seeds are to be *tested,* two plots of

equal size are to be taken, or if two type-sizes are to be tested for suitability for use in textbooks, two groups of classes are to be taken. In case of two treatment conditions, the design would be as follows:

	First Time	Second Time
Subject Group A	T_i	T_2
Subject Group B	T_2	T_1

Where T_1 and T_2 are the two treatment conditions. In the above example two varieties of seeds or two type-sizes.

While analysing the results, the sum of the two observations for each treatment are compared. The difference between these two is tested for statistical significance. Thus if the sum of the two observations for a certain treatment is statistically different (greater) than the sum of the two observations for the other treatment, the first treatment is superior.

In this design three, four, or more treatments can be tested. If four treatments are to be tested, four groups of subjects will ban to be subjected to different treatments four time as shown below:

Replications

	First Time	Second Time	Third Time	Fourth Time
Group A	T_i	T_2	T_3	T_4
Group B	T_2	T_i	T_1	T_3
Group C	T_3	T_4	T_1	T_2
Group	T_4	T_3	T_2	T_i

During the first replication (or first time) Group A receives treatment 1 (T_1), Group B, T_2, Group C, T_3 and Group D, T_4. In the second replication the groups receive treatments in a different order (see column with heading "Second Time"). It may be noted that in each column and row each treatment occurs only once, it may also be pointed out that this is not the only arrangement of treatments possible. With four subject groups and four treatments, there can be 576 different arrangements and an experimenter should select one arrangement at random.

For analysis, the sums of the four observations for each treatment shall have to be obtained' and statistical technique shall have to be used to determine which of these, if any, is significantly greater than others.

g) *Design No. 13- (Factorial Design):*

The factorial design permits the experimenter to manipulate and check the effect of two or more variables simultaneously rather than in separate experiments. This design enables the researcher to evaluate both the main (independent) effect of each variable and the interaction (joint) effect of the two variables.

The concept of interaction needs to be explained further with the help of an example. Suppose that the effects of two drugs A and 13 administered separately have been investigated with the use of experimental and control groups and the effects of each drug have been noted. Later drugs A and B were administered together and it was found that this produced a much greater healing effect than produced by the two drugs separately. This additional healing effect can be explained as the interaction effect.

To take another example, suppose that experiments have shown that the discussion method produces higher student achievement than the lecture method. Now suppose we are interested in finding out whether the discussion method produces better student achievement than the lecture method with students of superior, average as well as lower intelligence. We can find answer to this question in one experiment if we use the factorial design. The design would enable us study the effect of the two methods of teaching as well as the interaction of the method with intelligence.

Unlike the Latin square or counter-balanced design we do not have to have equal number of variations of methods and intelligence level.

The simplest factorial design is x 2; for example the effect of two teaching methods on boys and girls. This design can also be used to study more than two independent variables. For example, a 2 x 3 x 3 factorial design can *be* used to study the impact of two teaching methods used *by* teachers of varying intelligence levels in class having students of varying intelligence levels. An important characteristic of the factorial design is that it enables the experimenter to test several hypotheses simultaneously In one experiment We no longer have to perform a series of single-variable experiments under the law of the single variable.

To illustrate, assume that we are Interested in studying the effect of two methods of teaching and sex on student achievement In simple 2 x 2 factorial design, subjects are assigned at random to four groups as shown in the following diagrams:

	Lecture	Discussion	Row Mean
	cell 1	cell 2	
	cell 3 XLG	cell XDG	
Column Mean	XL	XD	

After the treatments have been applied, the mean (X) of the achievement scores of boys taught by the lecture method will be entered in cell 1, the mean of the achievement scores obtained by boys taught by the discussion method will be entered in cell 2 and so on. Later average scores of all boys will be entered under the appropriate row means and that of girls in the next line. Similarly, the average of scores obtained by all students (boys as well as girls) taught by the lecture method will be entered as the first column mean. This will enable the experimenter to apply statistical techniques to determine: (i) what is the effect of teaching method on achievement? (ii) What is the effect of sex on achievement? and (iii) Wt is the interaction effect of teaching method and sex on achievement? The statistical technique used is known as analysis of variance.

SELF-ASSESSMENT QUESTIONS No. 5

Q. 1 a) Propose an experiment with three treatments and with three conditions for each variable:

Treatment No. T_1.....
T_2.....
T_3.....

Condition No. 1 .....
Condition No.2 .....
Condition No. 3 .....

b) In the space provided below thaw a diagram for a design of the type you have proposed in 1(a) above.

Activity No. 5

Keeping in view the designs you have studied in this unit, write an experimental research study design on the topics that you intend to propose for your MA E.P.M. research thesis.

CONCLUDING REMARKS

You have had a good study about the designing of an experiment in the area of educational planning and management and lam sure that the study of this unit will help you a lot in writing research thesis if you plan to conduct an experiment.

REFERENCES

1. Albert Pilliner. *Experiment in Educational Research,* Methods of Educational Enquiry,
   E-341, Block No. 5, The Open University, UK, 1975 (For additional study, this book may be used.)

2. Best, J.W. and James V. Kahn: *Research in Education,* New Jersey, Englewood Cliffs, (Eighth Edition), 1986.

3. Campbell, D.T. and Stanley, J.C.: *Experimental and Quasi- Experimental Designs, for Research,* Chicago, 1960. (This may also serve as an additional text on the subject.)

4. Entwistle, N.J.: *The Nature of Educational Research, UK* Open University, The Open University Press, 1973.

5. Good Carter, V.: *Introduction to Educational Research,* New York, Appleton-Century-Crofts, the latest edition.

6. Good, Carter, V.: *Essentials of Educational Research,* New York, Appleton Century-Crofts, the latest edition.

7. Good, William J.: *Methods in Social Research,* New York, Mc-Graw-Hill Book Company, 1952.

8. *Mouly, George J.: Educational Research - The Art and Science of Investigation,* Boston: Allyn and Bacon, Inc., 1978.

9. *Rummel, J.* Francis: *An Introduction to Research Procedures in Education,* New York: Harper & Brothers, Publishers, 1958.

10. *Sax,* Gilbert: *Empirical Foundations of Educational Research,* New Jersey, Englewood Cliffs, Press Prentice Hall, Inc., 1968.

11. Van Dalen, Deobold, B.: *Understanding Educational Research - An Introduction,* New York Mc-Graw-Hill Book Company, 1985.

12. Wiersma, William: *Research Methods in Education - An Introduction,* New York: Lippincott Company, 1969.

Unit–5

DESCRIPTIVE RESEARCH DESIGN

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CONTENTS

INTRODUCTION

You have already studied the historical and the experimental types of re searches. In this unit, an attempt has been mane to explain descriptive research which is the pre-dominant research method of the behavioural sciences. You mow how an experimenter makes a hypothesis alter a critical analysis of the problem at hand and then sets about planning his research carefully. He selects his subjects, applies some treatment to them and then makes observations which may confirm or reject his hypothesis. Many types of behaviour that interest a researcher cannot be observed under experimental conditions because the significant variables may be harmful to the subjects. The prevailing practice of social scientists is accordingly to systematically examine and analyze behaviour under conditions that naturally occur in the home, the classroom, the community, etc. Herein lies the advantages of descriptive research.

OBJECTIVES

It is expected that after going through this unit, you will be able to:

1. differentiate between experimental and descriptive research;

2. distinguish between the various types of descriptive researches;

3. state as to what type of descriptive researches can be planned in the field of educational planning and management;

4. plan a descriptive research study for your master's thesis;

5. study the descriptive research reports with increased efficiency;

6. determine what type of descriptive studies can be used at various stages of the planning cycle.

5.1 What is Descriptive Research?

In a descriptive research the investigator does not manipulate the variables or arrange events to happen. Descriptive research involves events that have already taken place or would have taken place even though there had been no observation or description. Thus a descriptive research may be undertaken to study the administrative machinery for educational planning in different provinces or causes of low female participation rate may be Investigated by studying community attitude towards female education. In these studies the planning machinery is already in existence and the process of planning is going on; the researcher cannot cause any, change and study its impact. He can only describe and analyse the existing phenomena and may, at times, try to relate it with some factor e.g. community attitude in case of low female participation rate.

According to Best, descriptive research describes and interprets "what is? It is concerned with conditions or relationships that exist, practices that prevail; beliefs, points of views or attitudes that are held; processes that are going on, effects that are being felt or trends that are developing."

Descriptive research sometimes also investigates how an existing phenomenon is related to some preceding event or what was the effect of that preceding event on the present conditions. Its process involves gathering and tabulating facts, an element of analysis and interpretation, comparison or contrast of variables as well as their measurement and classification. An investigator, studying cause of low female participation rate, may try to assess the role played by parental attitudes, poverty of parents, non- availability of female teachers, distance of school from home,' non-functional curricula, etc., through obtaining the views of parents, teachers, community leaders and out-of-school girls through a questionnaire. He may then compare the views of fathers, mothers and daughters with one another and with those of the views of community leaders and teachers. On the basis of the analysis of data, he may also interpret the results.

The importance of this type of research lies in the fact that not much progress can be made in solving problems unless we possess descriptions of the phenomena with which we work. To continue with the example of the research study cited in the preceding pan it is obvious that no effective policy can be formulated or to measures can be adopted, unless we know why concerned parents did not send their daughters to the school and that role was placed by community leaders and teachers.

5.2 Steps in a Descriptive Research

In descriptive studies, the researchers follow certain procedures and steps and do not merely present private convictions or data based on cursory or casual observation. According to Van Dalen, the following steps may be taken by the investigate to carry out a good research:

- Examine their problematic situations;
- Define their problem and sometimes state their hypotheses,
- List the assumptions upon with their hypotheses and procedures are based,

- Select appropriate subject and source materials;
- Select or construct techniques for collecting the data,
- Establish categories for classing the data that are unambiguous, appropriate for the purpose of, the study and capable of bringing. about significant likeness, differences or relationships,
- Validate the data gathering techniques,
- Make discriminating and objective observation,
- Describe, ana1ye and interpret their findings in clear and precise terms.

Activity No. 1

A descriptive research study has been developed according to the steps suggested above. Use the blanks provided against each step to develop another such study in the area of educational planning and measurement.

A good descriptive research is not a bare description. It is, in fact, a collection of evidence on the basis of a hypothesis or theory, tabulation and careful summarization of data, analysis of results to draw meaningful generalization that will advance knowledge. Data of descriptive research maybe expressed (i) *qualitatively* - in verbal symbols, or (ii) *quantitatively* - in mathematics symbols.

Qualitative data -word descriptions -may predominate in studies that examine the general nature of the phenomenon. An example of use of no quantitative data would be a study of the educational conditions and practices in other countries. A survey of primary education in different province would require verbal data concerning the administrative machinery for planning and execution, the priorities of the provincial government and socio-cultural hurdles in the way of universalization of primary education. Qualitative studies help workers identify the significant factors to measure. A study may consist exclusively of one form or may contain both forms.

Types of Descriptive Research

Different writers have classified descriptive research in different ways. Van. Dalen has placed descriptive researches in three categories:

- Survey studies
- Inter-relationship studies
- Developmental studies

According to him some studies fall exclusively within one of the three areas but others have characteristics of more than one of these categories. A detailed description of these categories of research is given in the following sections.

5.3 Survey Studies

5.3.1 Where is Survey?

According to Carter V Good, the purpose of a descriptive survey study may be:

i) to secure evidence concerning and existing situation or current conditions.
ii) to identify standards or norms with which to compare present conditions.
iii) to determine how to make the next step (Having determined where we are and where we wish to go).

This means that researchers who are trying to solve problem in educational organizations by conducting surveys collect detailed descriptions of existing Phenomena with intent employing the data to justify current conditions and practices or to make plans for improving them. Their objective may be to ascertain status as well as to determine the adequacy of comparing it with selected or established standards.

The survey studies collect data from a number of cases at a particular period of time. These are not related with the characteristics of individuals but their main concern is to make generalizations which are based on the data collected from a number of cases.

Surveys may be broad or narrow in scope. They may encompass several countries or may be confined to one region, city or so other unit. Survey data may be gathered from every member of a population or from a carefully selected sample. Data may be collected concerning a large number of related factors or a few selected items. The scope and depth of the study depends primarily upon the nature of the problem.

A survey study is essentially a research and is dearly distinguished from a general report. But for this purpose a survey study should fulfill the following criteria:

a) The research report usually has distinctive form, with definite-attention given to describing the methodology, the sources, the population, the trait being studied, and other appropriate methodological or technical details.
b) Presumably original observations are taken.
c) Each step in the work proceeds with meticulous care and with due consideration for the large plan and purpose of the work. The data are verified and evaluated.
d) The data are resolved, or organized into certain more general terms, and are sometimes related to a single, overall thesis. Certainly the data will be summarized in some form or other, as systematically as possible. What is done with the data is a definite part of the contribution of the study.
e) The background, sensitivity, and general competence of the investigator, as well as the spirit with which he works, are vital elements. As to whether a study must have more or less than the qualities in this list, probably no definite rule can be stated. These qualities vary in degree; various types of research have their own criteria. One should aim, In doing his own research, not at the minimum requirements of research, but at a fairly full-bodied attach. (Good: 196)

Although the survey researchers make an effort to come up to the above mentioned criteria but there are certain limitations of survey studies which arise In most cases because of the nature of data used in these studies. Some of these limitations are as follows:

i) Information that is not known to 'the respondent cannot be obtained in survey.
ii) Information that is not significant to the respondent cannot be obtained in a reliable way.
iii) The information provided by the respondents may not be accurate in case it is about the aspects which the respondents intend to hide, although an assurance is given to the respondent about its remaining secret.
iv) Information about activities shared by a very small proportion of population cannot be obtained in a reliable way in cross-section surveys.
v) Data that can be obtained only with high sampling error do not constitute proper topics for sample surveys:
vi) Information obtained from a single survey is less reliable than trend data derived from two or more consecutive surveys carried out by the same methods.
vii) Survey cannot be aimed at obtaining exact quantitative forecasts of things to come.

Activity No. 2

Given below are the resume of two survey studies with bank spices on the light. Read these resume critically to identify if the shortcomings listed above are present in these studies. List these shortcomings in the blank spaces provided.

Resume	Shortcomings
Study No. 1 A survey was conducted to study (i) the causes of delay in project formulation, approval and implementation; (ii) the causes of cost over-runs; and (iii) the factors responsible for poor quality of construction and other material. A ques-tionnaire was prepared to elicit opinion and information about procedures relating to project formulation, approval, financing and implementation of projects as well as about reasons for cost over-runs and poor quality of construction and other material supplied. A few problem projects were selected and the questionnaire was administered to (i) common men in the area where the project was located, (ii) officials responsible for project formulation, approval, financing and implementation; (iii) engineer of works	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

department; and (iv) contractor order supplier concerned. *Study No.2* A survey was carried out to determine what changes, if any, should be made in the Nai Roshni school project to make it more attractive-acceptable to the out of school youth. A questionnaire was developed seek-views on the shortcomings of the project in respect of location, timing, teaching and the curricula, and also on the changes that should be introduced to make the project viable. The questionnaire was administered to the students, teachers anti project managers of a few randomly selected *Nai Roshni* schools as well as to out of school youth of the area not attending these schools, parents of experienced educationalists.	_____ _____

5.3.2 Types of Survey Studies

The following are the major types of survey studies:

- School Surveys
- Public Opinion Surveys
- Community Surveys
- Documentary Analysis
- Job Analysis
- Follow-up Studies

Each of these is described in the following sections.

5.3.3 School Surveys

School surveys were started in the beginning of this century by educationists in United States. School survey covers the following aspects of the school system:

- Aims, outcomes, pupil achievement curriculum, method and instructional aids.
- Administrative problems and procedures of the school.
- Financial policies
- Staff and personnel
- Pupil transportation
- School plant

The data for a school survey are collected through observations, questionnaires, interviews, standardized tests score cards, rating scales and other data gathering techniques. Analysis of such information enables the educationists to make recommendations on the basis of which planners can improve administrative, instructional, financial and curricular practices in the educational institutions.

5.3.4 Types of School Surveys

There are three types of school surveys:

- the outside expert survey
- the self-survey
- the Cooperative Survey.

The Outside Expert Survey; The Outside Expert Surveys conducted exclusively, by the research staff of a university or Education Department of a country.

The Self Survey

The Self Survey is undertaken by the members of the concerned educational institutions or organizations.

Cooperative Survey

Cooperative Surveys are undertaken by the local staff with an outside consultant or citizens and local staff members. Cooperative Surveys are usually considered more effective than those done by outside experts. The experts may be very well trained in survey techniques but may have a limited knowledge about the local scene and will need assistance of educationists and local staff members who are intimately familiar with the local community and local problems. Besides, if the local members do not participate in the surveys, they may not realize when a change is needed and may ignore recommendations for change.

Data Sought in School Surveys

Mostly the information sought by survey falls into the following categories:

i) The setting for learning
ii) The characteristics of educational personnel
iii) The nature of pupils
iv) The nature of the educational process

The Setting for Learning

Some surveys study the legal, administrative, social or physical setting for learning, or may investigate the responsibilities of local councils or Boards of Education, or may seek information about various aspects of school plants such as lighting facilities, play grounds, library facilities and laboratory equipment. The survey may also investigate aspects of social structure in the classroom, home or community that may Influence learning.

The Characteristics of Educational Personnel
Many surveys collect information about teachers, supervisors and administrators; some surveys study the behaviour of teaching personal in the classroom, the department and the community to assess the effectiveness of teaching, or the survey may investigate the inter-relationships of administrators, department heads, teachers and non-teaching personnel.

The Nature of Pupils
Many surveys are conducted to study the behaviour patterns of pupils in classrooms, at home and in community. Researchers may ask questions about pupils' health, attitude, skills, academic achievements, intelligence, aptitude, skills, and work or study habits. Attendance or dropout rates can also be studied.

The Nature of the Educational Process
Sometimes surveys scrutinize educational programmes, processes and outcomes. The researcher may study the effectiveness of curriculum: what is and what is not included in the curriculum.
As an illustration of school survey research, an abstract of a study on the "Utilization of Educational Facilities in Secondary Schools in Sheikhupura District" Is given as Annexure I.

Activity No. 3

In the blank space provided below write the titles of survey studies that could be conducted in the various aspects of the school system indicated in pan 2.8 and sometimes have been suggested by way of illustration.

Aspects of School System	Title of Survey study
Aims	Should aims of education be different for rural and urban schools?
Outcomes Pupil achievement	Do perceptions of students, teachers, parents and the community about pupil achievement differ?
Curriculum	What is taught for how long in rural and urban schools?
Method Instructional Aid Administrative problems and procedures	Community participation in school administration can check teacher absenteeism.
Financial policies	Salary disbursement procedure in rural schools and how to improve it. Per pupil public expenditure in different types of state institutions.
Staff and personnel	Teacher perception of transfer and promotional policies

Pupil transportation	Method and distances commuted by students in Karachi School bus system may be helpful in increasing female participation rate in small settlements
School plant	Maintenance and cleanliness of rural and urban schools. Drinking water and toilet facilities in rural schools.

5.3.5 Public Opinion Survey

An educational planner has to make many decisions just as an industrialist or a political leader. He can formulate policies either on the basis of proper researches, blind guesses or pressure group, demands. But the best method to make decisions should be to seek knowledge of the public opinions, attitude: and preferences. An educational planner can conduct public opinion surveys to find out how people feel about certain issues related to education.

Data for public opinion surveys is usually gathered through questionnaires or interviews and good researchers select their subjects with care so that each segment of a specified population is represented. An efficient researcher, however, must be aware of the limitations of public opinion surveys and must carefully make decisions about how, when, where and from whom data are obtained. The environment in which opinion is taken is also very important. Suppose students are asked about EPM programme so that the programme may be modified and improved. If they had a difficult day that day or they had just read a difficult unit or had not been satisfied with their tutor, they may record their immediate reactions rather than-more permanent attitudes towards the programme.

5.3.6 Community Survey

A close relationship exists between educational sector and the community. Educators often collect data about local setting and particular aspects of life in it. Sometimes they join social scientists in fact finding projects known as community surveys. These may also be called social surveys or field studies. These surveys are closely linked with school surveys. They may collect data concerning the schools or conversely the school surveys may analyse many aspects of community.

Community Surveys may focus sharply on a particular condition such as health services, or employment or may present data concerning specific segment,, of society as rural women, may comprehensively cover many aspects of community life. The scope and depth of a community survey is determined by the nature of the problem, the amount of time and money, qualified leadership and willingness of the community to cooperate. Community survey investigators use questionnaires, intervolves and direct observations. They collect data from teachers, students and administrators and adopt an inter-disciplinary approach to collect information about various social processes.

5.3.7 Documentary Analysis

Documentary analysis is also called content analysis or informational analysis. It is similar to historical research and both methods require examination of existing records but historical research is related with distant past while documentary analysis as a type of descriptive research, is concerned with the present.

In this type of research, a researcher may merely gather and clarify factual data from the official reports of institutions, organizations or may clarify or evaluate the contents of documents according to established criteria.

A researcher, however, has to bear in mind that the date appearing in print are not necessarily trustworthy and all documents used in this type of descriptive research must be subjected to the same careful criticism which is employed by historians. The authenticity of the document as well as the validity of its contents is of crucial importance. It is the duty of the researcher to establish th6 trust worthiness of all data that he draws from documentary sources.

The documentary sources of data are listed below:

- Official records and reports
- Printed forms
- Text Books, Books; Reference Books, Magazines, Newspapers, Bulletins
- Letters
- Autobiographies
- Letters
- Autobiographies
- Diaries
- Pictures, films and cartoons.

Documentary analysis can be undertaken for the following purposes:

a) To describe prevailing conditions and practices;
b) To discover the relative importance or interest in certain topics or problems;
c) To discover level of difficulty of presentation in text books or other publications;
d) To evaluate bias, prejudice or propaganda in text books presentation;
e) To analyse errors in students work to identify the literary style, concepts or beliefs of a writer.

This type of analysis serves a useful purpose in research adding important knowledge to a field of study or yielding information that is helpful in evaluating social or educational practices.

Activity No. 4

Suggest some topics for document analysis in the areas indicated in the margin. Some topics have been suggested by way of illustration.

Area	Topic for Document Analysis
Religious/private organizations like Himayat-i-Islam and institutions like Madrasatul Islam Policies of political parties Education policy	Educational policy of the Muslim League Provincial languages as medium of instruc-tion during the British colonialism
Administration and financing of education.	Grant-in-aid as a system of control over policies of private institutions
Development Plans	Universalization of primary education through five year plans
	Plan outlays and utilization by sub-sector of education
Teacher (certification) Students (union)	Sectoral and sub-sectors priorities during the seven plans

Let us take the example of Educational Planning and Management. If you plant to conduct a documentary study in this area for the purpose of your research thesis or for some other research, you may undertake to analyse the existing data for the purposes of investigating the literacy rates etc. For this purpose "p have to depend upon the official documents which are published frequently by various agencies at provincial and federal levels. The statistical year books published by the Statistical Division and Educational Statistics published by Education Departments of the provinces or by the Bureau of Education, Ministry of Education may provide the basic data for these types of researches. Other documents may be the statistics published by the population census departments for different age groups in the shape of actual figures or projected numbers. You may also use Five Year Plans and education policies for making documentary analysis.

As an example a synopsis of the study entitled "Impact of Public Financing on Education in Pakistan" carried out by an EMP student is given in Annexure-II.

5.3.8 Job Analysis

This technique is applied to study administrative, teaching and non-instructional priorities. In this type of research, data is often gathered about the general duties and responsibilities of workers and their specific activities, their status and relationships lathe administration of the organization, their working conditions and the nature and type of the facilities available to them. The data helps the investigator to describe present practices and conditions of employment and competencies and behavioural traits that personnel should possess to carry out their work effectively and efficiently

According to Van Dalen, this type of research helps the administrator to:

- detect weaknesses, duplications or inefficiency
- establish uniform classification for similar work identify the competencies.
- assign workers to jobs best suited to each worker to put the available manpower to the best use
- setup training programmes and establish requirements for promotion.

5.3.9 Fol1ow-up Study

The follow-up studies investigate individuals who leave an institution after completing a programme or a course of study. The study aims at discerning what has happened to them and what impact the programme or institution had on them. The purpose of the follow-up study is to determine the adequacy or inadequacy of the programme with the help of the opinions acquired-fronrthosr who have gone through that programme as well as the opinions of others with whom these people work. This type of research enables the researcher to find out if the course or programme is effective and of value or only of limited value. These studies are also helpful for the institutions in evaluating various aspects of their courses or programmes in the light of actual results.

An abstract oft follow-up study is given in Annexure-HI so that you may be able to conceptualize what a follow-up study is.

5.4 Interrelationship Studies

Educationists collect facts to obtain an accurate description of existing status as they make an effort to trace interrelationship between facts that will provide a deeper insight into the phenomena. According to Van Dalen, three types of studies are included in this type of descriptive research. These are:

i) Case studies
ii) Casual Comparative studies
iii) Correlation Studies.

Given below is a detailed discussion on each of the three types of studies.

5.4.1 Case Study

When the focus of attention is directed towards a single case or a limited number of cases, the process is personalised and such researches are included in the Case Study method of descriptive research. This study is extended to include any relatively detailed description and analysis of a single person, event, institution or community. This type of study is said to be 'idiographic', that is, it attempts to understand the behaviour or attitudes of the individuals without attempting to generalize these findings to other persons or groups. Here the emphasis is not upon the individual representing a type but upon the Jndivj4ual as a unique personality with his own problems and needs.

The case studies in research can be undertaken for the following purposes:

i. Uto provide the investigator with hypotheses that might be difficult to study in other context.
ii. a case study may provide the investigator unique situation that can be used to test hypotheses:
iii. the case study may provide new insights, help modify pie existing beliefs and point out gaps in knowledge;
iv. the case study may be useful in demonstrating how a theoretical model can be exhibited in a concrete model.

Case study data may come from various sources. The researcher may ask the subjects to recall the past experience or to express present situation interviews and questionnaires. Personal documents such as diaries, letters and various physical, psychological or sociological measurements may yield valuable information.

A case study is similar to a survey but instead of gathering data concerning a few factors from a large number of social units, an intensive study of a limited number of representative cases is made. It is narrower in scope but more exhaustive in nature than a survey.

Let as discuss an example to clarify the concept of case study.

Suppose an EPM student was to determine if the programmes offered by EPM Department of the Allama Iqbal Open University are really meeting the objectives of providing training to the educational planners and managers in the country will carry out a case study of the EPM Department. For this case study he gives a detailed background and history of the Department, its aims and bobjeclivesland the details of academic programmes offered. He also discusses the admission procedures and the methods of students evaluation. Discussion is also made abiat the feeding areas of the Department and the areas where EPM graduates can go to serve. The future programmes are also critically analysed and recommendations made by the researcher about the overall functioning, of the department keeping in view the existing situation of the Department.

This case study may provide new insights and would be helpful in modifying the existing programmes in the Department. It may point out the weaknesses or drawbacks in the functioning of the Department. Thus it can help in diagnosing the weaknesses or strengths of the Department so that it is better able to fulfill the aim of giving training to educational planners and managers in the country:

Though a case study does not aim at generalization, it may provide insight into a phenomenon and help in the formulation of some hypothesis. The existence lip of a particular condition in a unique case may suggest a factor to look for in other cases. An in – depth case study of the Mohammad brothers (Hanif, Mushtaq, etc.) and the Khan family of squash (Roshan, Jahahgir, etc.,) may indicate presence of some condition in the family environment that helps raising of sportsmen. Similarly there are families in Pakistan which have produced many outstanding civil servants, army officers, businessmen or professional. Case studies of these individuals/families could also be fruitful.

5.4.2 Causal Comparative Studies

Some researchers, while carrying out descriptive research not only try to discover what a phenomenon is, but also how and why it occurs. They try to determine what factors, or circumstances, certain events or practices accompany the occurrence of the phenomenon. In social sciences, where it is difficult to control various variables, causal comparative method is employed instead of experimental research. It is not always possible for an

educational planner to select, control and manipulate the factors necessary to study cause and effect relationship. So this method enables a researcher to analyse what happens in a natural rather than laboratory situation. In an experiment, the researcher may hypothesize; 'If observed'. He then manipulates independent variable and exposes an experimental group to experience A, while withholding the experience from a control group and observers the result In a causal' comparative study, the researcher observes phenomena B and searches back through a rnultimplicity of possible causes for the factors-independent variables-that are related to or contributed to the occurrence of the phenomena B.

For example, a researcher wants to determine the causes of riots in an, educational institution. He cannot set up a control group to test whether certain factors will cause a riot. He will compare the institutions where riots occurred with other institutions which had no riots. He will study the likeness and difference between the two situations and will determine the factors that appear to account for the riots in one instance and for its lack in the other.

This type of research has some limitations. Lack of control is the greatest weakness of this method. Suppose a researcher observes phenomenon B and hypothesizes that A caused B. The data may show that A is related to B but without controlling A, he cannot be certain that some other factor a C, D or did not cause the occurrence of B. So we can that causal comparative studies do not produce precise reliable knowledge that an experimental study can do. But they provide a way to probe problems that cannot be probed in a laboratory situation.

5.4.3 Correlation Studies

Descriptions of phenomena are sometimes made by employing correlation technique, which help in ascertaining the extent to which two variables are related or the extent to which variations in one factors correspond with variations in another factor. The investigator in these types of studies does not manipulate the independent variable but he merely makes observations of both the 'independent' as well as the 'dependent' variable as these occur in natural setting.

For example a researcher studying the relationship between I.Q. and achievement, randomly selects some group and measures both the I.Q and the achievement through some tests. The two variables in this type of research maybe closely related, moderately related or completely unrelated. Generally, the magnitude of the correlation depends upon the extent to which an increase or decrease in one variable is accompanied by an increase or decrease in the other variable whether in the same direction or opposite direction. For example, a high positive correlation exists if a high rank in one set is accompanied by a high rank in the other (high I.Q. High achievement test score) and a low rank in one set is accompanied by a low rank in the other. A high negative correlation exists of in general a high rank *in* one set of scores corresponds with a low rank in the other (high I.Q, low achievement test score). No or little correlation exists If a high score in one set is just as likely to correspond with a low as with a high score in the other set Correlations,

therefore, range over a scale which extend from a perfect negative correlation, to no correlation and to perfect positive correlation.*

The correlation technique is a valuable research tool but a coefficient of correlation merely quantifies the extent to which two variables are related and it does not imply that cause-effect relationship necessarily exists. The meaning of the relationship is interpreted by logical analysis rather than statistical computations. This Interpretation has all the limitations to which causal-comparative studies are subjected.

With some ingenuity, correlational method can also be used in studying problems in the field of planning and management. For example, the relationship between teacher commitment and drop-out rate, distance of school from home and female participation rate, etc. can be studied with the help of this method.

5.5 Developmental Studies

The concept of development in essentially biological and has been most commonly associated with living structures and life processes. However, the concept has come to be applied to physical system as well as to social institutions, cultural and systems of ideas. The purpose of developmental studies is to discover origin, direction, trend, pattern, rate and pattern of growth with a somewhat more recent interest in causes and inter-relationships affecting growth (Good; 159: 267:8). Longitudinal as; Nell as cross-section techniques have frequently been used. In longitudinal studies the growth of a particular group is followed over a period of months or years whereas in cross-sectional studies atleast a single measurement is obtained for each individual within the group studied.

The two types of developmental studies that can be used in the field of educational planning and management are growth studies and trend-projection studies described below.

5.5.1 Growth Studies

A planner, for successful and realistic planning, has to be fully aware of the changes taking place in areas affecting his field. He has to know what interrelated factors affect growth of education at various stages of economic development, when various aspects of growth are first observable and move forward to reach optimal development.

Growth studies can be carried out by using either longitudinal or cross-sectional approach. When applying the longitudinal method one person, group or institution is observed over a period of time while in cross-sectional method different person or groups are observed at approximately the same time at different stages of development. Cross-sectional approach has an advantage over the longitudinal approach. The former is more economical and has the advantage of gathering data promptly. A planner might well like to study the educational policies being pursued in countries at different levels of

* The concept of correlation and the method of computation of the coefficient of correlation shall be discussed in unit.

economic growth or might like to study the impact of a certain strategy of educational development being adopted by a country at a comparable level of socio-economic growth.

5.5.2 Trend-Projection Studies

Trend studies also called Predictive Studies are another interesting application of descriptive method. This type of research is based on longitudinal consideration of recorded data indicating what has been happening in the past, what the present situation is and, on the bases of these data, what is likely to happen in the future.

This type of research furnishes valuable data for planning programmes. These predictions are, however, only estimates and represent tentative conclusions because there are a lot of factors which can hasten or arrest the process of growth and development.

All the future plans can be made on the basis of approximately accurate estimates about the future. This is possible only if we critically analyse the past data and existing status. The trends can be mathematically calculated and trend projections can be made on the basis of the past trends. These types of studies may *be named as Trend Projections.*

Another type of projection study is *Target Oriented Projections.* In this way of projections the targets are set before-hand and the projections are made taking into consideration the existing data and projecting the figures upto the target, for example when we set the target that universal primary education may be achieved in Pakistan upto the year 1992 and we know that fifty six percent of the existing 5-9 year age group are in the primary schools, the projections will be made taking into consideration the existing fifty six percent enrollment ratio in the year 1988 and the target of hundred percent in the year 1992.

In case the projections are of trend type, the progress is likely to be very slow in the situation of Pakistan, and, in case, we make the target-oriented projections, the cost estimates are likely to be very high. A third type of projection is, therefore, more realistic and that is resource oriented projections. In this type of projections, we as planners keep in view the financial allocations, for the sub-sector for which we are making the projections. Most probably this is the route in between the trend-projections and target-oriented projections. These finance-oriented projections are, therefore, made keeping in view the financial allocations made by the Government for the plan period.

A trend pro study was carried out by Dr. Maqsud Alam Bukhari to make projections for the demand and supply of Primary School female teachers for the period 1981-82 to 1990-91. A summary of this study is given in Annexure-IV.

5.6 Planning Cycle and Descriptive Research

Now let us look at the planning cycle and decide about the types of research studies that can be used at various stages of the planning cycle.

The first stage of the planning cycle is diagnosis or to assess the present state of educational development and to identify the factors responsible for the present situation with a view to conceive the remedial measures. We can conduct status studies for this purpose and also use the casual comparative studies. Case studies conducted to evaluate the impact of measures introduced during the previous plan and to diagnose reasons for failures or' deficiencies can also be useful.

At the formulation of policy stage we can use document analysis to scrutinize previous policies, plans and other relevant documents. We can also carry out document analysis of the plans and policies of other developing countries at approximately comparable level of socio-economic level. A longitudinal study of the policies adopted by countries which have made rapid strides during the last decade or so would also be highly beneficial.

At the stages of assessment of future needs, costing of needs and target setting we can use trend-projection or target-oriented projection studies.

Feasibility testing can be done through survey studies. The readiness of the population to innovative ideas, their willingness to participate in the proposed experiments and the availability of the resources on the ground can be determined through such studies.

Plan evaluation needs not be restricted to an assessment of the allocation and utilization of funds and the attainment of physical targets. The emphasis should be on the impact of the plan on the lives of the people. Studies can be carried out through questionnaires, observations and interviews with the concerned people - parents, students, teachers, administrators, local community leaders as well as experts in education, management and plan evaluation to ascertain their views on the shortfalls, bottlenecks, progress and problems. Such studies can be highly suggestive for evolving a new strategy.

5.7 Concluding Remarks

Inspite of improvements made in recent years in research techniques the analysis and measurement of social phenomena remains less highly developed than in physical sciences. Some variable' relevant to education have been identified, isolated and precisely described but such knowledge of key variables does not yet exist. A number of statistical techniques have been developed which enable researchers to measure the influence of variables. More sensitive measuring devices have been developed which help control some distorting factors. Work is being done to minimize the sources of errors in measuring devices used to obtain data in descriptive research, it needs to be appreciated that even though descriptive studies are not able to fully analyze and explain phenomena enabling us to control conditions and make accurate predictions; these studies build a foundation of facts upon which explanatory hypotheses can later be constructed and tested.

It is hoped that this unit will help develop your understanding of the method of descriptive research. The technique of developing measuring devices for collecting data for descriptive research will be discussed in unit 6 and the statistical techniques applied to interpret data will be explained in units 9-13. After studying these units you should be able to undertake a descriptive research and also to evaluate the results of such studies.

Activity No. 5

You have been introduced to an exemplary trend-Projection study. Please go through the study and prepare a research design for making projections for your province for the period 1988-92 with respect to primary school enrolments.

Annexure-I

AN EXAMPLE OF SCHOOL SURVEY STUDY CARRIED OUT BY AN EPM STUDENT "UTILISATION OF EDUCATIONAL FACILITIES IN SECONDARY SCHOOLS IN SHEIKHUPIJRA DISTRICT"*

Problem

Problem of the study was to carry out a survey of utilization of existing educational facilities in-boys Secondary Schools of District Sheikhupura.

Objectives of the Study

Main objectives of the study were:

1) collect information about the following:
   a) enrolments
   b) teachers
   c) building
   d) equipment
   e) furniture

2) to determine the level of utilization of these facilities

3) to make recommendations to reduce the wastage of these facilities

4) to point out deficiencies of educational facilities.

Methodology

A sample of sixteen schools was chosen out of a total of sixty four schools in Sheikhupura District including Government, nationalized and provincialised schools with due consideration given to rural urban schools.

Proformas were prepared to collect data about

1) enrolment of students

2) No. of teachers, qualifications etc.

3) School building

4) School library

5) School laboratories for physics, Chemistry

The study was confined to the Boys Secondary School only.

* The study was conducted by Mr Zafar Iqbal Rharal under the guidance of Dr. M. Maqsud Alam Bukhari, at AI0U in 87.

Findings:
The researcher visited all the schools included in the sample and collected data. The data were analysed and on the basis of the findings of the study the following malt conclusion; were drawn:

1. There is on average annual increase of sixty two students;
2. On the average two teachers are added to each school every year;
3. There is more concentration of science teachers in Urban schools;
4. More teachers have been provided in the rural schools;
5. 44% off the schools had no building or they have insufficient covered an
6. Science apparatus is underutilized in rural areas;
7. School laboratories are not provided sufficient funds to replace broken apparatus;
8. Needs of laboratories are not properly diagnosed.

Recommendations:
The study made the following main recommendations:

1) New Schools must be established after proper school mapping;
2) Proper covered area must be provided for the students;
3) Science teachers must be provided according to the requirements of the schools;
4) Library facilities must be properly utilised;
5) Science laboratories need to be given special attention;
6) Requirements of each school for furniture and equipments must be determined after proper survey.

Annexure-II

AN EXAMPLE OF A DOCUMENTARY ANALYSIS CARRIED OUT BY AN EPM STUDENT

TOPIC: *Impact of Public Financing on Education Pakistan.*

Statement of the problem
Thy study was designed to analyse the pattern of public financing during 1960-80 and to determine its impact on various levels of education.

Objectives of the Study:
1) to study sub-sector-wise development and non-development public expenditures;

2) to identify sub-sector-wise pattern of public finances of education;

3) to analyse inter-sector and intra-sectoral priorities reflected in budget allocations;

4) to examine the growth of educational institutions as major levels-primary school and higher education.

Methodology
Review of the related literature. A few research studies related to the topic were reviewed.

Data Sources
The requisite data was collected from the relevant published and un-published official documents of the federal and provincial governments such as:
A.D.Ps.
Budget books
Five Year Plans
Evaluation Reports of the Plans
Pakistan Economic Surveys
Pakistan Educational Statistics
Pakistan Basic Facts
Census Reports

Tables were constructed for analysis of the data which included fiscal, educational, and demographic data. The fiscal data consisted of development and non-development expenditure on different sectors of the economy as well as on various sub- sectors of education, figures of GM! and total public expenditure. The educational data comprised number of educational institutions, enrolment and number of teachers at various levels of education. The demographic data included total number of 5-9 and 10-14 age groups.

The data were controlled from published and unpublished official documents of the Federal and Provincial governments. To analyze these data such statistical techniques as growth rates, percentages and correlation were applied.

Conclusion

The findings of the study led to the following conclusions:

1. that education system in Pakistan remained under-financed during 1960s and 1970s
2. there is no consistent pattern of allocating development thuds to education sector,
3. public financing contributed to the expansion of schools and number of teachers as compared to students enrolments at primary and secondary levels;
4. the educational growth has been more rapid at college and university levels;
5. technical educational growth compared negatively with the growth in general education;
6. rising trend is visible in students enrolments in professional universities;
7. female education shows relatively better progress at the school level.

Recommendations

The following recommendations were made on the basis of conclusions drawn from the findings of the study:

1. the share of education in GNP and total public expenditures to be raised to 4% of GNP and 15% of total expenditures as in developed countries;
2. priorities among various levels of education be rationally determined to avoid lopsided growth at any level. Priority assigned to education ht various policies and plans should be reflected in budget as well;
3. financial allocations for education be based on sound research studies rather than subjective judgments.

Annexure-III

AN EXAMPLE OF A FOLLOW-UP STUDY

Follow-up of Matriculates of Government Millat High School Gujranwala for the year 1982-83 to 1984-85. Trends and Adjustments.[*]

Problem

The problem of the study was to determine the adju4ments and trends of matriculates of Government Millat High School Gujranwala and investigate the relevance of school subjects with the jobs taken after their schooling.

Main Put-pose of the Study

The main purpose of the study was to explore the relevance of school subjects with the fields adopted by the students after matriculation and to suggest strategies for the curriculum developers.

Methodology

The following steps were adopted for the purpose of the study:

Literature related to the study was reviewed and the questionnaires used in the similar follow-up studies were examined for the preparation of a questionnaire for this study. the questionnaire consisted of the questions designed (a) to investigate the subjects taken by the students for S.S.C. examination; (b) the subjects taken for the H.S.C. examination; (c) relationship between the subjects; (d) the job or work done after their S.S.C. or H.S.C. examination; (e) relationships between their jobs and the subjects they studies for S.S.C. examination; and (f) the recommendations or suggestions of the students about the changes in the curriculum for Secondary School Certificate examination.

The questionnaires so prepared were mailed to the matriculates of Government Millat High School Gujranwala for the year 1982'83, 1983-84 and 1984-85 who were 45, 80 and 59 for the above- mentioned years respectively.

The questionnaires were mailed to those matriculates who were out of reach but the researcher tried to collect information personally from those respondents who resided within Gujranwala city.

Subject teachers in the school were also consulted to know their opinions about Vie present situation of the S.S.C. curriculum with respect to standard, quaky and relevance in the light of the responses of the students.

[*] The study was conducted by an E.P.M. graduate from Gujranwala, under the advice and guidance of Dr. Maqsud Alam Bukhari at AIOU in 1086.

Conclusion

The data so collected were analysed and the following were the main conclusions.

1. About 50 per cent of the students enrolled, changed their subjects after matriculation which led the investigator to conclude that there was lack of coordination between the school subjects and students' after school career.
2. That almost 75 per cent of the students had plan to go for higher education after their matriculation and only 20 per cent of the students planned to join the employed force after matriculation.
3. The school offered only science subjects and it did not suit those who joined commerce or such other colleges.
4. The subjects studies in the school were found useful for 42 per cent of the respondents who did not change their subjects after matriculation.
5. Eight per cent of the students were not satisfied with the school education whereas fifty per cent of the respondents expressed that the contents taught to them in the school were not useful for the studies/jobs undertaken by them after their matriculation.
6. About 25 per cent of the school graduates were of the opinion that the teachers were efficient and they were satisfied with their method of teaching but 50 per cent of the students complained about the high speed of speech of some of the teachers, and were not satisfied with their methods of teaching.

Recommendations

On the basis of the conclusion, the researcher proposed certain strategies for improvements in the subject matter and the methods of teaching so that the students are better adjusted in their jobs or studies after their matriculation from the School under investigation.

Exercise No. 3

Suppose that you are working in a Polytechnic in Prepare a follow-up study design for the graduates of this institute with special reference to the employability of the graduates and the feasibility of the curricula offered during the training.

Annexure-IV

AN EXAMPLE OF A TREND PROJECTION STUDY*

Introduction

The study aimed at analysing prevalent data regarding the primary and middle school female teachers in Pakistan and to make projections for their demand and supply for the period 1981-82 to 1990-91. Objectives of the study were as under.

1. To make projections for the demand of primary and middle level female teachers in Pakistan for the Year 1982-82 to 1990-91.
2. To determine the implications of training female teachers for primary and middle level of education in Pakistan for the period 1981.82 to 1990-91.
3. To give future considerations for the proper supply of teachers to meet the teacher demand each year of the projection period.

Methodology

Planning teacher education in Pakistan for a period of ten years was a huge project. It was, therefore, decided to divide the whole work into four separate research studies.

1. Demand and supply of primary and middle level female teachers in the Punjab for the years 1981.82 to 1990-91.
2. Demand and supply of primary and middle level of female teachers in KP for the year 1981-82 to 1990-91.
3. Demand and supply of primary and middle level female teachers in Baluchistan for the years 1981-82 to 1990-91.
4. Demand and supply of primary and middle level female teachers in Sind for the years 1981-82 to 1990-91.

The process of making projections for demand and supply of female teachers consisted of various phases discussed as under:

Document Analysis

Relevant documents were studied and analysed to have access to requisite information. Projections for the female primary and middle school teachers were' made on the basis of enrolments of students in the girls primary and middle level of education for the previous years upto 1981-82, teachers pupil ratio in the schools and the fractions of the teachers leaving the profession due to retirement, resignation or any other reason. These data were collected from the records maintained by various teachers training institutions and government agencies like the national and provincial Bureau of Education, Directorates of Education and Planning and Development Cells of Education Departments of Provincial secretariat, etc.

* This research project was conducted by Dr. M. Maqsud Alam Bukhari under the sponsorship of World Bank through the Ministry of Education, Govt. of Pakistan and AIOU.

Projections

The discussion regarding the projections was divided into three parts:

I Population projections
II Enrolment projections, and
III Teacher requirements

The population projections available were in five year age groups i.e.04, 5-9, 10-14, etc. and these were interpolated into single year age-groups with the use of Sprague Multipliers. For the purpose of the study it was assumed that 5 to 12 year age-group will be in class I to VIII respectively during the projection period.

As regards the enrolments projections, the National Educational Policies were reviewed and the trends of female enrolments in primary and middle classes prevailing in the provinces of Pakistan were observed and it was assumed that 75 per cent of the 5-9 age-group girls will he in classes 1 to V by 1990-91, whereas 25 per cent of 10-12 age-group girls will be in classes VI to VIII by the end of this plan period.

As regards the teacher requirements, the process was completed in two steps;

i) total teacher requirements; and
ii) additional teacher requirements.

In calculating the total teacher requirements the previous trends of teacher pupil ratios in the provinces were calculated and an effort was made to achieve 1:40 teacher pupil ratio at primary level and 1:25 teacher pupil ratio at middle level of schools in the provinces during or by the end of the plan period.

In the process of calculating the additional teacher requirements, there was a reed to know the attrition rates of the teacher in the provinces. It means that there was a need to determine the rates of the primary and rnid4le level female teachers who leave their jobs due to retirement, death, resignation, termination dismissal or any other reason. For this purpose, the responses were processed to calculate these attrition rates.

In order to make the above-mentioned projections, the following formula was applied:

A. Predicted School-age Population:

For the purpose of the study the future sizes of female school- age population for primary and middle schools were basically derived from population projections fox-the period 1981-91.

B. Enrolment Projections:

Enrolments for each year from 1981 to 1991 were calculated by using the 1981-82 enrolments as base data and school-age population. A lineal increase in the enrolment ratio was assumed from 1981 to the target year. The following formula describes the methodology for enrolment projections:

Where
E refers to full-time enrolment
t refers to time reference, yearly
e refers to enrolment ratio
p refers to school-age population

C. Teacher Requirements:
Following formula was used for estimating the number of female teachers required for teaching in primary and middle stages for the period 1981 to 1991.

$$T = \underline{E_t}$$

T - refers to total number of teachers
S - refers to pupils teacher ratio

The value of E was known from enrolment projections.

D. Additional Teacher Requirements:
The following formula was used for this purpose:

NTt = T— (1-1) F - 1

Where
NT refers to additional teacher requirements
a refers to fraction of total number of teachers leaving the profession for all reasons.

Supply of Teachers
Supply of female teachers was estimated by editing together the stock of acceptable teachers and the inflow/s with 1981 ac the has 3year. The number of acceptable teachers were determined by the total number of teachers serving a stage. The inflow for the period 1981-91 was determined on the basis of the average intake of the teacher training institutions engaged in under-graduate teacher training for the year 1977-81 and their optimum size.

Recommendations
The following recommendation were made on the basis of the study;
In NWFP and Baluchistan the onrolments of girls in classes-I to VIII are very low in terms of percentages of the relevant age-groups. Special efforts will, therefore, have to be made to achieve the targets in these provinces. For this purpose:

a. Some innovative projects will have to be visualised to attract the girls to the schools. These projects may be it the shape of evening school part-time schools or adult centers offering some special and abridged courses.
b. Some mobile type of schools may be started in the rural areas of Baluchistan in order to accommodate the thinly scattered population in the rural areas.
c. Some campaign to be launched to change the attitudes of parents towards the education of their daughters.

In order to supply the required number of teachers in Pakistan, the formal colleges of education will not be sufficient, in case the set targets are to be achieved. It is, therefore, recommended that some training programmes like the, establishment of teacher training centres/units alongwith the reputed girls high schools be started.

It is also recommended that in order to meet the growing demand of teacher preparation, the facilities provided by Allama Iqbal Open University may be availed to the maximum. For this purpose, the provincial governments may coordinate their future plans of teacher preparation with the authorities of AIOU well ahead of time so that the supply of teachers is regulated in time.

SELF-ASSESSMENT QUESTIONS

1. Define a descriptive study.
2. Differentiate a descriptive study from an experiment.
3. Differentiate a descriptive study from a historical study.
4. Distinguish a case study from a school survey.
5. Describe various categories of descriptive research.
6. State the relationship between the school survey and community survey.
7. State various types of descriptive researches that can be used at different stages of the planning cycle.

REFERENCES

1. Best, J.W. and James V. Kahn: *Research in Education,* New Jersey, Englewood Cliffs, (Eighth Edition), 1986.

2. Entwistle, N. J.: *The Nature of Educational Research, UK* Open University, The Open University Press, 1973.

3. Good, Carter, V.: *Essentials of Educational Research,* New York, Appleton-Century-Crofts, 1959.

4. Good, William J.: *Methods in Social Research,* New York, Mc-Graw-Hill Book Company, 1952.

5. *Sax, Gilbert: Empirical Foundations of Educational Research,* New Jersey, Englewood Cliffs, Prentice Hall, Inc.; 1968.

6. *Van Dalen, Deobold, B.: Understanding Educational Research - An Introduction,* New York: Mc.Graw-Hill Book Company, 1985.

Unit–6

TOOLS AND TECHNIQUES OF RESEARCH

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CONTENTS

INTRODUCTION

You have now completed the previous units which gave you a general idea about research methodology and various types of researches in the field of educational planning and management. In this unit you will study about the tools of research often used in the conduct of a research project.

In this unit the following four* types of tools of research most frequently used in behavioural research have been discussed:

a. Questionnaire
b. Interview
C. Observation
d. Tests and appraisal instruments

It needs to be emphasized that each of the above tool employs distinctive ways of describing and quantifying the data. Each tool is particularly appropriate for certain sources of data, yielding information of the kind and in' the form that would be most effectively used.

You would recall that an investigation starts with the identification of the problem. The research then formulates an hypothesis after making a critical analysis of the problem and all that is known about it. Once he has developed a hypothesis he works out the type of evidence that would be appropriate for testing the hypothesis. If one was to test the hypothesis that 'use of different typo and colour for printing difficult words would improve spellings among students', a spelling test shall have to be devised for use with experimental and control groups. If, on the other hand, one was to test the hypothesis that 'reading a book highlighting man's common struggle against elements of nature and tyranny of autocrat rulers would reduce radical prejudices', the researcher would have to develop an attitude scale and arrange pre- and post- treatment interview alongwith the us6of attitude scale. Again, to test the hypothesis that 'support or opposition of the nationalization of educational institutions was divided along socio-economic lines', a questionnaire would have to be used to elicit opinion of people of socio-economic levels.

In this unit an attempt has been made to describe questionnaire as tool of research and to discuss the procedure for the construction and administration of questionnaire for data collection. The limitation of questionnaire as a tool of research has also been pointed out The same approach has been adopted in respect of other three tools of research enumerated in pars, 1.2. It is hoped that this unit would help you in acquiring competence in developing and using these tools in your researches.

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* Some authors Include sampling among the tools or research. In view of the importance of sampling techniques unit? has been exclusively devoted for it.

OBJECTIVES

After reading this unit you should be able to:

1. explain various tools used for the collection of data for your research study;
2. decide what type of instrument would be appropriate for your study;
3. differentiate between different types of tools;
4. understand the advantages and disadvantages of various techniques;
5. choose an appropriate psychological test for use in your research study.

6.1 Questionnaire

A questionnaire is a set of carefully selected and ordered questions prepared by an investigation to seek factual information from respondents or to find their opinion, attitude or interest. Some authors restrict the use of the word questionnaire to a Set of questions seeking factual information whereas those seeking opinion are called opinionaire and those dealing with attitude of the respondent are called attitude scale. However, it is generally agreed that isolating specific questions for the consideration of respondents tends to objectify, intensify and standardize their observations.

6.1.1 Forms of Questionnaire

You can construct questions in the form of a closed open, pictorial and scale item, you can utilize one type of questionnaire exclusively or a combination of them when structuring your questionnaire. The nature of the problem and the character of the respondents determine which form or forms will most likely supply the desired data.

a. ***Closed form***

Closed form of questionnaire usually consists of a prepared list of concrete questions and a choice of possible answers. To indicate his answer, the respondent simply marks 'yes' or 'no;' or checks one or more items from the list of answers. Often an alternative "Do not know" is provided in items seeking opinion on highly controversial matters. For example, Do you think that a person known for his strong views against maintenance of peaceful atmosphere in educational institutions should be allowed to make a speech in your city on this subject?

- Yes
- No
- Do not know

Sometimes respondents are asked to rank a series of statements/reasons/factors, etc., in the order of their importance or interest. An example is given below:

Why did you choose to do your M.A. in EPM at this university? Kindly indicate three reasons in order of their importance, using 1 for the most important, 2 for the second most important and, 3 for the third most important.

- convenience of transportation
- advice of a friend
- reputation of institution
- expense factors
- scholarship aid
- other (please specify)

Closed from questionnaires are easy to fill out and help in keeping the respondents mind focused on the subject. However, they often fail to reveal the respondent's motives (why he answers as he does), and do not always get information of sufficient scope and depth, and may not discriminate between finer shades of meaning. Fixed alternative responses may make respondents take a stand on issues about which they have not crystallized opinion or may force them give answers that do not accurately express their ideas.

Let us examine the following items from a questionnaire sent to eminent educationists of the country;

> There should be no restriction on the expression of opinion by student unions on any political issue. YES/NO
>
> All English medium institutions should be dosed forthwith. YES/NO

Obviously only proponents or opponents of 'student union' and 'English medium institutions' could answer these questions in 'yes' or 'no.' Moreover, one would be benefited more from a detailed statement on the different aspects of the issues involved from eminent educationists.

In spite of the above shortcomings of the dosed form of questionnaire, it is an entirely satisfactory tool for gathering certain types of information. Moreover, it is easy to fill up, takes little time, keeps the respondent on the subject, is relatively objective, and is fairly easy to tabulate and analyze.

b. ***Open form***

Rather than forcing respondents to choose between rigidly limited responses, the open form, or unrestricted type of questionnaire calls for a free response in respondent's own words. For example, the following open-form items seek the same type of information as close-form items in pars, 2.4 and 2.6 above.

> Why did you choose to do your M.A. in EPM in this university?
>
> What policy should be adopted about the unrestricted expression of opinion on political issues by the student unions?

What should be done with the English medium Institutions which may want to be dosed down?

Note that no clues are given. The respondents are free to express their views. This allows for greater depth of response by the respondents, who may reveal their frame of reference and possibly the reasons for their responses. Since it requires greater effort on the part of the respondent, it is difficult to get back the filled up questionnaires in large proportion. This type of item is sometimes difficult to interpret, tabulate and summarize in the research report.

A special type of open-ended question is the funnel. Actually As is a set of questions directed towards getting information on a single important topic or a single set of related topics. The funnel starts with a broad question and narrows down progressively to the important specific point.

Another form of funnel starts with an open general question and uses follow-up and specific type of closed questions. After asking the broad general question of policy about student union, the questionnaire may include the following:

- prevent all demonstrations outside the premises of the Institution. Yes No
- prevent demonstrations that are likely to strain our relations with some foreign country. Yes No
- prevent demonstration outside foreign embassies. Yes No

This instrument has some disadvantages. For example, when respondents answer general question and have no dues to guide their thinking, they may unintentionally omit important information or fail to note sufficient details. If subjects are not highly articulated and willing to give considerable time and critical thought to questions, they cannot provide useful data. if they were capable of providing pertinent information, their detailed and complex answers may create problems. However, if you frame, write and use these questions properly, these disadvantages can be minimized.

Open-ended questions are flexible they have possibilities of depth and have the capability to encourage cooperation and achieve rapport, and to make better estimates of respondents' true intentions, beliefs, and attitudes. The responses to open- ended questions can suggest you the possibilities of relations and hypotheses. Respondents will sometime give unexpected answers that may indicate the existence of relations not originally anticipated by you in the development of questionnaire.

c. ***Pictorial form:***

Some questionnaires present respondent with drawings and photographs rather than written statement from which to choose answers. They may also provide oral rather than written directions. This form of questionnaire is particularly a suitable tool for collecting data from children and. adults with limited reading ability. Pictures often capture the attention of respondents more readily than printed words, lessen subject's resistance to

responding, and stimulate the interest in the questions. Sometimes they clearly depict situations that do not lend themselves readily to verbal descriptions and sometimes they make it possible to detect attitudes or gather information that could not be obtained by other procedures.

Pictorial techniques, however, possess, at least, two limitations:

1) their use must be restricted to situations involving distinguishable and understandable visual characteristics, and
2) they are difficult to standardize particularly when pictures are photographs of human beings.

d. ***Scale items:***

A scale item is a question to which the respondent expresses his agreement or disagreement of various levels. Scale items have fixed alternatives and the respondent indicates where he stands on the scale. Thus the item relating to the English medium institutions may be presented as follows:

All English medium institutions should be closed forthwith.

- Strongly agree
- Agree
- Undecided
- Disagree
- Strongly disagree

6.1.2 Construction of a Questionnaire

Questionnaire is a popular research tool because it is easy for you to ask questions. But asking questions to obtain precise and reliable data is not an easy job. You are often amazed when respondents draw different meanings from questions that you thought were perfectly clear. You may be resented when your colleagues point out biases in the wording or structuring of your questionnaire, which seems absolutely objective to you. Following are some of the steps that you should, take while constructing questionnaires.

a. ***Framing of questions:***

Have you thoroughly explored your hypothesis, experienced, literature and other questionnaires so as to frame questions stated in crystal dear, simple language and sharply focused in meaning? Arc subordinate questions asked or are an exhaustive list of alternative choices provided so as to explore various aspects of decisive answers? Are the questions framed to elicit specific answers? Thee ere the questions, the answers of which help you decide what information is needed, which questions are to be selected and then draft and review them.

b. ***Ordering of questions:***

Are items placed in psychologically or logically sound sequence sample, interesting, neutral questions preceding more difficult, crucial or personal ones and those that establish a frame of reference or provide keys to recall before those asking for detail is a smooth transition made from one group of questions to the next? Positive answers to these questions will help you order the questions on technically sound basis.

c. ***Designing the directions and format:***
Are clear and complete directions given concerning the type and scope of information that is wanted? Are the categories, format and directions designed to elicit accurate and unambiguous answers to require a minimum of respondent's time? These are the questions such help in designing directions and format for the questionnaire.

d. ***Eliciting honest replies:***
Are directions and questions words and orders so as to remove any fears, suspicions, embarrassments or hostility on the part of the respondent? if personal questions are asked, is a guarantee of anonymity or assurance that responses will be held in strict confidence given? Are any questions coloured or phrased so as to elicit replies that will support the researcher's beliefs? Are respondents asked for information concerning subjects about which they have little or no knowledge? Are specific questions asked in order to check the truthfulness of answers to general questions? Are parallel questions asked in order to check consistency of answers? The satisfactory answers to all these questions can be sought if the following criteria of question-writing is strictly observed.

6.1.3 Criteria of Question-Writing

Criteria or precepts of question-writing have been developed through experience and research. Some of the most important criteria are given below in the form of questions. Brief comments are appended to the questions.

a. ***Is the question related to the research problem and the research objectives?***
Except for factual and sociological information, all the questions of a questionnaire should have some research problem function. This means that the purpose of each question is to elicit Information that can be used to test the hypothesis of the research.

b. ***Is the question right and appropriate?***
Some information can best be obtained with the open-ended questions, for example, reasons for behaviour, intentions and attitudes, etc. Certain other information, on the other hand, can be more expeditiously obtained with closed questions. If all that is required of a respondent is his preferred choice of two or more alternatives, and these alternatives can be clearly specified, it would be wasteful to use an open-ended question.

c. ***Is the question clear and unambiguous?***
Certain precepts help the question-writer to remove ambiguity. Questions that contain more than one idea to which respondent can react should be avoided. A question like "Do you believe that the administrative aims of the modern high school and the teaching methods used to attain these aims are educationally sound?" is an ambiguous question, because the respondent is asked about both administrative aims and teaching methods in the same question. Also avoid ambiguous words and expressions. A question, "Do you think the teachers of your school get fair treatment?" is ambiguous, because 'lair treatment" might refer to several different terms of treatment. The word "fair" too can mean 'lust," "equitable," "not too good," impartial" and "objective." Moreover, long question tend to be ambiguous, because the respondent may get lost. His attention may be diverted towards a non-essential part of the question. The entire question, however, may be long because it may be necessary to supply adequate informational context but the actual question should be focused on one idea.

d. ***Is the question suggestive?***

Suggestive questions lead to answer. As such, they threaten validity. If you ask a person: "Have you read about the local school situation?" you may get a disproportionately large number of "Yes" responses.

e. ***Does the question demand knowledge and information that the respondent does not have?***

To counter the invalidity of response due to lack of information, it is wise to use information filter questions. For example, before asking a person what he thinks of UNESCO, first find out whether he knows what UNESCO is and means. Another approach is possible. You can explain UNESCO briefly and then ask the respondent what he thinks of it.

f. ***Does the question demand personal or delicate material that the respondent may not like to divulge?***

Special techniques are needed to obtain information of delicate, or controversial nature from a person. Establishing rapport is one such technique. When questioning about something that is socially disapproved, show that some people believe one way and others believe another way. Use 'soft' rather than 'hard' expressions.

Is the question loaded with social desirability?

People tend to give responses that are socially desirable, responses that indicate or Imply approval of actions or things that are generally considered good. You may ask a person about his feelings towards children. Everybody is supposed to love children. Unless you are very careful, you will get a stereotyped response about children and love. Also, when you ask a person about his voting, you must be careful since everyone is supposed to vote. If you ask respondents about their reactions to minority groups, you again run the risk of getting invalid responses. Most educated people, no matter what their true attitudes, are aware that prejudice is disapproved. A "good question" then, is one in which respondents are not led to express merely socially desirable sentiments. At the same time, you should not question a respondent so that he is faced with the necessity of giving a socially undesirable response.

6.1.4 Administration of the Questionnaire

Before the final form of the questionnaire is prepared for distribution among the respondents it should be tried out or pretested for the purpose of validation in terms of practical use. The pretest should be done on a c w prospective respondents and the responses be tabulated. This would indicate whether the answers can be tabulated satisfactorily and whether answers are forthcoming to crucial questions. The pretesting would probably indicate need for revision of certain questions, deletion of some questions not yielding useful information and addition of some new questions.

After pretesting and revision the questionnaire is ready for distribution among respondents, the questionnaire can be presented to respondents in two ways: through direct contact in a face-to-face situation or through the mail.

a. ***Direct contact:***
When you personally present the questionnaire to respondents, you can explain the purpose and significance of the study, clarify points, - answer questions that arise, motive respondents to answer questions carefully and truthfully, and obtain new partial responses and refusals. But bringing a group together, to fill up a questionnaire, is often difficult and meeting members individually may be extremely costly and time- consuming, hence it is often necessary to send questionnaire through the mail.

b. ***Mailed questionnaires:***
Mailed questionnaires can quickly and easily reach many people in widely scattered areas at a .relatively low cost. Unfortunately the returns are generally less than 40 to 50% and the partial returns, thus obtained can introduce a bias that will render the obtained data useless. If non-respondents are quite different from the respondents, they may not hold the same views as those who answer the questions. Thus, their missing data might substantially change the find-ings of the study. The mailed questionnaire has another limitation: it cannot obtain a representative sample of data from a population that includes some non-readers.

6.1.5 Steps for Better Response through Questionnaire

Collecting data through mailed questionnaires requires special care. Un-planned or hurriedly mailed questionnaires yield disappointingly low returns which may even make it impossible to complete the research. The following steps are likely to ensure better return.

a. ***Choose respondents carefully:***
It is important that you send the questionnaire only to those who possess the desired information - those who are likely to be sufficiently interested to respond conscientiously and objectively. A preliminary card, asking whether the individual would be willing to participate in the proposed study, is recommended by some research authorities. This will not only be a courteous approach, but a practical way of discovering those who will cooperate in furnishing the desired information. A greater proportion of returns is possible when the original request is made to be the administrative head of the organization, rather than directly to the person who had the desired information. It facilitates the returns.

b. ***Be sure' to include a courteous, carefully constructed cover letter to explain the purpose of the study:***
The letter should promise some sort of inducement to the respondent for compliance with the request. In educational circles a summary of questionnaire results is considered an appropriate reward, a promise that should be scrupulously honoured after the study has been completed. The covering letter should assure the respondent that delicate information will be held in strict confidence. It is usually suggested that two copies of the questionnaire be sent to respondents alongwith a stamped, addressed return envelope. It will facilitate the respondents to return-one copy and keep the other one in his own record. To omit this courtesy would be practically to guarantee that many of the questionnaires would go into the waste basket.

c. ***If the desired information is delicate or intimate in nature, consider the possibility of providing for anonymous responses:***

The anonymous instrument is most likely to produce objective responses. There are occasions, however, for purpose of classification, when the identity of the respondent is necessary. If a signature is needed, it is essential to convince the respondent that his responses will be held in strict confidence, and that his answers will, in no way, jeopardize the status and security of his position.

d. ***Follow-up procedure:***

Recipients are often slow to return completed questionnaires. To increase the number of returns, a vigorous follow-up procedure may be necessary. A courteous post- card, reminding the recipient that the completed questionnaire has not been received, will bring in some additional responses. This reminder will be effective with those who have just put off or forgotten to fill up or mail the document. A further step in the follow-up process may involve a personal letter of reminder. In extreme case a telegram, phone call, or personal visit may bring additional responses. Every effort should be made to obtain return of at least 80 to 90 per cent or more.

6.1.6 Uses of Questionnaire

Following are some of the uses of questionnaires:

Some authors include sampling among the tools of research. In view of the importance of sampling techniques, unit? has been exclusively devoted for it. Questionnaires may be relatively inexpensive to administer, since they are completed big respondent without any enterer present.

They can be distributed to respondents quickly and inexpensively through the mail or they can be administered to an assembled group of people at one time.

They often can be designed to maintain respondents anonymity, thus respondents are reassured that their responses will not be used if against them in anyway. Hence they will respond with greater honesty than might otherwise be the case.

They can be standardized, so that all respondents are given exactly the same printed questions to answer. On the contrary, in an interview, a respondent's answers may be influenced by the way, the interviewer asks questions.

6.1.7 Limitations of Questionnaire

Following are some of the limitations of the questionnaire:

a. The responses may not be truthful or accurate. A respondent may make are less errors (e.g. writing incorrect numbers, checking wrong responses); he may make purposeful prors in the, hope of conveying a favourable impression and avoiding embarrassing admissions; of lie may make unintentional error because he misinterprets questions or does not understand his attitudes, feelings -'or actions well enough to answer questions accurately.

b. The mailed questionnaires give low rate of responses. It may be due to postal wastage ranging from 20% to 40% or due to non- responses. In Pakistan this low rate may be 40% to 60%.

c. The respondents answer questionnaires at their leisure which implies that they will answer at different times, on different days and in different circumstances and that their responses may be subject to situationally-induced differences.

You have studied so far the characteristics, types, uses and limitations of questionnaires as a data gathering tool. Before you start with the study of the other tool of research, namely interview, it would be advisable to complete the three exercises designed to give you the desired practice in the use of questionnaires:

S.A.Q. No. 1

Following are some topics for research. Please indicate against each whether use of questionnaire would be appropriate as a data-gathering tool and also give reasons. Answer to the first problem has been entered by way of illustration.

Sr. #	Research	Use of Questionnaire Appropriate		Remarks
		Yes	No	
i)	Period trained and untrained secondary school teachers stay in the same grade.	Yes	No	Data can be obtained from office file
ii)	Reasons for unemployment of graduate and under-graduate females with teacher-training	Yes	No	
iii)	Incentives most likely to enhance and sustain teacher motivation	Yes	No	
iv)	How do parents, teachers and students feel about the lifting of ban on students' union?	Yes	No	
v)	Shorter school hours to increase participation rate in rural schools.	Yes	No	
vi)	Why do such a large number of candidates fail in English at the Matriculation level?	Yes	No	
vii)	Provision of school residence would encourage female teachers to go to rural areas.	Yes	No	
viii)	Fully-operationalschool health service would motivate parents to send children to schools in rural areas	Yes	No	
ix)	Establishment of mosque schools has increased primary school enrolment	Yes	No	

S.A.Q. No. 2

Different types of items are used in the questionnaire in accordance with data requirement. For each of the data listed in column 1 indicate the type of item that would be appropriate in column 2 and also frame a question eliciting that information in column 3. The first problem has been worked out as an illustration.

Data Required	Type of Item	Questions
Do administratorsthink that pay rise would reduce teacher absenteeism?	Closed	Do you agree that increase in pay of teachers would reduce incidence of teacher absenteeism?
Number of days per month Teachers remain absent without leave.		Yes No
Who remains absent more frequently - local teachers or teachers from outside?		
How strongly do teachers feel against posting away from home?		
Which three of the six given causes are regarded by administrators as most important causes of teacher absenteeism?		
Attitude of children towards cruelty to animals and towards child beatings.		
Are administrators certain that delegation of authority to them to hire and fire would result in qualitative and quantitative improvement in teaching?		
Views of politicians on the priority that should be accorded to various sub-sectors of education.		
What curricular changes should be made, according to educationists, to reduce educated unemployment?		
Measures to be taken to eradicate student violence.		

Activity No. 1
You are interested in obtaining the views of and information from senior officers of the Ministry of Planning and Development on the extent and causes of delay that occurs in the approval of various categories of projects, namely high cost and low cost projects; provincial projects to be funded by them; provincial projects to be funded by the federal government federal projects located in federal areas; federal projects located in provinces, etc. Write funnel type questions for this purpose.

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6.2 Opinionnaire and Attitude Scale

A set of questions attempting to measure the attitude or belief of an individual is called an opinionnaire or an attitude sca1. The underlying assumption in this method is that opinions expressed in response to the questions truly reflect the attitude of the respondent But this may not always be true as either the individual himself may not really know how he feels about a social issue as he may never have given the issue any serious thought: At times the respondent may deliberately try to conceal, his real attitudes and try to project himself in good colour.

To develop an opinionnaire a number of statements expressing idea or institution are collected. These statements 'are then either submitted to a panel of judges/experts (under the Thurstone technique) or administered to a number of subjects (under the Likert method). On the basis of an analysis of data thus collected, values are computed to each item (under the Thurstone technique) or to each of the five responses of an item (under the Likert method). This permits quantification of the responses of subjects and computation of an attitude score of the subject. Whereas in a questionnaire, the responses of a group of subjects on-each item/question has to be tabulated and reported separately, the opinionnaire permits to work out scores for each respondent the attitude scores of subjects can be used in a number of ways and are particularly useful in experimental esearch studies.*

* This description of the method of developing attitude sales has been kept brief on purpose. Those wanting to develop attitude sales for their research studies an refer to standard textbooks on the subject.

6.3 Interviews

Many people are more willing to communicate information verbally that in writing and, therefore, will provide data more readily and fully in an interview than on a questionnaire. Indeed you can have several advantages from the friendly interaction in an interview that cannot be obtained in limited, impersonal questionnaire contacts.

The interview is probably the man's oldest and most often used device for obtaining information. It is a face-to-face interpersonal situation in which you, as an interviewer, ask a person being interviewed, the respondent or interviewee, questions designed to obtain answers pertinent to the purpose of the research problems.

In a face-to-face meeting, you, as an interviewer, can constantly encourage the interviewees and help them probe more deeply into a problem. Through interviewee's incidental comments, facial and bodily expressions, and tone of voice, you can acquire information that would not be conveyed in written replies. The auditory and visual clues also help you keep the tempo of the tone of the private conversation so as to elicit personal and confidential information and to gain knowledge about motivations,, feelings, attitudes and beliefs.

6.3.1 Purpose of the Interview

Interviews vary in purpose, nature and scope. They may be conducted for guidance or research purposes. You may confine them to one individual or extend to several people. In short, an interview can be used for three main purposes.

a. It can be used as an exploratory device to help identify variables and relations, to suggest hypotheses and to guide other phases of the research.
b. It can be used as an instrument of the research. In this case questions designed to measure the variables of the research will be included in it. These questions are, then, considered as items in a psychometric instrument, rather than as mere information- gathering devices.
c. It can be used to supplement other method used in a research study: to follow up unexpected results, to validate other methods, and to go deeper into the motivation of respondents and their reasons for responding as they do.

6.3.2 Types of Interview

There are many types of interviews. Some of them are: (a) individual and group interviews; (b) structured or standardized interviews; (c) unstructured or unstandardized interviews (U) non-directive depth interviews; and (e) focussed interviews, and they have been discussed below.

a. Individual and group interviews:

Most interviews are conducted in a private sitting with one person at a time so that the subject will feel free to express himself fully and truthfully. Sometimes individuals with common or divergent backgrounds are brought together to explore a problem or to evaluate the merits of a proposition. They can present a wide range of information and varied viewpoints. They can also help one another recall, verify or rectify items of

information. Subjects may refrain from expressing some points before a group that they might reveal in a private interview.

b. Structured 'or standardized interviews:

In the standardized interviews, the questions, their sequence and' their wordings are fixed. It means that the same questions are presented in the same manner and order to each subject and the choice of alternative answers is restricted to a predetermined list Even the introductory and 'concluding remarks are systematically stated. An interviewer may be allowed, some liberty in asking questions, but very little. This liberty is specified in advance. Standardized interviews use interview schedules (questionnaires) that have been carefully prepared in advance to obtain information pertinent to the research problem. A structured interview is more scientific in nature than the unstructured one as the standardized approach introduces controls that permit generalization.

c. Unstructured and unstandardized interviews:

Unstructured interviews are much more flexible and open. Although the research purposes govern the questions asked, their content, their sequence and their wordings are entirely in the heads of the interviewers, who can alter them to suit the situation and subjects. Sometimes subjects are encouraged to express their thoughts freely. In an informal unstructured interview one can penetrate behind initial answers, follow up unexpected clues, redirects the inquiry on the basis of emerging data into more meaningful analysis of data. Unstructured interviews are not ordinarily used for testing and verifying hypotheses, but they are valuable instruments in the exploratory stage of research. It may also provide insight into human motivation and social interaction that enable him to formulate fruitful hypotheses.

d. Non-directive depth interview:

It is also called an unguided interview. It is almost analytical in character, and is sometimes most appropriate method for obtaining insight into hidden or underlying motivation, unacknowledged attitudes, personal hopes, fears and conflicts and the dynamic interrelatedness of responses. Rather than asking a number of direct or predetermined questions to obtain specific items of information, an interviewer permits the interviewee to talk freely and fully concerning a particular issue, incident, or relationship. While the subject unfolds his story, the interviewer serves as a good listener who unobstrusively inserts a judicious "remarks" that is interesting," "go on" or performs generalized actions to stimulate the flow of conversations. When the interviewee is drawing to a close, interviewer may ask some direct questions to fill in the gap and round up the discussion. By placing few restrictions on the direction by the discussion and encouraging a wide range of responses the interviewer gets natural and representative picture of the subjects behaviour and gain an insight into the character and intensity of his attitudes, motives, feelings and beliefs.

e. Focussed interview:

It focuses attention upon a concrete experience that the interviewee has had. If he has seen a movie or read a book, for example, an effort is made to ascertain the specific facts that this experience has had upon him. To probe that attitude and emotional responses of the subject, the interviewer thoroughly analyzes the movie or book prior to meeting him,

prepares appropriate questions to serve as a framework for discussion, and during the interview, confines the conversation to these relevant issues. The respondent is permitted to express himself completely, but the interviewer directs the line of thought.

6.3.3 Conduct of an Interview

Interviewer must be trained, questions must be pretested and revised to eliminate ambiguity and inadequate wording. Special pains must be taken to eliminate interviewer's bias and questions must be tested for unknown biases. The particular research problem and the nature of the information sought must, in the last analysis, dictate whether or not the interviews will be used. The main steps in the conduct of an interview are:

- Preparing for the interview,
- Establishing rapport, and
- Recording interviews.

These steps have been described below:

a. Preparation for the interviews:

Interview can only yield the desired result if necessary preparatory work has been done in advance. The interviewer must have a clear concept of the kind of information he wants to obtain. He must clearly outline the sequences of questions that would be most appropriate an4, he must think out the stimulating style that will systematically bring out the desired responses from the interviewee. A written outline, schedule or check list will provide a set plan for the interview and would ensure that the interviewer would obtain all important data needed during the interview.

b. Establishing rapport:

The nature of personal relationship between you, as an interviewer, and interviewee requires an expertness and sensitivity that might well be called an art. The initial task of securing the confidence and cooperation of the interview is crucial. Talking in a friendly way about a topic of interest to the interviewee will often dispel hostility or suspicion. As is true in the use of questionnaire, you as, an interviewer, must be able to assure the subject (interviewee), that his responses will be held in strict confidence.

c. ***Recording interview:***

Recording interviews on tape is convenient and inexpensive, and obviates the necessity of writing during the interview. Writing during an interview may have distracting influence, both on the interviewer and the interviewee. Interviews recorded on tape may be replayed for complete and objective analysis. In addition to the words, the tone of the voice and emotional impact of the respondent is preserved on the tapes.

6.3.4 Interview as a Data-gathering Tool

Interview belongs to a class of methods that yield primarily subjective data that is direct descriptions of the world of experience. Its importance lies in the fact that many types of information can be secured only through face-to-face contact with people, specially data relating to personal history, family de, opinions and attitudes.

At this stage attention may be drawn to a unique value of interview as compared with the questionnaire. The respondent of a questionnaire can edit earlier answers in the light of later questions which makes control of the contextual effect of other questions on the salient questions impossible. In an interview, on the other hand, the later questions remain hidden from the respondent and hence do not affect his response to earlier questions.

The interview has unique advantages as a data-gathering technique in areas where human motivation as revealed in reasons for actions, feeling and attitude is to be studied. Interview is, however, time- consuming and a difficult method to employ successfully. The danger of interviewer bias is constant. Since the objectivity, sensitivity and insight of the interviewer is crucial, this procedure is one that requires a level of expertness not ordinarily possessed by inexperienced researchers.

S.A.Q. No. 3

Listed in column 1 are some data requirements for research. Indicate in column 2 whether or not interview would be an appropriate data-gather technique and, if so, indicate in column 3 the type of interview that would be appropriate. The first problem has been worked out by way of illustration.

Sr. #	Data requirement	Interview, could be used		Types of Interview
		YES	NO	
i)	Attitude of administrators towards curricular changes.	YES	NO	Structured
ii)	What childhood experiences gave Jehangir Khan such fighting spirit?	YES	NO	
iii)	What do successful administrators regard as key to efficient administration?	YES	NO	
iv)	Reasons for resigning captaincy by Javed Maindad twice in two years.	YES	NO	
v)	Attitude of project managers towards projects in the designing of which they had no hand.	YES	NO	
vi)	Comparison of the feelings of two squash giants on losing their crown.	YES	NO	
vii)	Factors given priority in project approval by decision- makers.	YES	NO	

viii)	Views of students onthe proposal to entrust maintenance of discipline to student unions.	YES	NO
ix)	Factors considered decisive by project managers in determining success or failure of projects.	YES	NO
x)	How do convicts feel on hearing death sentence pronounced by The judge?	YES	NO
xi)	What makes students turn to the drug?	YES	NO
xii)	Priorities in the education sector plans of SAARC countries.	YES	NO

6.4 Observation

As a data-gathering device, direct observation may make an important contribution to descriptive research. Certain types of information can best be obtained through direct examination by you. For example, characteristics of a school building: materials of construction, number of rooms for various purposes, size of rooms, amount of furniture and equipment, presence or absence of certain facilities and other relevant aspects. Their adequacy can be determined by comparing these facilities with reasonable standards previously determined by expert judgment and research. But when the study of human subject in action is involved, data- gathering through observation, becomes much more complex. Here you must know "what to look for?" and "how to look for.?" You must be able to distinguish between the significant aspects of the situation and factors that have little or even no importance to the investigation. This requires the selection of the situations where observational techniques are useful.

Observation is concerned with the overt behaviour of persons under conditions of normal living. Many important aspects of human observation are concerned with the overt behaviour of persons under conditions of normal living. Many important aspects of human behaviour cannot be profitably observed under the artificially arranged laboratory conditions. The method of descriptive research seeks to describe behaviour under natural conditions. Observation as a research technique must be directed by a specific purpose; systematic, carefully focussed and thoroughly recorded. Like other research procedures, it must be subjected to the usual checks for accuracy, validity and reliability. The observer must know just what to observe and what to look for. Both reliability and validity of observation are improved when observations are made at frequent intervals by the same observer.

Observations may be direct or indirect, scheduled or unscheduled, and known or unknown. A more normal view of activity may be observed from unknown, unscheduled, indirect observations such as through a one-way-vision glass. People are known to have committed minor crimes in order to get a true picture of prison conditions.

6.4.1 Methods of Recording Observations

To aid in the recording of information gained through observation, a number of devices have come to be extensively used. These instruments help the researcher focus his attention on specific phenomena, make objective and accurate observations, and systematize the collection of data.

a. Check-list:

The check-list is the simplest of the devices, consisting of a prepared list of items. The presence or absence of the items may be indicated by checking "Yes or No" or the type and number of items may be indicated by inserting the appropriate word or number. This simple 'laundry list" type of device systematizes and facilitates the recording of observations, and helps to assure the consideration of important aspects of the object or act observed.

Suppose you want to use observation for gathering data to study project implementation. Before you actually visit the project office, you must have a complete list of things that you want to observe. For this purpose you prepare a check-list, some of whose items may be the following:

Is a copy of the approval of P.CA available?	YES	NO
Has a time schedule been prepared to start Various major activities?	YES	NO
Have responsibilities for each major activity been assigned?	YES	NO
Has detailed drawing of the building been prepared?	YES	NO
Has the building plan been approved?	YES	NO

The data collected through observations made at the project office would be as exhaustive and complete as the check-list.

b. Rating scale:

A rating scale is used for qualitative description of a limited number of aspects of a thing or of traits of a person. In this device the aspects of the thing or the traits of a person are rated on a five or a seven point scale from the highest to the lowest. In describing the quality of construction of a building; the following categories may be used:

Excellent Good Average Below Avenge Poor

In rating a project manager's knowledge of project details, one use the following categories:

Thorough Good Fair Below Average Sketchy

One of the problems in using a rating scale is that different observers may interpret the quality to be rated differently. If a rating scale uses brief behavioural statements, it would be possible for different raters to use it with greater objectivity. To continue with the rating of project managers in respect to their knowledge of projects, it would be more objective to use the following categories to describe this quality:

Knows all details of each major components	Knows some details of each major components	Knows some details of a few components	Knows only the major components but no details	Knows no details of any major components

In addition to the difficulty of defining the traits to be rated, rating scales have several limitations. The tendency to rate higher on all traits, a person having pleasing personality mitigates against the objectivity of rating scales. To counter the 'halo' effect it has been suggested that the number of traits or characteristics to be rated should be kept at a minimum. Another problem is the tendency of raters to put a much larger number of persons in above average groups.

c. ***Score card:***

The score card, similar in some respects to both the cheek-list and the rating scale, usually provides for the appraisal of a relatively large number of aspects. In addition, the presence of each characteristic or aspect, or the rating assigned to each, has a predetermined point value. Thus the score card rating may yield a total weighted score that can be used in the evaluation of the object observed. Score rates are frequently used in evaluating communities, building sites, schools or textbooks. It is sometimes used in arriving at an overall evaluation of a school.

Score cards have been designed to help in estimating the socioeconomic status of a family. Such aspects as type of neighbourhood, home, number of rooms, ownership, number of books in the library and number and types of periodicals subscribed are all considered significant and have appropriate point values assigned.

The limitations of the score card are similar to those of the rating scale. In addition to the difficulty of choosing, identifying and quantifying the significant aspects of the factor to be observed, there is the suspicion that the whole at a rating may be greater than the sum of its parts.

d. Scaled specimen:

	Data requirement for	Use of Observation Appropriate		Observation gathering Device
		YES	**NO**	
i)	Management approach of secondary school headmasters.	YES	NO	Check List
ii)	Extra-curricular activities in rural secondary schools.	YES	NO	
iii)	Effectiveness of teacher in-service course given at centre schools.	YES	NO	
iv)	Communication skills of secondary school science teachers.	YES	NO	
v)	Selection for Presidential award for best teachers.	YES	NO	
vi)	Content analysis of social studies books of Punjab Textbook Board.	YES	NO	
vii)	Leadership qualities of managers of poorly-managed and well-managed projects.	YES	NO	
viii)	Quality of speeches made in a school debate.	YES	NO	
ix)	How well do school administrators conduct school staff meetings?	YES	NO	
x)	Do teacher-parent meetings attain the desired goal?	YES	NO	
xi)	Use of the National Teaching Kit by rural school teachers.	YES	NO	
xii)	Checking of homework by teachers.	YES	NO	
xiii)	Time-motion study of the setting up of a laboratory experiment by secondary school teachers.	YES	NO	
xiv)	English language competence of teachers of English medium private schools.	YES	NO	

The scaled specimen, although not frequently encountered, provides an effective method for evaluating certain standards of performance. Throndike's handwriting scales provide a number of graded samples to which one may compare the handwriting to be evaluated. Various intelligence-test scoring manuals provide scaled specimens for determining the mental age of children as revealed by their drawings.

6.4.2 Value of Observational Techniques

Following are some of the merits of observational techniques in the collection of data:

a. Observational techniques supply information which supplements the information obtained by other methods.
b. Observation supplies information which cannot be gathered by other available techniques.
c. Observation provides a sample of individual's real behaviour.
d. Observations are selective.
e. Observation promotes the growth of person doing the observation

S.A.Q. No. 4

Please indicate the column 2 whether observation could be used to meet the data requirements for studies listed in column 1. If so state in column 3 the device you would like to use for recording your observations.

6.5 Tests and Appraisal Instruments

A large variety of research-based appraisal instruments such as tests, inventories, scales, etc, have been developed in recent years and are being used extensively in research particularly in experimental and descriptive researches in behavioural fields. These instruments have been designed to describe and measure a sample of certain aspects of human behaviour. These measuring devices claim to assess a variety of human abilities, potentials, achievements and behaviour tendencies. These appraisal instruments have different degrees of validity, reliability and applicability. For an exhaustive list you can refer to the latest edition of the Mental Measurement Yearbook.

6.5.1 Classification of Tests

These appraisal instruments have been variously classified. By way of a very preliminary classification you may use the following two broad categories:

a. What the individual can do (his abilities); and
b. What the individual will do (his characteristic behaviour reflecting his personality).

Given below are a few descriptive categories by the function or the purpose of the instrument.

a. Achievement tests:

Achievement tests (also known as tests of proficiency) yield measures of what the individual knows or the extent of his achievement and performance in the solution of problems and completion of set tasks. These tests attempt to measure what the individual has learned- his present level of performance/mastery in a subject or skill as a result of instruction. Such tests measure performance in a specific area e.g. typing, spelling, reading or arithmetic. Some achievement batteries measure performance in several areas.

Achievement tests can be used, among other things, for diagnosing strengths and weaknesses of an individual and for evaluating influence of a course of study, teaching methods, teachers, etc. These tests can also be used to select equivalent groups to be used as control and experimental groups, to measure gains made by experimental and control groups by applying the test before and after the treatment, and to evaluate the relative effectiveness of two teaching methods, course of study, textbooks, etc.

b. Aptitude tests:

Aptitude tests seek to assess the level of achievement that an individual can attain in some particular academic or vocational fields. In other words, aptitude tests attempt to predict an individual's capacity to acquire improved performance with additional training. As tests of achievement were found to be good predictors of school success, earlier academic aptitude tests originated in just this way. Aptitude tests measure present performances including performance in some of those areas in which the individual had received no specific training in order to infer his potential for further growth with necessary training. Aptitude tests may measure mechanical, motor coordination, artistic aptitude or aptitude for medicine, engineering, computer, languages, stenography, etc.

Some aptitude tests yield scores on a number of abilities. Such tests provide a comprehensive picture of the overall strengths and weaknesses, that is they provide ability profile of the individual. This profile can be matched with the profiles of those who have attained success in various vocations to determine the field(s) in which he is more likely to succeed after necessary training.

Intelligence, or general mental ability, plays a dominant role in all human goal-directed behaviour. In fact it would be more appropriate to refer to intelligent behaviour rather than to intelligence since it is only performance (behaviour) that can be measured and not the so called "innate potential ability" implied by the word "intelligence."In mental testing this has come to mean the performance involved in working with symbols, abstract ideas and their relationships. From this it can be inferred that intelligent behaviour enters into performance in achievement tests as also on most aptitude tests (excepting those dealing with simple manual and visual speed and accuracy). There is thus no clear distinction between measures of intelligence, aptitude and achievement. The real difference lies in the purpose for which the test has been constructed (which determines the test validation technique adopted) and the use to which it is put (through the use of norms developed for each test in accordance with the use to which the test is to be put.

Intelligence, or general mental ability, is also really measured by present performance on the assumption that if an individual has more effectively profited from the informal opportunities for learning which 'others of his age also have had, he is more likely to perform better than others in future also in areas in which he is given necessary training.

c. Personality tests:

Another broad area of psychological testing is concerned with the non-intellectual aspects of human behaviour. Personality tests most often refer to measure of such characteristics and attitudes. Most of these tests are usually self-report instruments. The individual checks responses to certain questions indicating what he prefers to do or how he tends to act in a given situation. Because of the difficulty, inability or unwillingness of individuals to report their own reactions accurately or objectively, these instruments may be of limited value. Personality tests may be classified into two broad categories.

i) Personality questionnaires:

In recent years self-report instrumented have come to be used for personality assessment. One of the methods used in the construction of personality questionnaires is to make up a very large number of questions and then to determine by experimental studies which items discriminate between normal persons and group of individuals known to deviate from the normal. For example, the following two statements appear in the Minnesota Multi-phasic Personality Inventory (popularly known as MMPI):

I do not fire quickly.	YES	NO
At times I think lam not good at all.	YES	NO

By comparing the answers of normal persons with groups having personality problems keys have been constructed to measures different aspects of behaviour. In its regular administration, the MMPI provides ten "clinical scales."

Another widely used d9vice, namely California Psychological Inventory (CPI) provides scores on fifteen scales. Some of these being dominance, sociability self-acceptance, responsibility, self-control, achievement-via-conformance, achievement-via independence, etc.

Edwards Personal Preference Schedule, developed on the basis of manifest need system proposed by Murray and his associates, seeks to assess strength of such needs as Achievement (to do one's best and accomplish something difficult), Deference (to conform to what is expected of one), Exhibition (to be the center of attention), Interception (to influence others and to be regarded as a leader), Nurturance (to help others in trouble), and so on. EPPS consists of 210 pairs of statements in which items from each of the 16 scales are paired with items from the other14. Within each pair the subject must choose one statement as more characteristic of himself. Two pairs, need as demonstration items, are reproduced below:

A. I like to talk about myself to others.
B. I like to work toward some goal that I have set for myself.
A. I feel depressed when I fail at something.
B. I feel nervous when giving a talk before a group.

ii) Projective technique

A new approach to personality assessment has received much attention from psychologists in recent years. The new methods are called projective4pcause these provide for the projection of subject's own characteristics into his response to a rather vague, undefined situation. The basis of this technique is the hypothesis that once the subject is left free from social conventions, he is more likely to be truly himself and interpret the situation in his own characteristic way. The situation is purposefully kept vague so that there is less able to distort his genuine responses to make a favourable impression.

The projective method has been applied in a number of ways for the assessment of personality. The more well-known ones being:

Rorschach test. The test consists of cards on which ink blot patterns are printed and the subject is asked to indicate what the pattern might be.

Thematic Apperception test. TAT uses a number of pictures involving human figures and the subject is asked as to what is happening, what has happened before, what are the feelings and thoughts of the characters in the picture, and what will be the outcome.

Sentence completion. Sentence completion has been widely used as a verbal projective technique on a wide scale both in research, and clinical practice. Generally, the opening words, or sentence stems, permit an almost unlimited variety of possible completions. The sentence stems are frequently formulated so as to elicit responses relevant to the personality domain under investigation. Examples might be 'My ambition' what worries me; My mother; Women.

Word association. Word association test originally known as free association test, were the early precursors of projective tests. A series of disconnected words are presented to the subject, one at a time, and he is asked to respond by giving the first word that comes to his mind.

In general, projective instruments are less susceptible to felting than are self-report inventories because their purpose is usually disguised. On the other hand most projective techniques are inadequately standardized with respect to both administration and - scoring. In final analysis the scoring and interpretation of projective devices usually depend on the skill and clinical experience of the examiner.

The above brief over-view of the field of psychological testing has been presented with a view to acquainting educational planners and manager with the field and to help them in choosing tests for use in their research studies.

6.5.2 How to Choose a Test for Use?

The researcher who intends to use a test for collecting data for his research would choose his instrument with care. Obviously, if the test with which he collected the data was not appropriate, his entire effort would go waste as his conclusions would not be acceptable. To develop competence in choosing an appropriate test it may be useful to understand the process of construction of a standardized test.

a) Steps in the construction of a standardized test

The author starts with a definition of the ability for which he wants to devise a measuring instrument. He then analyses the ability into its major factors, components or aspects. For example, a test of English ability may contain written comprehension, grammar and spelling. The author has then 6 specify the population for which the test was being devised. Thus the test of English ability may be for school leavers of Pakistan.

Once he has passed this definitional stage, he is ready to write test questions for each component and keeps the number of items in each in proportion to the contribution of the factor to that ability. After puffing these items in a proper format and writing out of the instructions he starts with a series of try-outs. After making such changes in the presentation of the items and the directions as may be indicated by these try-outs. He then administers the test to some subjects drawn out of the population for which the test was being developed. He then carries out statistical analyses to determine the difficulty level

and validity* of each items as well as the validity and reliability* of the test as a whole. He then prepares a revised version of the test by eliminating items that were either too easy or too difficult The test passes through a series of revisions fill the author is satisfied that he has developed an adequately valid and reliable test.

Having developed the test, he sets out to prepare the norms. This he does by administering the final form of the test to a large number of subjects and tabulating the data in various appropriate fables. The sore obtained by an individual is then compared with the appropriate norm for purposes of interpretation.

b) Qualities of a good test

Every psychological test is gin objective measure of a sample of the individual's behaviour. If this measure of a sample of his behaviour has to have any value in predicting his behaviour, the test has to have certain characteristics described below.

i) Standardization

The standardization of a test consists in the establishment of uniform conditions for (1) administration of the tests to all individuals, and (2) the method for evaluation of the responses of all individuals. The only variable in a test situation is the person being tested. If an only if all other conditions are rigidly controlled, can differences in scores be correctly attributed to the individual.

It is, therefore, essential that the test user should familiarize himself with the test manual. Before deciding to use a test, he should satisfy himself that the test has been properly standardized. The test manual must be studied critically to find out how the test was developed, what the test is designed to measure and what were the characteristics of the subjects to whom the test was administered at various stages of test construction. A test whose manual does not give details about the standardization procedure, characteristics of the subjects used for normative data, and validity and reliability of the test should be used with considerable reservation.

A test user administers the test 6 subjects strictly in accordance with the instructions given in the manual and then scores the responses with the help of the key provided with the manual. The score so obtained is a raw score. The raw score obtained by a subject has little meaning in itself. The evaluation of the raw score can only be made with the help of the norms given in the manual. A norm is a table of normal or avenge performance in the test of the subjects to whom the test was administered in connection with the standardization of the test.

Test manuals often give percentile norms also. A percentile norm indicates the scores below which a certain percent of scores lie. Thus a score given in a percentile norm against 60th percentile indicates that 60 per cent of the subjects of the standardization group obtained scores less than it. Many manuals give separate percentile norms for significantly different groups. For example, separate norms may be given for different age groups, or for subjects with different levels of education, or again for persons belonging to different professions. A test user can thus choose which ever group is more relevant for his purpose.

* The concepts of validity and reliability shall be explained in the next few paras.

Reliability
A test is said to be reliable if it gives the same result on different occasions. The reliability of a test refers to the consistency of the subjects' score if they are tested again. There are three ways in which the reliability of a test may be measured. (1) A large number of persons may be tested and then retested and the coefficient of correlation between the test and retest scores may be computed. (2) A test, which consists of a large number of items may be administered once, but two scores may be obtained for each subject; one on even number items and the other one odd number items. The coefficient of correlation between the these two scores would give a measure of the reliability of the test.

Different forms of the test may be constructed as experience with one form may make retest unfair. Scores of subjects on the two forms may be correlated to obtain the reliability coefficient.

Validity
The degree to which the test actually succeeds in measuring what it sets out to measure is called its validity. In order to determine test validity, it is necessary to have an independent criterion of the trait being measured. For example, in validating a test of English ability, marks obtained by students in English in a recent school examination may be used as a criterion. Similarly, a scholastic aptitude test for college entrants, the marks obtained by them at the first examination after entering college, may be used as the criterion. The coefficient of correlation between scores on the test and the criterion scores, is known as test validity.

To sum up, before using a test the user should satisfy himself that:
- the test has been designed to measure what he himself wants to measure,
- the test has been standardized on a group of subjects which is comparable to the group for which he wants to use the test,
- the test has high validity, and
- the test is adequately reliable.

6.6 Concluding Remarks
You have just completed the unit which briefly outlines the major categories of tools and techniques frequently used by researchers. You must realize that this unit has essentially surveyed the most commonly used techniques leaving out a number, of other tools and techniques. The important thing is that you should be conscious of the need to choose a data collecting tool that is appropriate for the type of data needed for your study. You must have your hypothesis always properly focussed so that the data you gather would permit acceptance or rejection of the hypothesis. The success of your research effort would greatly depend upon the correct choice of the data gathering tool.

One of the objectives of the unit was to make you conscious of the limitations and short-comings of various data gathering techniques. In this context you should realize that there is no end to the extent to which these techniques can be adapted to suit any research requirement A creative, imaginative and determined researcher can use his ingenuity in designing the tools to meet his peculiar requirements.

KEY TO SAQ'S

S.A.Q. 1

i)	No
ii)	Yes
iii)	Yes
iv)	Yes
v)	Yes
vi)	Yes
vii)	Yes
viii)	Yes
ix)	Yes

S.A.Q 2

i)	Closed
ii)	Both
iii)	Open
iv)	Closed
v)	Closed
vi)	Both
vii)	Closed
viii)	Both
ix)	Open
x)	Open

S.A.Q. 2

i)	Yes (structured)
ii)	Yes (depth)
iii)	Yes (unstructed)
iv)	Yes (Focussed)
v)	Yes (Structured)
vi)	Yes (Focussed)
vii)	Yes (Structured)
viii)	Yes (Structured)
ix)	Yes (Structured)
x)	Yes (Focussed)
xi)	Yes (Focussed depth)
xii)	No

S.A.Q. 4

i)	Yes-Checklist
ii)	Yes-Checklist
iii)	Yes-Checklist
iv)	Yes-Rating Scale
v)	No
vi)	No
vii)	Yes-Checklist & Rating Scale
viii)	Yes-Rating Scale
ix)	Yes-Rating Scale
x)	Yes-Checklist
xi)	Yes-simple observation
xii)	Yes-simple observation
xiii)	Yes-Checklist
xiv)	No

REFERENCES

Best, J.W. and James V. Khan, *Research in Education,* Englewood Cliffs, 1986.

Boring, Edwin G., H. S. Langfeld and H. P. Weld, *Foundations of Psychol*ogy. John Wiley and Sons, 1962.

Entwistle, N.J., *The Nature of Educational Research.* UK Open University, The Open University Press, 1973.

Good, Carter V., *Introduction to Educational Research.* Appleton Century Crofts, 1969.

Rummel, Francis J. An Introduction to Research Procedures in Education. Harper and Brothers, 1958.

Van Dakn, Deobold B., Understanding Educational Research. An Introduction. McGraw Hill Book Company, 1985.

Unit–7

SAMPLING TECHNIQUES

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CONTENTS

INTRODUCTION

The primary purpose of research is to discover principles that have universal application. Most of the researches use a small proportion of a population for application of treatment, collection of data for analysis and drawing of conclusions. This is done for a number of practical considerations. Some populations may be so large that measurement of their characteristics would be too expensive and time consuming. In cases of very large populations, like all children' of primary schools in Pakistan or all vehicles registered in the country, collection of data might take so long that by the time the investigator has completed his study, the population itself might under - go change. In that event the conclusions drawn from the study would not be true in respect of the changed, population whose composition might have been affected by increased rate of new entrants, and lowered rates of repeaters and drop-outs.

While in some cases it may seem feasible to obtain the information by taking a complete enumeration of census of the aggregate, in most others, the process of sampling would make it possible to draw valid inferences or generalizations or the basis of data collected from a relatively small proportion of the population. The extent to which we can do this Quake generalizations or draw inferences) with any accuracy depends on the adequacy of the sample.

The researcher is not alone in his reliance on sampling. Each one of us makes use of sampling in his everyday life. Before buying peanuts from a vendor we take out one or two peanuts and peel off the shell to see whether it has healthy looking nuts and then taste it to test whether it has been properly fried. If we are not satisfied with the quality of the contents of these sampled peanuts we move off.

Similarly our opinions of institutions and individuals are often based on samples of our experience with them. The inferences drawn by us in everyday life on the basis of samples may not always be true because we do not make deliberate efforts to obtain good samples. The researcher on the other hand makes use of the sampling techniques to draw samples which are:

- randomly selected;
- representative;
- sufficiently large; and
- controlled for extraneous variables.

OBJECTIVES

After completing the unit you are expected to be able to:

a) Cognitive

1. define a population with respect to the characteristics of the members comprising it.

2. distinguish between homogeneous and heterogeneous population.

3. distinguish between population and sample.

4. identify the characteristics of a good sample.

5. enumerate the factors causing biases in sample.

6. describe different sampling procedures employed in research.

7. identify distinguishing features of each sampling procedure.

b) Affective

1. develop an attitude of scientific thinking in the solution of problems.

2. develop awareness of the significance of sampling procedures in the conduct of research studies/projects.

3. realize the harmful effects of errors in sampling techniques leading to wrong inferences and generalizations.

c) Psycho-Motor

1. list the members of the population from which the sample is drawn.

4. draw samples according to different sampling procedures.

5. use a sampling design with advantage and ease in a particular situation.

7.1 Type of Samples

Samples can be broken down into basic types: non-probability and probability. The basic difference between the two is that in the former, there is no way of estimating the probability that each individual has an equal chance of becoming a part of the sample. The following example would explain the difference. Suppose an investigator conducting a study of class V students of Sheikhupura city approaches the headmasters of primary schools and collects data from schools where the headmasters make available their students. He goes from school to school and obtains data till he manages to reach his target of 250. This is an example of a non-probability sample. g on the other hand, he obtains a complete list of all students enrolled in class V in all schools of Sheikhupura city, puts their names on separate slips, places all slips in a drum/container and then draws 250 slips, one by one, after rotating or shaking the container repeatedly, he has a probability sample. This is known as a probability sample because each student has an equal chance of being included in the sample.

Non-probability sampling

In most of researches in social sciences, samples of non-probability type are commonly used. The researcher generally uses subjects where they are readily available. For example, an investigator interested in studying two different teaching methods may take two different classes. Such samples are called accidental or incidental samples. An investigator sampling prices of essential consumer goods may enter a large departmental store and note down the prices of all goods available there. A drug examiner collecting samples of drugs available in a large drug store uses incidental or accidental samples.

Another type of non-probability sampling is quote sampling. Under this method, the proportions of various subgroups in the population are first determined/ascertained and the sample is drawn (usually not in a random fashion) to have the same percentages in it. For example, while studying mathematical ability of high school students a researcher includes in his sample boys and girls in the proportion in which boys and girls are known to be enrolled in high schools., Similarly in studying the attitude of high school teachers towards lifting of ban on student' union, a researcher may include urban and rural teachers in their proportion in the population.

The third type of non-probability sampling is known as purposive sampling. A purposive sample is one arbitrarily selected because there is good evidence that this is very representative of the total population. Knowing that in the past, the candidate who polled more votes in the rural areas of Islamabad Capital Territory won the National Assembly seat, one interested in predicting the results of the ensuing election from this constituency may only sample the voting preference of voters from this area. Or again, one may sample trend in cotton prices only in Faisalabad wholesale market to predict cotton price trend for all other markets in the country if one knew that in the past Faisalabad market has reflected the country trend.

Probability sampling
Probability sampling is characterized by a systematic and methodical selection of samples from the population such that each individual in the population has an equal probability (chance) of being included in the sample. For example, if there are ten students in a class (S_1. S_2, S_3, S_4, S_5, S_6, S_7, S_8, S_9, S_{10}) and a sample of two students is to be drawn, one may make five pairs of students so that all students are included only once in a pair. A large number of combinations of five pairs are possible and any pair could be taken.

Say, the five pairs are: (S_1. S_2, S_3, S_4, S_5, S_6, S_7, S_8) and (S_9, S_{10}). Now if one of these pairs is selected through a draw, it would be obvious that all these pairs had an equal chance of being selected. Thus each pair had 20 per cent (100 by 5) chance or a probability of .20 of being picked up. It should be noted that there is neither any bias in the drawing of probability samples nor is the drawing of sample left to chance or convenience.

7.1.1 Need of and Advantages of Sampling

a) Need for sampling:
As emphasized earlier, research is directed toward learning about populations. Gathering data about large and widely dispersed population is often not feasible and is always costly and time- consuming. Consider such areas as eating habits, child-rearing practices, reading habits of students, house hold budget of various income-groups; incidence of divorce in the country, etc. Reliable information about a large number of very vital subjects would not be available, had complete enumeration of total population been the only method available to us. Fortunately characteristics of large and wide population can usually be determined by selecting samples that are small relative to the size of the population, if proper sampling systems are used.

b) Advantages of sampling:
The principal advantages of sampling as compared with complete numeration are discussed below.

i) *Reduced cost.* If data are obtained from only a small proportion - of the total population, expenditure is smaller than if a complete census is attempted. With large population adequately accurate results can be obtained from samples that represent only a small fraction of the population, say one in a thousand or one in thirteen hundred. Thus the saving in the cost of data collection alone is considerable.

ii) *Greater speed.* For the same reason, the data could be collected and systematized more quickly with a sample than with a complete count. The speed with which a sample survey can be completed is a vital consideration when the results are urgently needed.

iii) *Greater scope.* While carrying out complete enumeration, it may not be feasible to obtain detailed information and the scope may have to be limited. In certain enquiries highly trained personnel may be required for collection of the data which may make complete enumeration with sufficient details.

iv) *Greater accuracy.* Well trained personnel can gather data under careful supervision when the volume of work is reduced. As such a sample may yield more accurate results than complete enumeration done by poorly trained personnel with little or no supervision.

7.2 Population and Sample

Before proceeding with the actual discussion of the sampling techniques, it would be desirable to define the terms frequently used in these discussions and to clarify certain aspects and issues associated with these terms.

7.2.1 Population

A population or a universe Or an aggregate is any group of individuals ($_{w}$hi$_{c}$h may mean Individual persons or individual objects) that has one or more characteristics in common that are of interest to the researcher1rhus a population may consist of university students, cancer patients, cement factories, museums, or soon.

The population may consist of all the individuals of a particular type or a more restricted part of that group. Thus to continue with the earlier examples, the population may consist of all university students or of all cancer patients in the country or to those students only who are studying genetic engineering or those patients only who are undergoing a latest treatment respectively. Similarly, the population may consists of all cement factories or all museums in the country or it may consists of only those cement factories which are running below their production capacity or to only science and technology museums.

The population in a statistical investigation is always arbitrarily defined by' naming its unique properties. Some of the examples may be: Headmasters of secondary schools with enrolment of Over 250 students; Students who failed twice in English at the S.S.C. examination; Projects with the per cent cost overruns and delays of more than six months; Companies listed on the Karachi Stock Exchange which have not declared profit for the last two years; Ghost schools that have continued on the Government list for more than three years; and so on. In each of - these ases the population has been clearly defined by the researcher by specifying its unique properties. Thus in the first case the population would consist of only those headmasters of secondary schools in whose schools more than 250 students are enrolled. Headmasters of primary schools and headmasters of those secondary schools where less than 250 students are enrolled, have been excluded from the purview of the study.

a) Sampled population

Sampled population is the population out of which the sample has actually been drawn. A sample of 50 students of class ten drawn from model and private schools of Islamabad consisted of children of senior civil or military officers. The sampled population, therefore, was not students of class ten of model and private schools of Islamabad but children of senior civil and military officers studying in model and private schools of Islamabad. Suppose that a sample of thirty fields was drawn to study per acre cotton yield by using a certain brand of fertilizer. These fields happened to be located dose to the river

Indus. Thus the sampled population was those cotton fields, irrigated by river Indus, that use a certain brand of fertilizer' and not 'those cotton fields which use a certain brand of fertilizer.

b) Target population

The target population is that population in the characteristic of which the researcher is actually interested. In the example cited in the preceding para the target populations were all students of class ten studying in Model and private schools of Islamabad' and 'all cotton fields using a certain brand of fertilizer' respectively. Sometimes the sampled population is more restricted than he target population because it is easier or more convenient to have such samples. It should be remembered that conclusions drawn from the sample apply to the sampled population. The extent to which these conclusions would also apply-to target population would depend on other sources of information.

7.2.2 Types of population

Populations may be of two kinds:

a) Homogeneous population and
b) Heterogeneous population.

a) Homogeneous population

A homogeneous population refers to a set of objects/things/units wherein the members are like one another with respect to a number of characteristics. For example, students in a local high school coming from the vicinity of the school are likely to be homogeneous in respect of their common cultural, socio-economic and ethnic back grounds.

b) Heterogeneous population.

A heteregdneous population refers to a set of objects/things/units wherein the members differ from one another in a number of ways. For example a comprehensive high school selecting students for admission from diverse cultural, socio-economic and ethnic back-rounds contains a population which is .heterogeneous to a great extent.

Complete homogeneity and complete heterogeneity are at the two ends of a continuum, with all degrees of homogeneity in be seen. The same population may be homogeneous in respect of one characteristic and heterogeneous in respect of another. Thus students of a university in the final year of their master degree programme constitute a homogeneous population of students of final year M.A. class, but they may be a heterogeneous population in respect of their subjects of study, socio-economic level, domicile, etc.

7.2.3 Sample

A sample is a sub-set of objects/things/units taken from the population complete set) for observation and study. For example students of class ten of a few high schools randomly selected out of all high schools of Karachi constitute a sample of class ten students of high schools of Karachi. In the same manner groups of students selected for study on the basis of age, intelligence, achievement and the like will be samples drawn from the population of students.

Depending upon the type of population in which the researcher is interested, the members of a sample could be individuals, families, schools, houses, cities, books listed in card catalogue, and so on. For example, one interested in finding the socio- economic level of students of private schools may take a sample out of the population consisting of all private schools. Similarly, for studying the occupational pattern of families living in villages one would draw a sample of villages from the population of all villages.

a) Sample without replacement

While drawing samples without replacement, a member of the population once included in the sample is excluded from future draws. This one member of the population can only be included once in a particular random sample. Suppose a sample of ten is to be drawn out of 25 students enrolled in a class. The names/roll numbers of all the 25 students may be written on separate slips and placed in a box. After shaking the box well a slip may be drawn. In this first draw each of the 25 students have an equal chance of being included in the sample. The slip drawn shall not be placed back into the box which shall now have 24 slips. In drawing the second member of the sample, the remaining 24 students shall have equal probability of being included in the sample. The third member of the sample shall be drawn out of 23, the fourth member out of 22 and so on. .It may be emphasized that at each draw all members of the population not already included in the sample have an equal and determinable probability of being selected.

b) Sample with replacement.

While drawing a sample under this scheme, the slip picked up at each draw is replaced in the box so that each member of the total population has an equal probability of being selected, no matter how often they have already been drawn. Although there seems little point in having the same unit two or more times in the sample, the method of random sampling with replacement is used in more complex sampling plans because of statistical consideration which at this stage is outside the scope of this unit.

c) Sampling frame

A list of the members of the population divided into parts from which the sample is to be drawn is called the sampling frame, or sampling unit or unit, these units must cover the whole of the population and they must not overlap, that is every element in the population belongs to one and only one unit Sometimes the appropriate unit is obvious, for example if we are interested in estimating the average life of an electric bulb, the unit will be a single bulb. At others there is a choice of units. For example, sampling the people of a town, the unit might be an individual person, the members of a family, all persons living in a block of flats. Again in sampling the reading habits of students, the unit may be individual students, students studying in an institution or students living in a city.

The sampling frame would vary with the unit selected. In the example given above if the unit is individual student, the sampling frame would consist of a complete list of students. If on the other hand, the unit is 'students studying in an institution', the sampling frame would consist of a complete list of institutions. Finally, if the unit is 'students living in a thy', the sampling frame would contain a complete list of cities.

In view of the above it may be pointed out that construction of the list of sampling units or frames is often one of the major practical problems in sampling.

7.3 Sampling Designs

Various strategies have been devised to obtain representative and adequate. samples. Some of the strategies are as under:

a) Random Sampling
b) Stratified Random Sampling
c) Double Sampling
d) Cluster Sampling

These sampling designs are defined and the methodology is described in the following sections.

7.3.1 Random Sampling

Random sampling is the process of obtaining sample from a population wherein conditions are controlled to ensure that each member of the population has equal chance of being included in the sample. Random sampling technique can be used to obtain either (i) simple random sample or (ii) systematic random sample.

i) *Simple random sample*

A simple random sample of members of a population is one in which each member/case has the same chance of being selected. Suppose that it is desired to interview one adult member of each family. The sample size in this case is one. If the four adult members are father (F), mother (M), son (5) and grandfather (GF), a simple random sample would be one in which each of the above members has an equal chance of being selected.

The sample can be drawn by picking up one of the four slips, each given containing the name of one family member. However, if a simple random sample of two (n-2) were to be drawn, all possible distinct samples should have an equal chance of being selected in this case, one possible set of samples could be:

1) M, F; 2) M, S; 3) M, GF; 4) F, S;
5) F, GF, 6) 5, GF

To draw a simple random sample of two, one of the six slips each -containing one of the combinations should be drawn giving an equal chance to each possible sample to be selected.

S.A.Q. No. 1

List all possible samples of three (nn3) to be drawn out of a population of five adult family members:

M= Mother; F=Father; S = Son; D = Daughter and Gm = Grand Mother

In actual practice, however, and particularly where total population and sample size are large, all possible samples are not listed prior to the drawing of samples. Instead, the table of random numbers is used to draw simple random samples of desired size. It has been established statistically that drawing samples in this manner also provides equal chance to all possible samples to be selected. It may also be pointed out that a member once drawn is removed from the population for all subsequent draws. Thus this method is also called random sampling without replacement.

To prevent biases of preferences of the investigator entering into the process, some mechanical devices are used. For, example flipping of coins may be used as a technique, if the population is small. Preparing slips, numbering and shuffling them, keeping them in a container and selecting a few at random, may be another technique for random sampling. However, for refinement and sophistication, as well as in cases where populations are large, a table of random numbers is used for obtaining samples.

i) *Table of random numbers.* The table of random numbers is generated from the digits 0, 1, 2,...9 in such a way that each digit has an equal chance of being selected at each draw. Among the larger tables are those published by the Rand Corporation or those devised by Tippet, Fisher and Yates, and Kendall and Smith for use by investigators.

To use the table of random number first a list of units/members of the population is prepared and they are numbered in consecutive order. The investigator then takes the table of random numbers and starts reading the number from the table. When a number is read from the table, the unit/number bearing that number is selected to be included in the sample. This process is continued until a sample of desired size is obtained. The table of random numbers may be-read vertically, horizontally or diagonally, but whatever be the direction, the readings must be consecutive.

To illustrate, the use of the table of random number, suppose that it is desired to choose a simple random sample of fifty (n50) out of a population of 12,000 university students (N 12,000).

All students enrolled, in the university may be arranged in alphabetic order and assigned numbers from 00001 to 12000. Then "a page of five digit numbers may be taken (a page reproduced as a sample) and starting with the first column note down each number between 00001 to 12000 till the required sample size is completed. For example, in the first column of the table, the first number is 10480 which is less than 12000 and hence would be included in the sample. Then numbers 2 to 12 are greater than 12000 and hence are to be left out. The numbers 2 to 12 are greater than 12000 and hence are to be left out. The 13th number is 9429 which is less than 12000 and shall be included in the sample. Similarly 14th and 15th are also less than 12000 and shall be included in the sample. This process shall continue till 50 number less than 12300 are noted down from the table of random numbers. Students who were assigned numbers 10480, 9429, 10365, 7119.....shall constitute the required sample.

Table 2.2 Random Numbers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1	10480	15011	01536	02011	81647	91646	69179	14194	62590	36207	20969	99570	91291	90700
2	22368	46573	25595	85393	30995	89198	27982	53402	93965	34095	52666	19174	39615	99505
3	24130	48360	22527	97265	76393	64809	15179	24830	49340	32081	30680	19655	63348	58629
4	42167	93093	06243	61680	07856	16376	39440	53537	71341	57004	00849	74917	97758	16379
5	37570	39975	81837	16656	06121	91782	60468	81305	49684	60672	14110	06927	01263	54613
6	77921	06907	11008	42751	27756	53498	18602	70659	90655	15053	21916	81825	44394	42880
7	99562	72905	56420	69994	98872	31016	71194	18738	44013	48840	63213	21069	10634	12952
8	96301	91977	05463	07972	18876	20922	94595	56869	69014	60045	18425	84903	42508	32307
9	89579	14342	63661	10281	17453	18103	57740	84378	25331	12566	58678	44947	05585	56941
10	85475	36857	53342	53988	53060	59533	38867	62300	08158	17983	16439	11458	18593	952
11	28918	69578	88231	33276	70997	79936	56865	05859	90106	31595	01547	85590	91610	78188
12	63553	40961	48235	03427	49626	69445	18663	72695	52180	20847	12234	90511	33703	90322
13	09429	93969	52626	92737	88974	33488	36320	17617	30015	08282	84115	27156	30613	74952
14	10365	61129	87529	85689	48237	52267	67689	93394	01511	26358	85104	20285	29975	89868
15	07119	97336	71048	08178	77233	13916	47564	81056	97735	85977	29312	74461	28551	90707
16	51085	12765	51821	51259	77452	16308	60756	92144	49442	53900	70960	63990	75601	40719
17	02368	21382	52404	60268	89368	19885	55322	44819	01188	65255	64835	44919	05944	55157
18	01011	54092	33362	94904	31273	04146	18594	29852	71585	85030	51132	01915	92747	64951
19	52162	53916	46369	58586	23216	14513	83149	98736	23495	64350	95738	17752	35156	35749
20	07056	97628	33787	09998	42698	06691	76988	13602	51851	46104	88916	19509	25625	58104
21	48663	91245	85828	14346	09172	30168	90229	04734	59193	22178	30421	61666	99904	32812
22	54164	58492	22421	74103	47070	25306	76468	26384	58151	06646	21524	15227	96909	44592
23	32639	32363	05597	24200	13363	38005	94342	28728	35806	06912	17012	64161	18296	22851
24	29334	27001	87637	87308	58731	00256	45834	15398	46557	41135	10367	0784	36188	18510
25	02488	33062	28834	07351	19731	92420	60952	61280	50001	67658	32586	86679	50720	94953

In N is a three or four digit number either tables of three-digit or four-digit should be selected or if these are not available first three or four digits of the five-digit table can be used for selecting the sathp1e.Thus if a sample of 15 is to be selected from a population if 545, the table reproduced can be used. Supposing it is decided to start with the fourth column of the in table. Number 020, 166, 427, 079, 102, 539, 332, 034, 081, 512, 099, 143, 242, 073 which are all less than 545 in this column (taking only the first three digits) shall be included and the fifteenth member of the sample shall be selected from column 5

ii) *Systematic random sample:* The systematic random sampling is an easier sampling procedure but is usually equally good for inference-making. It consists in selecting every K_{th} $(k = \frac{N}{n})$ member of the population.

Supposing it is desired to select a systematic random sample of 50 out of 12000 students of a university. In the list of names of all students arranged alphabetically, any name may be randomly selected from among the first 240 names $(k = \frac{12000}{50})$ 240). Suppose that this name is at serial number 125. The second student to be included in the sample shall be at serial number 365 (125+240); the third at serial number 605 (365 + 240); and so on.

Though a systematic random sample is much simpler to obtain, it typically provides as good a representation of the population as obtained by a simple random sample. However, at times a systematic bias may be introduced if the value of k synchronizes with the cyclic fluctuation in the value of the variable [1]of interest to the researcher. Suppose it is desired to sample the menu of the large city hotels on 52 of the 365 days in a year. The value of k comes to 7. If the first member of the sample happens j be Wednesday, all subsequent members shall also be Wednesday. In effect the sample would be baised particularly because Wednesday happens to be a meatless day.

7.3.2 Stratified Random Sampling

Sometimes it may happen that a randomly selected sample includes one type of units/members disproportionate to its strength in the population, thereby, rendering its representatives to question. To avoid this effect of chance factor a device, known as stratified sampling, is employed.

A stratified random sample is obtained by dividing the population into separate groups, called strata, then taking a simple random sample from each stratum. These strata (subpopulations) shall be non-overlapping, that is no unit of the population should belong to more than one stratum. At the same time, the sum total of all strata should be equal to the total population. To draw full benefit from stratification, the proportion of each stratum in the total population must be known.

In stratified sampling, the population is divided into several relatively homogeneous units and each unit contributes its share to the sample size in proportion to its strength in the population. For example an investigator wants to determine the attitude of parents in Baluchistan towards female education. The population of parents may comprise various socio-economic strata, different cultural and religious backgrounds and different age groups. To obtain a truly representative sample from such a population, it may be advisable to split the population into subpopulations on the basis of the aforesaid characteristics. After determining the total sample size, the share of each sub-population/stratum is fixed according to its strength in the total population and this fixed share is obtained from each sub- population/stratum by the process of random sampling.

Stratified random samples are especially useful when it is desired to make comparison among various strata on several variables. Supposing that a stratified random sample of Federal Government employees working in pay scales 1-4, 5-10, 1-15, 16- 18, 19.20, and 21-22 is drawn and data on age, sex, educational level, length of service and opinions on national and international issues are obtained. It would then be possible to:

i) obtain a better estimate of the various characteristics in the whole population; and
ii) compare' employees in different strata in respect of various characteristics.

Proportional and disproportional-stratified random sampling:
While stratified random samples generally include members in different strata in the same proportion as these are found in the population (proportional stratified random samples), it may become expedient at times to take samples from different strata in proportions which are different from the proportions in the population, the disproportional stratified random sample is especially useful when it is desired to compare different strata on some variable but the size of some strata is relatively small. For example, a relatively small stratified random sample of graduate Pakistani women may contain so few cases from Baluchistan and FATA that any conclusion may be meaningless. To draw inference or make comparisons with such a small number of cases in some strata may not be appropriate. In such cases one may include more cases in some strata than justified on the basis of their proportion in the population.

Situation where stratified random sampling may be useful:
In the following situations the use of stratified random sampling may be particularly useful and justifiable.

i) *Data required for known subpopulations:* If data of known precision are required for certain subpopulations/strata of the population, it is advisable to treat each subpopulation as a 'population' in its own right. Random selection of sample for each of the subpopulations must be obtained.

ii) *Sampling problems may differ in different strata.* In some cases sampling problems may differ markedly in different parts of the population. For example, people living in large may have to be placed in a different stratum from people living in large residential houses because a different sampling approach is appropriate for the two situations. In sampling people living in large residential houses, the list of housing

units available in municipal offices can be used for drawing random sample. Some type of areas sampling may have to be used for sampling people living in large because of the non-availability of complete enumeration of juggis.

iii) *Greater precision in estimating characteristics of the total population may be required:* Stratification may produce a gain in precision in the estimates of characteristics of the whole population. It may be possible to divide heterogeneous people into subpopulations, each of which is internally homogeneous. If each stratum is homogeneous, precise estimate of the characteristic under investigation can be had from a small sample.

Stratified sampling, also known as quota or controlled sampling, is essentially a technique designed to ensure representativeness and avoid bias by using a modified random sampling method.

7.3.3 Double Sampling

A number of sampling techniques depend on the possession of advance information about the population characteristic in respect of some variable. When such information is lacking, it is sometimes easier as well as cheaper to take a large *preliminary sample* to get that information. The purpose of this sample is to provide either a good estimate of the (1) mean value of that characteristic in the total population, or (ii) distribution of that characteristic in the population.

On the result of this preliminary sample, a *second sample* is drawn to study the variable in which the researcher is really interested. This techniques is known as double sampling or two-phased sampling.

Suppose a researcher is interested in obtaining the views of Federal Government employees on a proposal to fix different age of retirement for employees of different cadres. Supposing further that the researcher has no access to any information about the composition of the population of Federal Government employees and that the only document available is the alphabetic payroll for the previous month. Instead of tabulating the entire list to determine the characteristics and composition of the population, he may draw a large simple random sample from the payroll. For this preliminary sample, the researcher- may obtain the information that he needs to be able to draw a representative sample. He may then devise a sampling technique for drawing a second sample and interview only those employees included in the second sample.

Even though the purpose of the research cited in the preceding para was to obtains views of Federal Government employees on a certain proposal, part of the resources were devoted to the preliminary survey which was apparently not devoted to obtain the data required. This means that the size of the sample for 'ol1ecting the main data must be decreased. The technique is profitable only if the gain in precision is more than offsets of reduction in the size of the main sample.

Double sampling, sometimes called sequential sampling, may also be used in a different type of situation. Sometimes a researcher is interested in investigating a large number of characteristics of a population. Collecting data on all characteristics from a large representative sample would be too costly and time-consuming. Hence he collects some broad and general data from a large representative sample and then draws a sample from the first sample for a more detailed investigation.

An investigator, making a detailed evaluation of the impact of training imparted to about 5000 project managers around the counti5', draws a simple random sample of 125. He administers a written test to see how well the project managers have learnt the theory. He then draws a small sample of 25 from within these 125 project managers to carry out an evaluation of the extent to which the managers were actually applying the concepts in their day to day work. He accordingly visits the project office and site of these 25 managers and with the help of a detailed check-list collects the required data. It is obvious that carrying out the entire evaluative study with the sample of 125 would have been very expensive and time-consuming.

7.3.4 Cluster Sampling

In a large number of surveys, a sampling unit consists of a group or duster of smaller units or elements. There are two main reasons for the widespread application of cluster sampling. At times no reliable list of the elements in the population is available and it would be very expensive to construct such a list. With the help of maps the entire geographic region may be divided into blocks and a random sample of blocks may be drawn for the purpose of the survey. All elements (individuals, houses, factories, schools, farms, hospitals, etc., as the case may be) included in the sampled blocks from the sample for the survey/research.

Even when a complete list of all elements is available, cost considerations may point to the choice of a larger cluster of units. For a given size of sample, a small unit usually gives more precise results than a large unit. For example, a simple random sample of 600 students passing the S.S.C. examination in the country in a year cover the population more evenly than 30 randomly selected students passing the said examination from 20 randomly selected centres. But greater field costs are incurred in locating 600 students around the country and reaching them than in locating 20 centres and visiting 30 students at each of these centres.

7.4 Estimating Sample Size

In planning a research study, a stage is always reached at which a decision must be made about the size of the sample. This decision is important because too large a sample implies wastages and too small a sample, diminishes the utility of the results. Often we do not possess enough information to be sure that our choice of sample size is the best one. However sampling theory (to be discussed in Block three) provides a framework within which to think intelligently about the problem.

Before computing the sample size, the researcher must make two decisions. Firstly, he must decide about the *degree of precision* desired in the research. This means that he should decide as to how close the estimates made from the sample should be to the population parameter. The degree of precision required varies from study to study. For example, if the incidence of child abuse by teachers was being studied, a higher degree of precision would be required than if the incidence of student late coming was being studied. Or again, a higher degree of precision would be required if the percentage of sugar in a beverage claiming to be sugar-free was being estimated than if the incidence of cheating in the EPM final examinations was under investigation. So it must be decided whether the error should be no more than 0.05 (five percentage points), or 0.04 or 0.03 or something else.

The second decision that must be made in concerning the probability that the specified amount of error will not be exceeded, it need to be emphasized that with any sample size it is possible to have an odd sample so that the estimate made from it may have more than the specified error (refer to the sampling theory in Block III three). It is therefore necessary that acceptable probability, that the specified error may be exceeded, is specified.

Having made these two decisions the researcher can, with the help of statistical technique of sampling theory, determine the appropriate sample size so that the probability, that the information gained would not deviate more than the specified amount of error, is not higher than indicated. The actual statistical technique and the, computational method shall be dealt with in Block III.

7.5 Summary

The main purpose of sampling is to facilitate the conduct of a research in situations where it may not be feasible to obtain information regarding certain characteristics from each and every member of a population. An investigator may work with a sample and later generalize his findings to the population from which the sample is taken. But he can make such generalizations only when the sample is like the population in all possible ways. In other words, he may put the questions to himself:

a. Is the sample representative of the population?
b. Is the sample adequate?

The answer to the first question involves a consideration of the nature of the population. That is, the sample must comprise members from all strata/sections of the population to ensure its representativeness.

Selection of members/units that are a eveniently at hand, such a staking the first twenty names from a list of the headmasters or forming a group of principals from the total number of principals in an area on one's own preferences, may introduce a bias in the sampling process that will affect its representative character. Generalizations based on the findings with such a sample cannot be validly extended to the population from which the sample is drawn as ordinary methods of statistical inference are not validly applicable to such samples.

Some of the weaknesses of research may be attributed to the drawing of random sampling inferences from non-random samples. Unless appropriate and more complex experimental designs are used to nullify uncontrolled factors, the research conducted on the basis of these available samples cannot be considered sound. You should, therefore, avoid the use of available samples and should try to apply such techniques of sampling for Your research studies that the sample is truly representative of the population characteristics with the result that the conclusions drawn on the basis of the sample are approximately accurate about the total population with insignificant margin for the error in the conclusions of the study.

The answer to the second question implies consideration of homogeneity and heterogeneity of the population. A small size of the sample may suffice, if the population is homogeneous, while a large sample size may be necessary when the population is relatively heterogeneous. In other words, size of the sample must increase in proportion to the corresponding increase in heterogeneity of the population. The absolute size of the population is also a factor determining the size of the sample. The larger the population, the greater should be the sample size. For example a sample of five principals in an attitude test from a population of one hundred principals in a province will not constitute an adequate sample.

SELF-ASSESSMENT QUESTIONS

S.A.Q. No. 2

I True-false Questions

(Instruction: Encircle T if the statement is true and F if it is false.)

1.	The students of High School No. 1 of a city X constitute a group which may be called a population.	T	F
2.	The students of High School No. 2 of a city X constitute a group, which may be called a sample.	T	F
3.	Adequacy of a sample refers to the size of the samples.	T	F
4.	If a sample is representative, it has to be adequate.	T	F
5.	If the members of a population, are akin to one another, the population is heterogeneous.	T	F
6.	In a homogeneous population members have diverse characteristics.	T	F
7.	A random sample must be representative of the population from which it is drawn.	T	F
8.	Stratified sampling refers to sample made up of samples drawn from different sections of a population.	T	F

II Sampling Problems

Items No. 1 to 7 are statements, related to one of the following sampling designs:

a. Random sampling
b. Stratified sampling
c. Double sampling
d. Cluster sampling

Indicate against each statement the sampling design related to it.

1. Out of a class of hundred students, having 30 science students, 20 arts students, 20 home economic students, 10 commerce students and 20 agriculture students, a sample of twenty students is selected:

2. Out of a class of hundred, students, a group of twelve is selected by the teacher in such a way that every student stands equal chance of selection_____.

3. In a study of certain characteristics of secondary schoolteachers, the investigator selected some secondary schools randomly for the collection of relevant data_____.

4. A sample of hundred cases was drawn from a population of one thousand. A second sample of 25 was drawn from the first sample of one hundred to study in more depth some of the related aspects of the phenomena under research _____.

5. In an electric bulb manufacturing factory any five out of every hundred bulbs are rechecked _____.

6. In an electric bulb manufacturing factory, any five out of total bulbs are checked_____.

7. A farmer has four grades of apples with 20%, 40%, 30% and 10% in each grade respectively. He selects 400 for sale ensuring that the sample contains 80 apples of grade A, 160 of grade B, 120 of grade C and 40 of grade D _____.

Follow-up Activities

The following activities by the students may help clarify the concepts of population, samples and sampling designs.

1. Choosing populations and defining them by identifying their characteristics.
2. Using tables of random numbers to select samples of different sizes from defined populations of different sites.
3. Using different strategies of sampling to draw samples from given populations.
4. Discovering and testing new approaches to drawing representative and adequate samples from a population.

7.6 Conclusion

Utilization of samples has made the task of an investigator much easier and rewarding. But he has to guard against misuse of sampling procedures and the biases that may enter into his investigation. He has to keep in mind the following steps in drawing samples from population:

1. The population must be clearly defined in terms o the characteristics it possesses.
2. The sample drawn should be representative of the population.
3. The size of the sample should be adequate with reference to size and homogeneity of the population.
4. Any sampling design may be used to form sample depending upon the nature of the population and the purpose of the study.

Key to S.A.Q's

S.A.Q No. 1

– MFS
– MFD
– MF Gm
– MSD
– MS Gm
– MD Gm
– FSD
– FS Gm
– FD Gm
– SD Gm

S.A.Q No. 2

I	1	T	2.	T	3.	T	4.	F	5. F
	6.	F	7.	F	8.	T			
II	1.	B	2.	A	3.	D	4.	C	5. C
	6.	a	7.	b					

BIBLIOGRAPHY

1. Agresti, Alan and Barbara Finlay: *Statistical Methods for the Social Sciences,* San Francisco: Dellen Publishing Company, Second Edition, 1986.

2. Best, John W.: *Research in Education,* Englewood Cliffs: Prentice-Hall, Inc., Second Edition, 1970.

3. Cochran, William G.: *Sampling Techniques,* New York: John Wiley and Sons, Third Edition, 1977.

4. Garrett Henry E.: *Statistics in Psychology and Education,* Bombay: Vakils, Feffer and Simons Ltd., Eleventh Indian Reprint, 1985.

5. Hillway, Tyrus, *Handbook of Educational Research,* Boston: Houghton Mifflin Company, 1969.

Unit–8

DESIGNING A RESEARCH PROPOSAL

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CONTENTS

INTRODUCTION

You have now completed the first seven units of the course and are quite familiar with the basic concepts of research. In this unit an attempt has been made to integrate the it search concepts presented in different units so &r with a view to helping you in the development of a research proposal.

It would be recalled that most research projects fall into a definite pattern or design. In other words, a distinct way of thinking characterizes every research. In conceiving a research proposal, the researcher passes through the following stages:

a. The researcher forms a clear-cut notion of *the problem* he wishes to investigate. Writing out the problem statement helps to clarify it.

b. The researcher then starts to collect all *relevant, available information* that he possibly can. He must familiarize himself with all that is already known about the problem; both facts and the theoretical framework being used to interpret the facts. Knowing what is al-ready known helps:
   i) ciystellize the problem in the mind of the researcher and
   ii) formulate the hypothesis to be verified.

c. The scholar then formulates a theory or hypothesis to explain the phenomenon under investigation. He presupposes the probable solution or what it might both Sometimes, several solutions may appear possible and he may decide to design a study to test which of these is true.

d. The researcher then proceeds to test the hypothesis. The testing of hypothesis is the distinctive characteristic of all research. The research design is specifically chosen to test the hypothesis. If the evidence (collected data) supports the hypothesis, it may be accepted. If, on the other hand, the data fail to explain all evidence in a completely logical fashion, it should be rejected.

OBJECTIVES

After reading this unit, you should be able to:

1. explain the steps of a research proposal;
2. distinguish a good problem from a bad problem;
3. write the statement of the problem for your research proposal;
4. write the objectives of the research study;
5. develop hypotheses for the research study; and
6. develop a good proposal for the research study.

8.1 Format of the Research Proposal

It is a common practice that students undertaking a research as part of their degree requirement first submit a research proposal or outline for approval from the faculty. The research adviser judges the worth of the proposed study and discusses with the student the suitability of the problem selected and the proposed method of the study. This review by the faculty helps to clarify students' own thinking about the suitability of the problem selected and the methodology proposed. This arrangement also saves considerable amount of time and effort that the student might have otherwise wasted on a poorly designed study which might have been rejected.

Though there is some variation in the format prescribed by different universities, the following information is most often required about the research proposal:

- Statement of the problem.
- Purpose, objective and significance of the study.
- Definitions, assumptions and limitations.
- Review of related literature.
- Theoretical framework.
- Hypotheses and questions.
- Proposed research procedures.
- Time schedule.

In the following sections each of the above would be discussed so that you may feel confident about developing the proposal for your research.

8.2 Statement of the Problem

One of the unholy joys one feels as Pakistani researcher is the realization that what f`tile land Pakistan is for research. There are unlimited number of problems waiting at every step for the researchers to carry out the study. Yet when one talks to graduate students they seem to be at a loss as to what should be the topic of their research.

The reason perhaps is lack of insight in the research process itself. There are many misunderstandings about the research activity itself which confuse the researcher. They commonly say:

- "Research is nothing more than gathering the facts already known."
- "Research can be done on anything and everything."
- "Research should be undertaken on entirely new areas about which no one knows anything tit all," etc.

These are all misleading statements and show lack of insight into scientific inquiry. This is one of the reasons that many of the social sciences have not carried out scientific research in many of its important problem areas due S the complexity and non-measurability of the problem situation.

Research proposal, whether designed for dissertation purposes for a degree requirement, or for an external funding agency, may be considered as response to a problem. Because that is what research really is. Despite this obvious and integral link between the statement of problem and the reasons put forward for carrying it out, it is not easy to conceive the problem clearly and scientifically.

There is a strong feeling amongst the professors who evaluate research proposals that the most frequent deficiency noted by them is the lack of a clear problem statement to define and guide the inquiry. And the most frequent complaint of the graduate students and their seemingly never-ending search for a problem significant enough to pursue and discrete enough to handle; The efforts of the writers is to de-mystify the process of generating problem statements which will be adequate to define, guide and conduct systematic inquiry.
We should then try to describe the qualities of a good research problem. instead of describing the qualities that a good research problem should have, it is sometimes useful to start at the other end and describe what a good research problem is not. It is this approach that has been adopted in this unit.

8.2.1 Which is not a Good Research Problem?

a. It is not too broad:

This appears to be a special disease of new researchers in general and Pakistani researchers in particular that they choose a problem that is too broad. In our long career of teaching and research we have yet to come across a research proposal which is manageable or realistic when presented for preliminary approval. Let us take, for example the following topics:

> Effect of Child Rearing Practices on Intelligence Level of Pakistani Children

The above research proposal presupposes that child rearing practices adopted by Pakistani parents belonging to different socio-economic levels in rural and urban areas of different provinces of Pakistan have already been studied. If this assumption is not true, the researcher shall first have to carry out a country-wide survey of the child rearing practices. The second assumption underlying this proposal is that tests/devices for measuring intelligence level of Pakistani children have been developed. If this assumption is also not true, the research would also have to undertake development of instruments for the measurement of intelligence of children. It is obvious that this topic is too broad and too complex to be handled in one enquiry or in the life-lime of one researcher.

To illustrate the point further, let us take the following research proposal:

> The Role of English Medium Private Institutions in Improving Academic Achievement of Pakistani Students

To carry out the proposed research, a complete list of all private English medium institutions of the country would have to be obtained. The method of study would probably involve assessing the academic achievement of students at the time of their admission into selected private English medium institution and again after a lapse of few years of study in these institutions. It is not clear from the statement of the problem whether improvement in academic achievement in all subjects is to be evaluated. In any case, academic achievement test batteries for the entrance and terminal years would have to be developed, if not already available. It is quite well-known that a large number of extra, institutional factors influence the academic achievement of the learner. These include differences in academic aptitude, educational level of parents, atmosphere at home including relations between parents, availability of reading material home including audio-visual educational materials, etc. How the researcher proposes to control these intervening variables is not clear. Thus it would be seen that this problem is also too broad for one researcher to solve, that too within a year or two.

A rational approach would be to select a *small fraction* of an area of study which can be isolated in terms of a limited number of variables which appear to be related with each other in special way. Thus, if a researcher desires to carry on some research on child rearing practices in Pakistan, he should, for example, limit himself to survey the child rearing practices among farm labourers, landless farmers and agricultural land- owners in the rural areas in a district. Thus the statement of the problem may be worded as follows:

> Child rearing practices adopted by farm labourers, landless farmers and land-owners in the rural areas of Larkana District.
>
> **or**
>
> Child rearing practices adopted by industrial labour, office workers and shopkeepers of Sheikhupura.

Or, if the researcher is interested in carrying out research to establish relationship of child rearing practice with some personality characteristic, he should preferably isolate some child rearing practice(s) and try to study its relationship with some personality characteristic which is more directly observable/measurable. Thus, for example, a possible problem could be stated as:

> Temper tantrums among six year old breast-fed and bottle-fed children of middle class educated urban mothers.
>
> **or**
>
> Bed soiling by four year old children of educated working and non-working urban mothers belonging to middle and upper socio- economic levels.

Similarly, if a researcher is interested in working on problems in the area of private English medium institutions and the academic achievement of their students, he would do well to select a *small fraction* of the problem. Some of the manageable research problems in this field could be stated as follows:

- Analysis of the performance in English spelling of students class X by socio-economic level of parents studying in selected private English medium institutions,

Islamabad Model School and Federal Government schools located in Islamabad.

- Qualification, pay and teaching load of the faculty of private English Medium educational institutions established in Sialkot between 1980-1985.
- Performance on an English comprehension test of children of educated and uneducated mothers studying in private English medium institutions in Lahore.
- Comparison of the per student physical facilities available at private English medium institutions, cadet colleges and provincial government schools.

Often some very attractive problems do not lend themselves to scientific inquiry, at least *not in one* big global enquiry. The researchers have to untangle the complex situation into manageable portions before they can start their study. Every more innocent problems, like, 'Effect of harsh discipline on personality make up of primary school children,' cannot be studied because of the difficulty of isolating discipline and its effect from a large number of intervening variables like child's family, school, community, etc., which is contributing to his or her personality development. In other words what is being emphasized is that it is not sufficient to have an interesting for research, more important factor is that initiated enough to be handled by a researcher who has limited time and resources.

Activity No. 1

Some research proposals submitted by students are listed below. In the light of the above discussion rewrite the statement of the problem so as to make it a manageable research proposal.

To assess you in this task, the key words which are toe global and need to be broken up have been underlined.

Student's Proposal	***Manageable Research Proposal***
Students of Arabic are not *religious than* students of science.	_____ _____
Students of home economics are better house-wives.	_____ _____
Children of educated parents are more intelligent.	_____ _____

b. *It is not too subjective: A* very misleading statement regarding selection of a research topic is that one should select an area in which one is generally interested and also knows something about it. However, it is never intended by this statement that a personal opinion or the opinion of others would be a proper topic. A whim like "drinking *lassi* at breakfast brings prosperity," or "boys with curly hair are physically stronger," etc. are such topics. These will be difficult to research as facts would be hard to collect and there would be hardly any library resources available.

Not that such areas cannot be researched into, but this would be time-taking and would require special research design and techniques. The common belief that 'blinds have sixth sense has been tested out successfully in an experimental situation in which a movable screen was placed in a hall obstructing the path and a blind person was asked to walk straight across the hall. It was found that the blind person invariably stopped when he came near the screen.

As the position of the screen was changed after every trial, it was not possible for the blind subject to measure the distance or learn the position of the screen. After establishing the ability of the blind person to know if there. is an obstruction in his path, a systematic study was carried out for testing the sixth sense. Different parts of the body of the blind subjects were carefully covered to find out which of other sense organ has taken over the work of the eyes.

First the hands of the blind person were covered up with thick covers and he was asked to walk across the hail. The blind subject stopped just before the screen, so the possibility of obstruction was ruled out. Next his face was covered with thick cloth and he still was able to detect the obstruction. Similarly various parts of the body were covered up and eliminated, one by one. Finally when experimenter covered the ears of the subject, the subject failed to identify the obstruction and crashed into the screen. After this discovery the same experiment was repeated with large number of blind subjects and it was discovered that indeed ears do help the blind person in detecting the obstruction by its intricate system of feeling air pressure etc. The later belief about fish and milk combination has not been tested but it can be tested if somebody so desires. The only difference in the belief of blind having a sixth sense and lassi being instrumental in prosperity, is that the one belief is shared by many whereas the later is only a personal whim and may-not be shared by anyone else.

c) *It should not be too controversial.* A good research topic should not be too controversial because the nature of the material and one's own preconceptions make it difficult to make an objective study. In some subject areas, one may get bogged down in contradictory charges and counter charges making it difficult to separate the truth from falsehood. Such topics as "the graduates of Gomal University are inferior to these from the Peshawar University," or "one holding a Ph.D. degree in Arabic is not as intellectually sophisticated as one with Ph.D. in Philosophy," are too complex and too emotional to be a topic of a scientific study. Not that graduates of different universities cannot be scientifically evaluated, but the topic of research would then have to be structured differently. For example,

Performance of the graduates of Gomal and Peshawar universities on the Graduate Record Examination.

or

Performance of those holding M.A. degrees in English from the Gomal and Peshawar universities on an advanced test of English Literature.

or

Capacity for analytical thinking displayed by Ph.D. degree holders in Arabic and Philosophy.

d) It should not be too familiar. A research study should not be limited to gathering of known facts only; it should include some unknown territory also. Even in the case of historical research known facts are gathered to find some unknown' or partially known facts of a sequence of events. g for example, you are an expert cotton farmer and Want to know about better seeds for planting cotton, there will be no thrill of discovery in a study designed to test certain cotton seeds. You will be dealing with the same material which you already work with. On the other hand if you study planting of sunflowers seeds, which you have not grown before, it will be more interesting and challenging. A good topic is one that you are curious' about but not thoroughly familiar with.

Thus if you are a teacher in a school where the Teaching Kit has been in use for some time, you would not like to conduct a research into:

> Extent of utilization of the Teaching Kit and the reasons for occasional utilization thereof.

e) It is not too technical. The decision as to whether or not a topic is too technical for you to write about, will depend on your interest A study of "use of radioactive tracers in plant culture" will be too technical bra student who has no background in physical sciences. For educational planners and manages a study of the motivational and cognitive factors in creativity might be too technical and complex. As a general rule, you should not get involved in a research problem which deals with a complex problem of a technical nature for which you do not have the theoretical background.

8.2.2 What is a Good Problem Statement?

Having elaborated don'ts of a problem area, now let come to the basic issue that is how to select a problem for research and what is a good problem statement. Although research problems differ a great deal, and although there is no one "right" way to state a research problem, certain characteristics of problems and problem statements can be learned and used to good advantage. Let us take, for example, the following research problem:

> What is the effect of the use of Primary Teaching Kit on the cognitive development of primary school children?

Note that the statement is in question form in which two variables, Primary Teaching Kit and cognitive development of primary school children, have been linked together in a certain relationship. Note also that this is a question in the mind of the researcher and he has expressed it in a simple statement. Also not that the problem states a relationship between variables.

Let us take another example.

> Do comments made by the supervisor of student teachers cause an improvement in their performance?

It would be seen that one variable is "Supervisor's comments" and the other is "student teacher's performance." The relational part is "cause" which links the two variables.

A problem then is an interrogative sentence or statement that asks what relation exists between two or more variables. The answer to this statement is what is being sought in the study. If the problem is a scientific one, it will always have two or more variables and these will be related to each other in a specific way. There are three criteria of good problems and problem statement:

a) The problem should express a relationship between two or more variables. Is X related to'?? Is use of Primary Teaching Kit related to the cognitive development in children? how is X and related to Z? How is use of Primary Teaching Kit and method of teaching related to cognitive development in children? Or, to take the other example, 'Are comments of the supervisor related to performance of student teachers?

b) The problem should be stated clearly and unambiguously in question form? Instead of saying, for instance, "The problem is _____", or the purpose of the study is_____", ask a question. The questions have the advantage of expressing the problem in a direct and precise way and there is no beating about the bush. Secondly, the purpose of the study need not be the problem of the study. The study of noise level for instance has the purpose of providing optimum, conditions for examinations. While the problem of the study is to see what is the effect of noise on the performance of the students.

   It has been stated earlier that research is response to a problem. The research is, thus, undertaken to seek answer to *p* question arising in the mind of the research. Sometimes the statement of the problem may not be explicitly stated in the form of a question, but the question implicit can always be discerned. Thus, for example, the questions implicit in the problem statements on 'temper tantrums' and 'bed soiling' in pan 3.8 are;

   - Is there any difference in the extent of temper tantrums shown by six years old children who were bottle-fed and, those who were breast-fed?
   - In there any difference in the extent of bed soiling by those four year olds whose mothers are working and those whose mothers are not working women?

c) The problem and the problem statement should be such as imply/permit possibilities of empirical testing. A problem, that does not contain implications for testing its stated relations, is not a scientific problem. This means not only that an actual relation is stated, but also that the variation of the relation is measurable in some way. Many interesting and important questions are not scientific questions because variables cannot be measured, e.g. metaphysical questions like existence of God, etc. Education has many interesting, yet not researchable, questions like 'what affects are taking place in the thinking of Pakistani children in this rapidly changing society of Pakistan?" or "Is uncertain political process in Pakistan deterimental to our children?" The main difficulty in above mentioned problem is

that most of them are not relations and most of their constructs are very difficult or impossible to define in a way that they can be measured.

A beginning can be made in conducting research into these complex problems, once the global concept of 'thinking of Pakistani children' is broken up into thinking about parents, thinking about schools, thinking about their responsibility toward family, school and community etc. Similarly, some studies can be undertaken in the other area if 'detrimental to their self concept, detrimental to their concept of nationhood, detrimental to their confidence in a secure future, etc.

Activity No. 2

In the blank space given against each statement of the problem rewrite the problem in the form of a question expressing the relationship being studied. By way of illustration, the first problem statement has been rewritten.

1.	Child rearing practices adopted by farm labourers, landless farmers and land owners in the rural areas of Larkana.	Are child rearing practices adopted in rural areas of Larkana related to the economic activities of parents?
2.	Temper tantrums among six year old breast-fed and bottle-fed children.	
3.	Bed soiling by four year old children of educated working and non-working mothers	
4.	Performance in English spelling of class X students by socio- economic level and type of institutions being attended by students.	
5.	Qualification, pay and teaching load of the faculty of private English medium institutions.	
6.	Performance in English comprehension of children of educated and uneducated mothers.	
7.	Performance of graduates of Gomal and Peshawar universities on the Graduate Record Examination.	
8.	Performance of holders of M.A (English) degree from Gomal and Peshawar universities on an advance test of English Literature.	
9.	Capacity for analytical thinking displayed by Ph.D. degree holders in Arabic and Philosophy.	

8.3 Purpose of the Study

When the problem area has been selected and its theoretical framework determined, the third step is to state the purpose, objective and significance of the study. As stated earlier research is always undertaken in response to a problem. Accordingly the purpose of the study is always to understand better the factors affecting the problem and to test one or more possible solutions of the problem. It may be emphasized here that the purpose of the study and the objectives of the study are not necessarily the same. You may recall the following study stated in para. 3.2.

- What is the effect of the use of Primary Teaching Kit on the cognitive development of primary school children?

The purpose of the study is to determine whether the .use of the Primary Teaching Kit helps in fostering the objective of the study of primary school children. However the objective of the study is to determine whether or not to continue the use of the Primary Teaching Kit or whether any changes need to be made in its components.

Reported temper tantrums and bed soiling by children of middle- class, educated urban mothers impelled the researcher to undertake the study referred to in para 3.1. The purpose of the study, in case of one, is to determine whether the mode of feeding (breast vs bottle) prevalent among middle class, educated urban families has an effect on the temper tantrums displayed by children. The objective of the study is to recommend discontinuation of that mode of feeding which causes greater temper tantrums among children.

Related to purpose and objective of the study is the question of significance of the study. The researcher should indicate how the answer to the question or the solution to the problem, can influence educational theory or practice. The undertaking of the proposed research study would be justified if the implications or possible applications of the finding of the research are properly formulated and presented. Thus, if the research studies on student achievement and socioeconomic level of parents, listed in pan 3.1, indicate that it is the educationally stimulating home environment and the educational level of parents that is more important in the academic achievement of students, the educational institutions shall have to seriously review their educational programmes and activities to compensate for the deficiencies in home environment of disadvantaged groups.

Functions of the objective section of a research proposal are as under:

a) *Proposing:* To propose the goals or ends which the researcher intends to achieve as a result of the proposed inquiry.

b) *Justifying:* To justify the selection of the objectives which are chosen by explicating the criteria employed in making the choice and by showing how the objectives meet the criteria.

Common deficiencies in choosing and posing objectives are as under:

a) *Letting the readerlay down objectives:* These are the objectives which add no new

knowledge to the one already known.

b) *The free-floating objectives:* This is very common case in the studies which are not carefully thought out. It means the objectives which have no relationship with the study in hand. A common example is when a neophite researcher while planning a survey of a small village writes in his objectives that it will be helpful in planning the national policies, etc.

c) *Objectives without criteria:* Unless the objectives are evolved from the theoretical framework and conform to the criteria laid down for the relationship to be established amongst a set of variables, they cannot be accepted as legitimate objectives of the study. For example, in the study of bed soiling, the criteria laid down for such action of the parents which are accepted as relevant for toilet training behaviour, have to be followed for development of the objectives also. The objectives should not be outside these criteria, as they should be part of a whole and not outside the theoretical rationale.

Activity No. 3

For each of the research problems below, write the *purpose, objective,* and the *significance* of the study.

1. Do children who attend nursery or kindergarten demonstrate better academic achievement in the first two years of primary?

   Purpose of the study _____
   Objective of the study _____
   Significance of the study _____

2. Is participation in extra-curricular activities by students of class IX and X detrimental to academic achievement?

   Purpose of the study _____
   Objective of the study _____
   Significance of the study _____

3. Does segregation of sexes in high schools have a damaging effect upon the self-image of girls?

   Purpose of the study _____
   Objective of the study _____
   Significance of the study _____

8.4 Definitions, Assumptions and Limitations

In this section you should be provide definitions of all such terms, being used in the statement of the problem, as are ambiguous and likely to be misinterprets. The definition of these terms helps sharpen the frame of reference with which the researcher approaches the problem. Let us take, as an example, the following research proposal:

> Involvement of the students of classes IX and X in the extra- curricular activities adversely affects their academic performance in Board's Examination.

The researcher must explain what he means by the term "involvement". Is watching a hockey match played between his school land an out of town school as part of the district hockey championship termed as "involvement?" He must clearly lay down the criterion for classifying students into the group "involved" in extra-curricular activities and the group "not involved" in such activities. Apart from laying a cut-off-point, namely hours per week spent in extra-curricular activities, the researcher should also define the term "extra-curricular activities." What would be taken as a measure of "academic performance" shall also have to be defined. Would it be the total marks, percentage of marks, division obtained, or only pass and fail? It would be clear that definition of these terms would determine what data are to be collected and organized.

The assumptions that the researcher has made and the limitations of the study that he recognizes should be clearly stated. Thus, in the example considered above, one of the assumptions would be that the time spent on extra-curricular activities would otherwise have been devoted to studies. Another, more basic question, would be that the academic performance is directly related with the time devoted for studies. The sort of data on which the study would be based does not directly establish the truth of any of these propositions and hence these can only be assumed. Otherwise, it would not be possible to conclude that involvement in extra-curricular activities affects the academic performance. The researcher should clearly state the limitations of short-comings of his study. This does not, in any way, reduce the significance of his study. It, on the other hand, indicates that he is conscious of what he proposes to do and how far, in the solution of the problem, his methodology would take him. In short, this indicates that he knows what he is doing and this builds the confidence of the users of the results of his study. The limitations of the study often stem from the design of the study.

In the study proposed in pan 5.0, no attempt seems to have been made to control the academic achievement of those involved in extra-curricular activities at the beginning of the research, that is when they enter into class IX. Neither any attempt seems to have been made to-take into account differences in academic aptitude and motivational factors among the two groups - those involved and those not-involved in extra-curricular activities. This limitation would not be operative, however, if the researcher tried to equate the two groups on these factors or if the design permits analysis of variance on account of these factors.

Activity No. 4

In respect of each of the following research proposals, list the terms that need to be defined, the assumptions of the study and the limitations of the study.

1. Bed soiling by four year old children of educated working and non-working urban mothers belonging to middle and upper socioeconomic levels.
   Terms _____
   Assumptions _____
   Limitations _____

2. Performance on an English comprehension test of children of educated and uneducated mothers studying in private English medium institutions in Lahore.
   Terms _____
   Assumptions _____
   Limitations _____

3. Does segregation of sexes in high schools have a damaging effect upon the self image of girls?
   Terms _____
   Assumptions _____
   Limitations _____

4. Fee paying students are more serious in doing their home work than non fee-paying students of primary classes.
   Terms _____
   Assumptions _____
   Limitations _____

8.5 Review of Related Literature

In this section the researcher should give a summary of previous researches carried out in this field and should also state what recognized experts have written on the subject. This indicates that the researcher is familiar with what is known and hence has the necessary conceptual background to take up research in the area. It is obvious that further knowledge must be built on the edifice of sound previous knowledge. A review of related literature also helps the researcher in developing the theoretical framework within which the research is to be undertaken and also helps him in formulating useful hypotheses.

While reviewing related literature, the researcher should take particular note of the following elements:

a) He should review the findings of researches undertaken in the problem area and such other closely related problems as may have some bearing on his subject.
b) The researcher should describe the research designs of the studies reviewed, procedures employed and data-gathering instruments used.
c) The population studied in previous researches should also be clearly described.
d) The researcher should not merely describe the various aspects of these studies but should also make a critical analysis of the methodology bringing out particularly the variables that could have affected the reported findings.

e) Any shortcomings, pitfalls or faults that he discerned in these studies should also be pointed out.
f) Finally, the researcher should state recommendations for further research made by the authors.

When a number of related studies are reviewed, the researcher may notice areas of agreements and disagreements between these. A critical analysis of these and the reasons for these conflicting findings should be stated. A thorough and critical review of related literature would provide an invaluable source material for future researchers besides being of immense help to the researcher in focusing his attention on the problem area, in formulating proper hypotheses and in properly designing his research.

8.6 Theoretical Framework

Neither can problems be formulated, nor can adequate research designs be developed, except within a specified theoretical framework. What is meant by framework is a conceptual or theoretical frame which every researcher has to adopt to view a problem and find a solution. Implicitly or explicitly every inquirer adopts his own pair of glasses through which he views the problem, and within the perspective, identifies and orders the variables on which he will concentrate his attention.

Let us go back to some of the research problems given in the previous section and try to identify the theoretical framework, the theoretical perspective of the researcher reflected therein. To begin with, let us take the statement of problem given in pan 3.1:

- Temper tantrums among six year old breast-fed and bottle-fed children of middle class educated urban mothers.

It is obvious that the researcher thinks that the child rearing practice relating to feeding is mainly responsible for the temper tantrums displayed by children. Restricting the study to 'six year old children' of 'middle class educated urban mothers' helps in identifying and restricting the population from which the sample is to be obtained. However, even the selection of middle class educated urban mothers for study may be indicative of the researcher's theoretical framework, namely that it is among the middle class educated mothers that the mode of feeding (bottle feeding) causes temper tantrums among children.

In the research topic "bed soiling by four year old children of educated working and non-working urban mothers belonging to middle and upper socioeconomic levels," the researcher's theory may be that the separation of children from their mothers (in cases of working mothers) for long hours causes insecurity among children which is reflected in bed soiling by them.

The selection and/or construction of a logical framework both clarifies the issues and restricts the variables so as to make a meaningful study possible. Let us take, for example, the problem stated in para 3.1 of the previous section:

- Analysis of the performance in English spelling of students of class X by socio-economic level of parents studying in selected private English medium in Islamabad Model school and Federal Government schools located in Islamabad.

The researcher seems to believe that socio-economic level of parents and not the type. of educational institution to which children go is the single most important area affecting the English spelling of students of class X. That appears to be the reason why he has excluded other factors affecting English spelling. This may appear wrong to a new researcher to pick only one variable while studying something as complex as performance in English spelling.

But very often this is the only way to study complex phenomena. Of course we have to remember that scientific study is not an easy task and has to do a bit at a time. Thus selection sharpens focus, and increases the clarity brought to the problem area. However, it excludes from the view of the inquiries other perspectives which might be brought to bear on the same problem. Although it is obvious that both the functions i.e. clarification and exclusion, are necessary and these dictate that this process of choosing a theoretical framework should be decided explicitly and rationally. Many of the researchers do it without giving due thought. No one would intentionally make significant exclusionary choices without considering alternatives. It is only when you have no clear conceptual framework that you remain vague and confused. This is one of the reasons that study of related research is so important for developing a research design, as it helps you to realize how many facets of the problem do exist and what other conceptual framework has been applied to solve the same problem earlier. The problem will remain obscure until the possible conceptual structures, winch have already been used for an investigation, have been examined and assessed by you, as researcher.

8.6.1 Defining a Logical Structure

A logical structure or theoretical framework is the set of concepts, variables, and relationship within which the problem is formulated and solved. Such frameworks will vary greatly in format and sophistication.

Typically, you deal with the design of an appropriate logical structure at two levels, Initially the concern is to identify a vantage point for the study. This level of design will be referred to as the development of a *macro-structure.* Even these perspectives, frequently adopted for macro structure adapted from previous research in the area of study, vary markedly in complexity. In its simplest form, such a perspective may be no more than a *set of descriptive categories* or ordered variables. For example, one might decide to investigate teacher behaviour by noting whether a teacher's verbal statements are questions, or disciplinary comments. Such a set of terms would be quite useful in categorizing behaviour even though there is no set principle that all behaviour could be categorized this way, or that the terms were preselected to conform to some particular point of view.

At a second level of design, the micro-structure level, you try to identify, define, and relate the key constructs and variables of concern in the study. You, having adopted or adapted a perspective, now turn to the construction of an idiosyncratic structure which focuses upon the key variables of this inquiry. Until both of these steps are taken explicitly, the investigator is unable to assess the alternative paths available for the inquiry.

Thus the general perspective adopted by the researcher in the two research proposals relating to behaviour problem of children in pan 3.1 is that the practice of keeping

children separated from them for long hours adopted by educated urban mother is the factor responsible for these problems. The key variables in these studies are temper tantrums, bed soiling, middle class, educated urban mothers, upper socio-economic educated urban mother, educated working and non-working mothers, etc.

In the two research proposals relating to the performance of students in English medium institutions the general perspective adopted by there-searcher seems to be that the performance of students is related more to the home environment than to the instruction provided in schools. The key constructs are student performance, socio-economic levels of parents, educated and uneducated mothers, etc.

8.7 Hypotheses and Questions

The statement of hypotheses or questions to be pursued in the investigation completes the four steps that collectively might be described as the inquirer's procedural guide.

a) *The problem statement identified the interacting factors* which gave rise to the anomaly, contradictory facts, exception and knowledge which is being investigated and signaled the strategy for attacking the problem to be employed by you.

b) *The conceptual framework sharpened the focus of the study* for viewing the phenomena under investigation; in the process, of course, screening out other views.

c) *The objectives narrowed the investigation further* by selecting the ultimate aims or purpose of the research and development activity and, concurrently, screened out other objectives which might have been chosen.

d) *The statement of hypotheses and questions is actually a two- steps process,* i.e.:

i) Selecting the key questions to be pursued from among several questions appropriate to the objectives.

ii) Operationalizing the definitions that will be employed for the major variables in the study in preparation for describing the design, instrumentation, and analysis appropriate to the inquiry.

It may be advisable to formulate *a major hypothesis* and *several minor hypotheses.* This clarifies the nature of the problem and the rationale behind the method proposed besides giving direction to the data-gathering process. It would be recalled that a hypothesis is a tentative answer to the question posed in the problem. The hypotheses should first be stated in positive form. For example, participation in extra-curricular activities by Students of classes IX and X adversely affects their academic performance in the Board examination. Later on, in the section on research .methodology, the statistical hypothesis should be stated in negative or null form. For example, "there is no significant difference between the academic performance of Board examination, of those who participate and those who do not participate in extra-curricular activities in classes IX and X".

8.7.1 Characteristics of a Good Hypothesis

A good hypothesis has the following basic characteristics:

a) It is reasonable.

b) It is consistent with known facts or theories.

c) It is stated in such a form as to permit testing and validation/rejection

d) It is stated in simplest possible form.

Activity No. 5

For each of the research proposals below suggest a major and two minor hypotheses. Major and minor hypotheses have been suggested for the first problem by way of illustration.

1. The self concept of a group of gifted and retarded children.

   Major hypotheses — The self concept of gifted children is more likely to be positive than that of retarded children.

   Minor hypotheses — More children coming from upper socio-economic level are likely to have positive self concept.

   More children coming from broken home are likely to have poorer self concept.

2. Absenteeism among under-graduate students of the University of the Punjab.

   Major hypothesis _____
   _____

   Minor hypothesis _____
   _____

3. Job preferences of high school students.

   Major hypotheses _____
   _____

   Minor hypotheses _____
   _____

4. Comparative study of recurring grants to various general universities.

   Major hypotheses _____
   _____

   Minor hypotheses _____
   _____

5. Perception of parents and teachers of the use of unfair means by students during examination.

   Major hypotheses _____
   _____

   Minor hypotheses _____
   _____

8.8 Proposed Research Procedures

In this section of the research proposal an outline of the research plan should be given. The research plan deals with the variables to be measured, the population to be sampled, the measuring devices to be used and the procedures to be used in an analyzing the data. The validity and reliability of data gathering devices should be critically evaluated and the limitations, if any, should be pointed.

Let us take, for example, the proposed study on "the job preferences of high school students." The outline of the research proposal shall have to detail:

i) how many high schools shall be selected for the collection of data?

ii) from which area these high schools shall be selected. Shall the schools be a representative of the high schools of the country; a province, or a district? Would an equal number of rural and urban schools be selected? Would an equal number of boys and girls high schools be sampled?

iii) how and how many students studying in the selected high school shall be chosen?

iv) how shall the job preferences of students be obtained? Shall a questionnaire be administered? What personal identification data shall be sought in the questionnaires? For example, shall infoiR1&tion about education level of parents; annual income of parents; number of brothers and sisters; job and employment status of parents, near relations, siblings, etc; level of academic achievement of student be sought through the questionnaire? A copy of the questionnaire may be appended.

v) how the data thus gathered shall be analyzed? Shall the data be tabulated by sexes, by rural and urban, by educational level of parents, by socio-economic level of parents, and so on? Shall any tests of significance be made?

vi) shall any attempt be made to obtain the aspirations of parents of sampled students? Shall these be correlated?

Activity No. 6

Indicate the research procedures in respect of the following research proposals:

1. Absenteeism among under-graduate students of the University of the Punjab.

_____
_____
_____
_____

2. Are fee-paying students of primary classes more serious in doing their home work than non fee-paying students?

_____
_____
_____
_____

3. Performance on an English Comprehension Test of children of educated and uneducated mothers studying in private English medium institutions in Lahore.

_____
_____
_____
_____

4. Perceptions of parents and teachers of the use of unfair means by students during examination.

_____
_____
_____
_____

8.9 Time Schedule

In this section the researcher should present a time schedule for carrying out the various steps in his research plan. This would help the researcher budget - his time and energy and complete his research within reasonable time. Some of the phases of the work would overlap while ethers would be initiated after some phase has been completed. Thus data gathering shall follow designing of data gathering device. However, review of related literature can be carried out while waiting for the data to be gathered.

The preparation of the time schedule also allows the advisor of the student to monitor the progress of his work. Thus it serves as a stimulus, helping the researcher to move systematically towards the goal of completing the project within the deadline set by the degree awarding institution.

8.10 Conclusion

The ultimate objective of this unit was to take you step by step towards the formulation of your research outline (or proposal). It may be recalled that the steps that need special care and attention were preparing a statement of problem, conceptualizing the theoretical framework within which the problem is to be solved, formulating hypotheses and designing appropriate research procedures.

Even though each of the steps in the preparation of a research outline has been profusely illustrated and opportunities have been provided to youth practice the required skills, a complete research outline has been appended to the unit to present as an end product of the entire process. This research outline has been prepared by Mr. Muhammad Zahid under the supervision of his advisor Dr. M. A. Bukhari, Associate Professor, Department of Educational Planning and Management, Allama Iqbal Open University, Islamabad. It is hoped that this would better prepare you in designing your own research proposal.

Annexure

RESEARCH DESIGN

"A STUDY ON VOCATIONAL TRAINING AND EMPLOYMENT OPPORTUNITIES FOR WOMEN IN THE PUNJAB"

RESEARCHER:
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ADVISOR:
DR. MAQSUD ALAM BUKHARI

INTRODUCTION

The population of Pakistan was estimated at 107 Million in June, 1988 (57.7 million for Punjab) with females accounting for about 48%. The total labour force (10 years of age and above) in that period was estimated at 31.50 million with an annual increase of 3.2% over the last four years. Of the average labour force participation rate of 30%, only 4.3% are women as compared to *52%* for men.

The educational sector does not present a bright picture either, in the age group of 10 years & above the female literacy rate is 13.7% (as compared to 31.8% males) placing it as one of the lowest among the developing countries. In term of level of education only about7% of total population has acquired education up to primary level and less than 1% has degree qualification or more, of these about 4.5% are women who have reached up to primary level education and 0.4% have reached the graduation or post graduation level of education. However because of their accepted social role and the non-availability of supportive services such as child care, proper transport system *&* accommodation, these educated females in general remain under-employed or un-employed.

Pakistan has an extremely high dependency ratio per employed adult (97 compared to 54 developed countries) due to non- participation of females in labour force. Recently economists have started to recognise women's economic contribution. In order to improve the standard & quality of life of Pakistani nation the improvement of women condition is imperative as women play an important role in the social, economic development of country. It is, therefore, the need of the time to start such work/skill oriented and income generating training programmes for women who may not only enhance their employment opportunities but can also be beneficial economically.

In the recent years, the country's economic performance has improved with expansion and rapid growth rates across all sectors. The gross domestic product increased by 57% with rates of 9.2% for industry, 4.4% for agriculture and 5% in the service sector. However, social development, specifically in the education and health services, has been slower than all the other sectors, this economic recovery and expansion is expected to increase the demand .for educated and trained manpower. It is, therefore, important to harness the economic potential of the female population.

It is estimated that 15-20% of the urban population will be the main target group for vocational training programmes. The women from these classes do not have permanent employment outside the home, but are involved in income saving activities in the house-holds. The girls from these classes no longer acquire education merely as a status symbol. Instead wage employment is the major objective and the possibility of contributing to the family income, a long-term goal.

Slowly, the role of the woman is growing from a narrow definition of wife, mother, housekeeper, although much of her activities are still being decided by tradition, class origin, religious attitude and/or individual attitudes & habits within families. These

continue to determine whether women can have an education and ultimately, whether they can seek employment. The situation today is that more girls are receiving education and vocational training and are being gainfully employed.

It is largely in the middle classes that the rigidity of traditional custom is being broken. Increasingly, the need for additional income is creating the situation in Pakistan where women must be employed for the family to survive. This is particularly true for widowed Or divorced women in families where the male is ill, under or unemployed, or where there are too few male children to contribute to the family earnings.

There is a greater demand by women for education and jobs than can be met by current opportunities coupled with a focus on the employer's needs and attitudes, and a support system for encouraging and assisting women in the workplace can do much to move the women towards greater participation in the labour force.

Statement of the Problem:
The problem of the study is to survey the existing facilities of vocational training for women and to identify the demand of the employment market in the Punjab.

Objectives of the study:
The objectives of the study will be the following:
1. To study the existing vocational training facilities for women under Government Departments Agencies in the Punjab.
2. To identify/assess demand of the employment market especially in non-traditional and secretarial trade.
3. To analyse training needs of women to meet the Identified demand of the employment market.
4. To formulate the recommendations for the future expansion of vocational training schemes for women.

Significance of the Study:
National resources are invested to accelerate efficiency of the system. If the ratio of output to input tends to become higher, it will be the ideal condition of efficiency. If the case is otherwise, efficiency declines.

This study attempts to find and analyse the existing vocational training facilities available for women vis-a-vis the labour market needs and to propose measures to improve the cost effectiveness of women's vocational training programme in the Punjab. Till Mid 88, women's vocation training has been limited to domestic activities (traditional trade courses) which result consumption by the producer herself (income saving.) rather than income generation. In July, 1988 the Technical Training Centre for women at Lahore under the Labour Department started offering courses in engineering and secretarial, trades (nontraditional trade course). The return of the skill oriented courses/training programme is measurable as compared to general education programmes. Since the training programnie offered in TTC for women is designed according to the requirement

of the Labour market, therefore, the pass outs have good chance to find jobs immediately which will minimize wastage and improve the efficiency of the system. Also the women are attracted to such income generating training programmes which will increase employability and contribute in the economic development activities.

The users of this study will be the policy makers and planners of Government Departments/Agencies (conducting Women's Training) for development programme formulation and evaluation. It will also facilitate the trainers in the development of training programme/curricula which are not only responsive to the needs of the employers but also socially and culturally feasible.

As far as the researcher knows no study in this field has been conducted, therefore, this study is needed.

Method and Procedures of the Study

For the Incecution of the study following steps will be undertaken:

1. Study of literature available and related research already conducted.
2. Discussion with the experts working in the field of vocational training/women's training. On the basis of information so collected, following instruments will be used:

1. A questionnaire to investigate:

   i) Data regarding existing Govt. Vocational Institutes for women in the Punjab.
   ii) Employers needs in engineering and 'secretarial trades where women are already employed.

2. Interview schedule in order to verify the data collected through the questionnaires.

Sampling:

For this study there will be two types of populations namely:-

1. Government Vocational Institutes for women in the Punjab imparting training form 6 months to two years duration.
2. All the registered engineering industrial and commercial establishments having women works on their payroll.

It is estimated that there are more than 100 Govt. vocational Institutes for women in the Punjab. A complete list of these institutions will be prepared and questionnaire (I) for the vocational institutes will be sent to all these institutes. Similarly a list of the registered manufacturing establishments employing women in the Punjab will be prepared and questionnaire (II) will be administered to all of them. In this way the whole population will be included in the sample for the purpose of collecting data through questionnaires.

Interviews:

In order to verify the data collected 'through questionnaires I&II the interview will also be conducted in the following pattern:

i) Three vocational Institutes in each Division (two from big cities and one from town) will be selected for the purpose of interview. In this way 24 institutions will be visited from 8 Divisions of the Punjab.

ii) As regards the industrial and commercial establishments, 50% of the registered organization will be visited. It will be managed so that the organizations of each Division are equally represented.

In this way the selection of the vocational Institutes and manufacturing establishments for the purpose of interviews will he stratified.

The Data Analysis:
The data collected through the questionnaires will be processed and verified with the help of interviews so that the reliability of the data is determined before the conclusions are drawn.

The needs of the employers will be determined, on the basis of the date collected through questionnaire (I). The supply side will be ascertained from the data collected through questionnaire (II). The matches and mis-matches of the skills being impacted by the vocational institutes with the market needs will be determined and the stragies will be developed for future expansion of women's vocational training scheme in the Punjab.

Delimitations of the study:
Keeping in view the scarcity of time and resources at the disposal of the researcher the study will be confined to:

i) The province of Punjab
ii) Only the Govt. vocational Institutes for Women imparting training from 6 months to 2 years duration.
iii) Only the registered industrial and commercial establishments.
iv) Ascertain the employers needs for women workers only in engineering and secretarial trades at the skilled (Grade-II) and semi-skilled (Grade-III) levels.

Definition of Terms:

- Vocational training: The term "Vocational Training" is applied to all forms of training designed to equip a person for employment in any branch of economic activity.
- Education and Training "Education" is the development of the special and general abilities of the mind (learning to know) where-as "Training" is practical education (learning to do).
- Income Saving Skills: Training of women in traditional household skills such as sewing and& cutting, embroidery, knitting etc.

Income Generating Skills: Training of women in non-traditional skills such as electronics, computer input operator, commercial illustrator civil and architectural drafting and secretarial trades where the evidence suggests that wage employment is possible.

Abbreviations:

GVIs	=	Govt. Vocational Institute for Women
WTTCs	=	Women's Technical Training Centres
WTEU	=	Women's Training and Employment Unit
DTE	=	Directorate of Technical Education
DMT	=	Directorate of Manpower & Training
PSIC	=	Punjab Small Industries Corporation
ABAD	=	Agency for Briani Area Development
NTI37	=	National Training Bureau, Islamabad
PTB	=	Provincial Training Board
PBTE	=	Punjab Board of Technical Education
TTB	=	Trade Testing Board under Labour Department
D.C.	=	Development Cell for Skilled Labour Training under Labour Department.
V.T. Cell	=	Vocational Training Cell under Labour Department
CIDA	=	Canadian Agency for International Development
I.L.O.	=	International Labour Organization
UNDP	=	United Nations Development Programme
Ph.	=	Punjab

TIME SCHEDULE:

i)	Design and instrument	February 89
ii)	Writing 2nd Chapter	March 89
iii)	Sending the Questionnaire	March 89
iv)	Survey	April 89
v)	Data Compilation and Analysis	May 89
vi)	Report Writing and Submission of Thesis Report	June/July 89
vii)	Thesis Viva etc	July 89

QUESTIONNIRE-I (Training Institutes)

N.B. Your answers will be treated strictly confidential pies put a cross (X) in the box where applicable.

1. Name of the Institute:_____
2. Location: _____
3. Administrative Department/Agency: _____
4. Course and Seating capacity: _____

S. No.	Trade	Duration of Trg.	Seating Capacity	Annual Intake admission	Trainees On roll
1					
2					
3					
4					
5					
6					
7					
Total					

5. Examination/Certification Authority: _____
6. Staffing Position: _____

S. No.	Name of the post	Trade	B.P.S.	No. of Posts Sanctioned	No. of Posts Vacant	Remarks
1						
2						
3						
4						
5						
6						
7						
8						

7. Building Position: Govt. Rented
8. Is hostel available: Yes No
9. Annual Budget 1988.89: _____
10. Give details of the training programme, being funded by the women's Division, if any:
    i) Name of the Programme: _____
    ii) Date of Starting the Programme: _____
    iii) Funds provided during 1988-89 a) Running Cost: _____
    b) Capital Cost: _____

S. No.	Trade	Duration	Seating Capacity	Trainees on roll
Total				

11. Give details of the evening extension programme, if any:

S. No.	Trade	Duration	Seating Capacity	Trainees on roll
1				
2				
3				
Total				

12. Do you suggest introduction of new trades in your institute. If yes give details of trade etc:_____

13. Any suggestion (5) to make the training programme more effective and relevant to the needs of employers: _____

Name & Designation of Reporting Officer

QUESTIONNAIRE-II (Employers/Supervisors)

N.B. Your answers will be treated strictly confidential. Please put a cross (X) in the box where applicable. The information is required or Women employees only.

1. Name: _____
2. Field of Specialisation: _____
3. Designation: _____
4. Total number of Women employed: _____
5. Number of Women employee possessing Trade Certificate:
   a) Engg. Trades:
   b) Secretarial Trades:
   c) Other Occupations:
6. Number of trained Women for the year 1989 to 1991:

	Occupation:	*Requirements*
i)	Electronics	–
ii)	Civil drafting	–
iii)	Mech. drafting	–
iv)	Arch. drafting	–
v)	Commercial Art	–
vi)	Secretarial Work	–
vii)	Computer Operator	–
viii)	Dress making & Desiging	–
ix)	Any other(Pl.specify)	–

7. Are you satisfied with the performance of certificate holders: ☐ Yes ☐ No

8. If no, it is due to deficiency in ☐ Skill ☐ Knowledge ☐ Both

9. Do you consider that on-the-job training is necessary for the Trade Certificate holders: ☐ Yes ☐ No

10. Can you provide on-the-job training to the trainees of Vocational Institutes ☐ Yes ☐ No

11. Any suggestion (s) to make the training programme of Vocational Institutes for women more relevant to the needs of the employers: _____

_____

_____

Name and Designation

Unit–9

WRITING RESEARCH REPORT

Written By:
Dr. S. M. Aijaz

CONTENTS

INTRODUCTION

In this course you have studied about research - its concept and methodology. You have also studies various statistic1 techniques used to analyze the data collected for the research, to interpret the data and to present it in meaningful ways. Once a research has been carried out in accordance with its design and the data collected through research instruments have been analyzed and interpreted, the researcher is ready to prepare a research report for the reading public and future researchers.

In this unit you would study about the research reports, its contents, format and basic techniques used in the preparation of bibliography, appendices, footnotes, quotations, etc., besides the guidelines for getting the report typed. By adopting these techniques you should be able to present your research report in a universally acceptable form.

OBJECTIVES

After studying this unit, you should be able to:

1. organize and structure your research report according to the standard pattern;

2. insert short and long quotations in acceptable manner and prepare the referencing footnote;

3. supervise and guide the typist in typing out the 'research report in an acceptable form;

4. write the report in simple, readable style

9.1 The Research Report

It would be recalled that a research is undertaken when some difficulty is experienced in realizing the desired objective. As the current examination system is not helping identify talent and is credited only with encouraging memorization, a need is experienced to conduct research in this field. Or again, the family planning programme is not helping reduce the rate of population growth, it is necessary to conduct research in the family planning practices and existing perceptions about various family planning devices. The principal value of research is its application to everyday problems. To be usable, research should be properly communicated to persona in the field.

The basic purpose of research report is to communicate to others in the field, complete and accurate information about what was done, how it was done and what results were obtained.

9.1.1 Guidelines for Preparing the Research Report

The writing of the research report should be undertaken after all the data have been collected and analyzed, and the conclusions based on these data have been drawn and firmly established. He should follow the outline which he submitted for the approval of his adviser/thesis committee. But the preliminary research outline should only serve as a guide. Sometimes changes are introduced in course of conducting a research study because the preliminary try out may indicate that certain methods should be abandoned and new ones introduced. The research report should reflect what was actually done. The research report should describe as clearly, directly and briefly as possible exactly how the research was conducted, how the data were collected, and how the conclusions were drawn.

The greatest virtue of a good research report is clarity. Experience has shown that clarity can be achieved if all extraneous, irrelevant and unnecessary material is eliminated from the report. It should be remembered that those for whom the research reports are written, are all well-versed in the basic facts and principles of the field of research report with elementary background material; the writer should not insult his intelligence and waste his time. If the writer considers some elementary background material as essential, he should only refer to it very briefly.

The research report should be well documented. It means that the source of every statement made should be provided. It should be dearly understood that the following statements need not be documented.

- statements acceptable as basic assumptions, for example; production is necessary for human resources development, investment in education provides higher rate of return, use of audio-visual aids enriches teaching-learning situation.
- statements based on direct observation, for example; students of primary ages cannot sit still for long, women are more reluctant to discuss their age than men, most eastern mothers tend to be over protective in bringing up their children, etc.

Documentation can take the form of footnotes[1] or can be incorporated into the text itself. Whatever the form used, the author to whom the statement is attributed and the source from where the statement has been obtained should be dearly stated. If the statement has been obtained from a written, published source, the title of the publication, name of the publisher, and the year of publication should be indicated. Expert opinion should be attributed through documentation to the person who expressed the opinion.

9.1.2 Typical Format of the Research Report

There is no one way of presenting a research-report in written form; there are many good and acceptable ways. But certain kinds of information must always be included. This makes the reports more or less alike in format.

The essential core of the research report consists of the new piece of knowledge that has resulted from the research study. But to establish that this new knowledge is relevant and useful, the research report must explain clearly what the problem was and how it was investigated. Thus all research reports contain three major sections, namely:

1) the introductory explanation
2) the presentation of the data collected and its analysis
3) a summary of the general conclusions.

Some researchers add a fourth section, namely:

4) recommendations for future action.

These sections constitute the organizational framework of the research report However, if any of these sections is long and can be split into more logical units, the report may contain more than five or six chapters.

A typical chapter outline of a research report is given below:
Chapter I - Nature and background of the Study
Chapter II - Method of the Study and Presentation of Data
Chapter III - Summary of the Study and General Conclusions, if a fourth chapter is Lobe added:
Chapter IV - Recommendations

What should normally go into these chapters, is now discussed in some details.

9.1.3 Nature and Background of the Study

The opening chapter of a research report should deal with the nature and background of the study and should set the stage for the actual research. This section really provides the rationale for the study. The major topics to be con-Sated In this section being.

A. Statement of the problem:
The statement-of the problem should be brief and to the point. At this stage only

[1] How this is done shall be explained later?

state what the study is about, what is the subject matter of the study? There is no need to provide any justification for undertaking the study. The objective should be to provide a clear picture of the subject of the study and the framework within which the study is to be conducted.

B. *Reasons for making the study:*
Here the researcher should provide a rationale for conducting the research. By reading this sub-section, a reader should be able to understand the difficulties/obstacles that were being experienced in the field which necessitated the research.

C. *Review of related literature:*
In this sub-section, the researcher should indicate his awareness of what was known about the problem prior to his study. The gaps in previous knowledge, if any, may be brought out or some deficiencies in the methodology adopted by previous researchers may be pinpointed. The review of related literature would, in a way, provide further justification for his research. No effort should be made to provide a review of all available literature in the field. Only such existing knowledge as is relevant to those aspects of the problem with which the research deals should be reviewed.

D. *Further elaboration of the problem*
In this sub-section are discussed issues relating to delimitation of the problem, sub-problems, hypotheses considered in course of formulation of the research study, etc.

F. *General hypothesis.*
Here the researcher should describe the hypothesis that he set out to test.

The opening chapter should thus prepare the reader for the main research and its findings. As stated earlier, if the chapter becomes too long it may be split into two or more chapters. It is this splitting of the chapter that accounts for superficial differences in different report formats.

9.1.4 Method of the Study and Presentation of Data

This section of the research report constitutes the essential core. It is here that an actual research is described in de'tails4nd the basic data collected are presented.

A. *Actual steps followed in course of the research:*
The researcher should describe the procedure followed by him in such details that it would become possible for others to replicate (duplicate) the study, if they so desired.

B. *Instruments used for collection of data:*
All tests, questionnaires, forms, etc. used in the study for collection of data should

be described. A sample of each of these instruments should be placed in the Appendix at the end of the text. The purpose for which each of these instruments were used and the stage of the research when used should also be clearly stated:

C. *Validity and reliability of instruments:*
The confidence that can be placed on research findings depends on the validity and reliability of the instruments used. The researcher should provide adequate information about the validity and reliability of the instruments used. if pit-testing of instruments was carried out, details of results should be furnished.

D. *Population and sample studied:*
Information should be provided about the, population studied and how the sample was drawn - characteristics of the sample - should be clearly provided.

E. *Description of the evidence gathered:*
Here the researcher should present the data collected with the help, of tables, graphs, charts, etc. The data should be analyzed and interpreted. Tables incorporating gist of data necessary for the under9tanding of the interpretation should be presented in the text while detailed tables should be placed in the Appendix. The presentation of data should be arranged according to the sub-problems and sub-hypotheses.

F. *Summary of dotty*
For the convenience of the reader a summary of data and their interpretation should be presented towards the end of this chapter and pointed out what has been revealed by the data.

Again, the chapter may be split into two or more chapters if the length so warrants. However, in so doing some logical system should be followed in splitting the contents. One way could be to describe the research procedures, instruments used, and validity and reliability of the instruments, i.e. sub-Sections A, B and C above, in one chapter and the rest of the material in another chapter. Sometimes It Is the sub-section dealing with data and their interpretation that is too long and needs to be split up. In such cases the material pertaining to one' or two sub-problems should be presented in one chapter and material pertaining to the rest of the sub-problems should be presented in the second chapter.

9.1.5 Summary and Conclusions

The final chapter should present briefly arguments and data supporting the conclusions. It should contain a brief recapitulate one of the entire study and should present briefly arguments and data supporting the is conclusions drawn from the interpretation of data. Some researchers also include within this chapter a section on recommendations about actions to be taken to use the new knowledge discovered in the study. The recommendation may also point to further studies of the problem that should be carried out some researchers prefer to put recommendations in a separate chapter.

SUMMAEY

The basic purpose of writing the research report is to inform others about the new knowledge gained through the research.

The research report should provide complete and systematic information about (a) the problem, its nature, background and importance; (b) the steps taken during the study, the hypotheses tested, the instruments used, the population studied and the data gathered; and (c) the conclusions drawn and the use to which the research findings can be put.

SELF-ASSESSMENT QUESTIONS No. 1

Read the following statements carefully and decide whether they al or false. If "true" put a circle around T at the end of the statement and if “false” put a circle around F.

1.	A good research report should have no more than three chapters.	T	F
2.	The first chapter of the research report should bring out what was done, how it was done and what results were obtained.	T	F
3.	Review the related literature logically belongs to the first section of the research report.	T	F
4.	The research report need not describe all steps taken during the study in great detail.	T	F
5.	The description of the population studied in the research and the procedure followed in drawing the sample forms an integral part of the chapter on methodology.	T	F
6.	All data gathered during the research should be incorporated in the research report so that the reader can check whether the data have been correctly analyzed and interpreted.	T	F
7.	Tables, charts, diagram;, etc., rightly belong to the Appendix.	T	F
8.	The review of related 1terature should provide the reader an exhaustive survey of all that is known about the subject.	T	F
9.	The three basic components of the research report are (a) the problem; (b) the methodology, and (c) the conclusions.	T	F
10.	The data collected should be exhaustively described in the research report.	T	F

9.2 Writing of the Report

The beginner, writing his first research report, would do well to remember Lull writing is a difficult and painstaking job requiring careful planning and frequent revisions. What he should aim at is effective communication in objective, unbiased language? Every individual has his own style of writing and it would be unrealistic to expect that it could be changed through reading this unit. However, it is expected that by following the guidelines given below, the beginner would be able to present a report in an acceptable format.

9.2.1 Guidelines for Writing a Research Report

a) *Prepare a detailed outline.*

Before starting writing of the research report, prepare a detailed outline following the general structural framework of the report presented in the previous section. Each chapter should be divided into sections and sub- sections. The major points to be made in each sub-section should be written out The outline should indicate the actual organization of the material that would go into each section of the report. Go over the outline a number of times to ensure that *they* is a logical sequence in the material presented.

b) Adopt a simple style. The beginner is tempted into using high sounding words and phrases and into building up long sentences. Remember that you are trying to communicate your ideas to others and not impress others with your vocabulary. Using an uncommon word when a simple, commonly, used word is available, simply hinders proper communication. Similarly, building up & long, complicated sentence interferes with free flow of ideas. Moreover, you run the risk of making mistakes of grammar and syntax. A student report writer would be well advised to write small, simple sentences consisting of commonly used words.

c) *Use dictionary frequently.*

Any mistake of grammar of spelling band in the research report would be attributed by the reader to the report writer and not to the typist. It is unfortunate that those who have weak spellings are often not conscious of their shortcoming. Get into the habit of doubting your spellings and checking it up in the dictionary. The dictionary should also be used to ensure that the word being used is appropriate for the occasion and actually conveys the meaning that it is intended to convey.

d) *Build strong paragraphs.*

The opening paragraph of a chapter or a section is of special Significance. By reading the first paragraph, the reader forms his opinion about the chapter/section. The guiding principle is to go straight to the point in the opening paragraph. A good report writer avoids vague introductory remarks. Another useful advice is to put a topic or sentence at the beginning of each paragraph. By reading he opening sentence the writer should know the subject dealt with in the paragraph. A summary sentence placed at the end of the paragraph strengthens understanding of the entire paragraph. Attention should also be paid to transitions from one paragraph to the other.

e) *Write clear, strong sentences.*

Each sentence should express one distinct idea or fact. Overloading the sentence with many ideas may lead to contusion. While constructing simple, straightforward sentences their length and structure should be varied. If consecutive sentences, have the same form and length, it would be monotonous for the reader. Use as few words as are essential for conveying the message. Choice of appropriate words is the hallmark of a good writer Avoid use of hackneyed expressions (teachers are nation builders; students are our future hope).

f) Follow accepted practices. The research report is to be read mostly by professionals. It is advisable that the practices adopted by the academic community are followed. Some of these are stated below:

i) The researcher should not refer to himself in first person; instead he should refer to himself in third person. He can refer to himself as the investigator, the present writer, etc.,

ii) While referring to other authorities their titles like "Sir, Dr." etc., are omitted. Similarly adjectives like "the eminent educationist" the word "renowned scientist" are not used with the names of these authorities.

iii) Never begin a sentence with a number written in Arabic numerals. Instead spell out the number. (.g., Three thousand primary teachers constituted the sample..) Numbers occurring in the middle of the sentence can be written in Arabic numerals.

iv) Numbers containing fewer than three digits are ordinarily spelled out as words no matter where they occur. (e.g., the test-consisted of fifty-four items). Large numbers are written as numerals (e.g. 234, 1,056...) An exception is made when there is a group or series of numbers. In such cases all numbers ire written as numerals (e.g. The number of students in these categories were 149, 57, 579 and 13...)

v) When stating percentages or decimals, use Arabic numerals irrespective of the number of digits (e.g., in all 12 per cent ...The average was 34.7...) Do not use the percentage sign *(%).*

g) *Revision of the draft.*

No investigator writes his research report in one go. After you have written one or two sections of your report, put it aside and work on some other parts. After a lapse of a few days, read your draft critically. Put yourself in the position of a reader and try to identify parts which are not quite clear or parts which do not follow logically in their positions. Try to see if the sentences contain unnecessary words or if the sentence could be reworded to enhance its clarity. You would be surprised that you could really make improvements in your draft on reading it after a lapse of a few days. After you have revised your draft three or four times, ask one of your colleagues to read your draft critically and suggest improvements. If he takes up the task sincerely you would have an objective feedback which you could use to remove the weak spots from your report.

SUMMARY

For writing a good research report one should first prepare a detailed research outline giving all major sec-lions and sub-sections and indicating the important points that would go in each.

The report should be written in simple, easily readable style using as few and commonly used words as possible. Consult dictionary frequently for checking the spellings as well as correct use of words.

Go straight to the point in the opening paragraph of each chapter/section. Open each paragraph with a topic or sentence and close it with a summary sentence. Put only one idea in each sentence and see that idea are arranged in a systematic and logical order.

Revise your draft at regular intervals.

SELF-ASSESSMENT QUESTION No. 2

Given below are sentences taken from research reports. Read these sentences carefully and decide whether any of the rules of scholarly writings have been violated. Write the word or words that are in contravention of these rules in the last column.

	Sentences	Violations
1.	Girls constituted forty-five percent of the sample.	
2.	125 of the students included In the sample were boys and 98 were girls.	
3.	In this study I have tried to analyze systematically the effect of the use of Primary Teaching Kit on the academic performance of primary school leaven.	
4.	The mean of the boys on the test was forty-five point six.	
5.	In his monumental book The Golden bough, Dr Frazer has given a psychological interpretation of the customs and mores of primitive people.	
6.	The number of teachers teaching in classes I, II, III, IV and V were respectively 135, 128, 101, ninety-five and eighty-three.	
7.	Rural boys formed 54% of the sample as against 96% of boys.	

9.2.3 Introducing Quotations

Indiscriminate use of quotations should be avoided in a research report. Too frequent and unnecessary use of quotations betrays lack of self confidence on the part of the writer. However, direct quotations from the works of other authors can be introduced as evidence or as an illustration of some statement made in the research report. Only quotation from the original source is acceptable in a scholarly report unless the original source no longer exists.

a) *Short quotations.*

Quotations not exceeding fifty words should be introduced as run-thug material in the text itself The authority and the source should be listed *by* way of introduction to the quotation, and double quotation marks (") should be placed both at the beginning as well as at the end of the quotation. An example follows:

It may be pointed out that Mad also emphasizes this point in *The Principles of State and Government in Islam* when he says that, "a state built on the foundations of religion offers an infinitely better prospect of national happiness than a state founded upon the concept of 'seqular' political organism; provided, of course, that.."

Two other rules of quotation are illustrated in the example given above. These are:

a) A word or phrase which appear within double quotation marks in the - source quoted, appears within single quotation marks (') in the research report. The word secular was places within double quotation marks (as "secular") in Asad's book and hence it appears in single quotation marks in the research report.

b) Three dots or periods indicate that some material in the source quoted as been omitted in the text of the report. The three dots appearing just before the quotation mark in the above example indicate that complete sentence has not been quoted. In the example given below some portion has been omitted from the middle of the sentence:

Asad maintains that "it is obvious that this concept of democracy is vastly different from that held by the ... Greeks." Irrespective of the number of words of lines omitted, only three dots or periods would indicate incomplete from the source.

When certain portions are omitted, problems of grammatical construction sometimes arise, as in the following passage:

"Its primary, purpose as an academic study is to understand and explain the behaviour and functioning of organizations..... it will lead to the creation of new, more effective organizational forms."

If the above material is quoted in the above form it would not fully convey the meaning. However if the word as is placed either before or after the three dots, the idea would be clearer. But to add any word to the author's text would not be permissible. To tide over this difficulty, it is customary to place the added word within brackets such as these [ ]. The above quotation would thus appear in the research report as shown below:

"Its primary purpose as an academic study is to understand and explain the

> behaviour and functioning of organizations.... [as] it will lead to the creation of new, more effective organizational forms."

Sometimes one may come across the word 'sic' placed in parentheses within a quotation, as shown below:

> Emphasizing the need for free inquiry, Asad points out the inevitability of *change in The Principles of State and Government in Islam* when he says that, "Whether we like it or not; a change there will be—it is indeed, already being enacted before our eyes: a fact as evident as it is pregrant with tremendous possibilities for better of (sic) for worse."

The insertion of the word sic indicates that the work "of' actually occurs in the original source instead of the word "or" and that-the researcher is in no way responsible for this error.

b) Longer quotations. Quotations exceeding fifty words are:
    a) set off from the main text; and
    b) indented a few spaces from the left margin.

An example of long quotation is given below.

Plato's concept is different in a number of significant ways form that- of western, parliamentary democracy. Will Durant brings out some of these differences in *The Story of Philosophy* in the following words:

> Automatically -without any hypocrisy of voting. Democracy means perfect equality of opportunity, especially in education; not the rotation of every Tom, Dick and Harry In public office. Every man shall have an equal chance to make himself fit for the complex tasks of administration; but only those who have proved their mettle (or in our myth, their metal), and have emerged from all tests with the insignia of skill, shall be eligible to rule.

Three things should be noted in the above example of a long quotation. Firstly, there are no double quotation marks at the beginning and end of the quoted material. Secondly, the quotation is typed in single space whereas the tat of the research report is typed in double space. Thirdly the quotation is indented a few spaces.(5 spaces) from the left margin. Indenting the long quotation and typing it in single space makes it stand out as distinct from the rest of the teat.

All paragraphy indentations of the original source should be shown while quoting long paragraphs. All word or words printed in italics in that original source should be underlined in the research report. Underlining of word L r words in typed manuscript is an indication that if the manuscript were to be printed, these words would be printed in italics.

If any part of a quoted material, which was not printed in italics, is underlined for the sake of emphasis, this fact should be made known. The usual practice is to write the words "italics mine" in parentheses immediately after the last underlined word. For

example:

> Outlining Spinoza's philosophy, will Durant says *in The Story of* Philosophy, "Only knowledge, then is power and freedom; and the *only permanent happiness* (italics mine) Is the pursuit of knowledge and joy of understanding."

In the above quotation, the insertion of the words' italics mine' parentheses indicates that the preceding words were not printed in italics in the book from which the matter has been quoted but it has been underlined by the writer of the report for the purpose of emphasis.

c) Punctuation and other marks in the quoted matter. When there is a punctuation or some other mark after the last word included in the quotation, the following rules are generally followed:

a) Commas, period (full stops), question marks, marks of exclamation (!) are always placed inside the quotation marks.
b) colons (:) and semi-colons (;) go outside the quotation marks.

As an example let us take the following passage from Muhammad Mad, *The Principles, of State and Government in Islam:*

> For one thing, an Individual, however brilliant, righteous and well-Intentioned, may easily commit mistakes of judgment owing to persona] bias in this or that matter, whereas, on the other hand, in an assembly composed of many persons, the very existence of contrasting opinions and the ensuing debate on these opinions tends to illuminate every problem from various angles: thus, the danger of individual bias obtruding itself on legislation is, If not eliminated, at least greatly reduced.

Two examples of how the punctuations marks will appear in the quotation are given below:

Mad points out that, "an individual, however, brilliant, righteous and well-intentioned, may easily commit mistakes of judgment owing to person M bias in this or that matter, whereas," in an assembly, "the dangers of individual bin obtruding itself on legislation Is," largely eliminated.

Note that the commas appearing after the words "whereas' and "is" are included within the quotation marks. Now let us see another form in which the same passage may be quoted.

Asad points out that, "an individual, however brilliant, righteous and well-intentioned, may easily commit mistakes of judgment owing to personal bias in this or that matter"; but in an assembly, "the danger of individual bias obtruding itself on legislation is... largely eliminated."

Note that the semi-colon appearing after the word "matter" has been placed outside the quotation marks whereas the period occurring at the end has been placed within the quotation marks.

9.2.4 Referencing

Referencing or documentation is the method used to inform the reader about the source from where a certain idea might have been borrowed or where a good discussion of an idea might be found. Two systems of documentation are prevalent In one system hill Information about the work under reference is provided on the same page in the research report on which the material under reference is presented. In this system, full details of the work under reference is provided at the bottom of the page in the form of a footnote. In the other system full particulars about all works consulted or referred to by the Investigator are placed in the end of the research report in alphabetical order and only the serial number of the work referred to and the page number in indicated .in the body of the tat in parenthesis.

a) *Footnotes.*
When this system of documentation is adopted, a number is placed half space above the material in the text of the report and a footnote is provided at the bottom of the same page. The footnote also has the same number typed half space above the line containing the name of the author, the title of the work, the name of the publisher and the year of the publication.

Hillway has identified four functions served by footnotes[1]
These are:

a) to cite authorities for statements made In the text,
b) to refer the reader to publications cited earlier or to information provided earlier in the report,
c) to acknowledge special aid received during the course of the study, and
d) to add any personal or explanatory remark that may be interesting to the reader but not important enough to be provided in the text.

Referencing of the above work under the system of footnote is shown at the end of the previous page.

Note that

1) A number Is plated half space above the material to be documented. The number could also have been placed above the name of the author.
2) Before placing the footnote(s) a short line has been drawn two spaces below the text.
3) The identification number of the footnote has been placed half a spate above the main footnote.

---

[1] Tyrus Hillway, Handbook of Educational Research (Boston: Hougffton Muffin Company. 1969), p. 72.

4) The footnote lists first the name of the author as printed in his cited work, then after a coma, the title of the work with main words capitalized and each word of the title underlined, then within parentheses the name of the city where the work was published and after colon the name of the publisher and after comma the data of publication. After closing the parentheses and placing a comma, the page number has been given.
5) The first line of the footnote has been indented a few spaces. The second line of the footnote is double spaced.

The first time a work has been cited it is fully documented in the footnote so that if any of the readers wants to check the authenticity of the citation he could locate the publication and check it. When the same work is referred to subsequently, full documentation is not necessary. The practice governing such citations is as follows:

a) If the second reference to a work is made immediately after the first reference, and no other work has been referred to between these, it is customary to write *mid* in the footnote followed by a comma and the page referred to. *(Ibid* is the abbreviation of *ibidem* and means "in the same work")
b) If reference is made to the work cited in the immediately preceding footnote and also to the some page, write *Lee.* cit, which is the abbreviation of *loco citato* and means "in the place cited, on the same page." Hence, when using *Lee. cit* the page number is not mentioned.
c) When one or more footnote intervene between first and second reference to the same work, the footnote of the second reference contains the last name f the author,, followed by op. *cit* (abbreviation of opere citato, meaning "in the work citato) and the page number.
d) When more than cine work by the same author are referred to, the *footnote* contains the last name of the author, Snort title of the work and page number.

To illustrate the above practices some footnotes are given from different pages of the research report. An explanatory note follows these footnotes.

[15]Will Durant, *The Story of Philosophy* (Washington Square Press, 1974), p. 197
[16]*Ibid,* p. 89.
[17]*Muhammad Asad, The Principles of State and Government in Islam* (Gibraltar: Dar Al-Andalus, 1980), p. 79.
[18]*Loc. cit.*
[20]Durant, op.cit., p. 285.
[25]Asad, *op. cit, p. 103.*
[26]*Loc. cit*

Explanatory note: The footnote numbered 15 gives fill details about the work referred to. This indicates that it is the first time that research report has made reference this work.

The footnote numbered 16 a gap refers to Will Durant's both this time the reference is made to another page (p. 89) when immediately preceding footnote referred to page .197. The footnote number 17 refers to Muhammad Asad's I first time and reference is made in

the research report to page 79 of the book. Footnote 18 indicates that reference is made again to the same page of Mad's book in the research report.

The footnote numbered 20 indicates that the research report now makes reference to Durant's book cited earlier. The use of op. cit. indicates that in between this reference to Durant's book and the last reference to that book the research report has referred to some works.

The footnote numbered 25, like the previous footnote, makes reference to an earliest cited book by Asad. The next reference is to the same page in Asad's book as in footnote number 25. All references in the text of the report are numbered serially to facilitate identification. The documentation of these references can be made in the footnote, at the end of the chapter or at the end of the research report. The footnote is generally preferred as the reader can easily locate it.

b) *Author-number system.*

In order to save space some research journals in western countries encouraged the author-number system for citing references. Under this system all works referred to are listed alphabetically under the heading "Bibliography" placed at end of the research report. Whenever reference is made in the research report, the serial number of the work and the page are placed in parentheses within the text (14: 105). Thus it is indicated that the material refers to the work at serial number 14 in the bibliography and page number 105 of that work. This system is more commonly used in journal articles.

Bibliography

Every piece of source material that an investigator found useful in conducting his research is included in the bibliography given at the end of the research report. Any work not actually consulted and found useful should not be included. The purpose is not to present an exhaustive list of all relevant available material but to list works which had direct application in the study.

If a bibliography is short, that is if it extends to two or three pages, all works should be arranged in an alphabetic order according to the last name of the author. If the bibliography is long, it may be useful to group works according to subject matter. Sometimes manuscripts and public documents, if numerous, are listed separately. Items in the bibliography are numbered only if the author-number system of referencing is used in the text.

a) *Annotated bibliography.*

In a thesis or dissertation, it is desirable to present an annotated bibliography. When presenting a bibliography in this form, each item is annotated briefly. A two or three lines description of the subject dealt with in the work and the element found useful is all that is Included. The annotation is given after the bibliographic entry and separate from it. It is typed in single space in the form of a paragraph indented a few spaces from the left hand margin.

Bibliographic entries differ slightly form entries in the footnote. The name of the author, is given last name first with first and middle names coming after a comma. Commas in the footnote are replaced with periods. However, if there are more than one authors, the name of the first author is given last name first. The names of other authors are given as normally written. There are some differences in the form in which books, government publications, journal articles, etc.: are listed. These are illustrated below.

b) Bibliographic entry for books and reports.

As books as well as reports are printed as a single piece of publication, the title is underlined. In case of reports the Committee/Commission/Foundation or Government agency preparing The report is named in place of the author. Thus,

Asad, Muhammad. *The Principles of Stole and Government in Islam.* Gibraltar: Dar Al-Andalus, 1980.

Al-Ghazali. *Inner Dimensions of Islamic Worship. Trans. Muhtar* Holland. Lelcester. The Islamic Foundation, 1983.

Ogburn,. William F., and Meyer F. Nimkoff. *Sociology,* 3rd. ed. Boston Houghton Mifflin Company, 1958.

Smithsonian Institute. *Annual Report of the Board of regents for the* year ending June 20, 1931. Washington: U.S. Government Printing Office, 1933.

Note that (1) the second line of each entry is indented quite a fes spaces so that the names of the authors stand out clearly, 2) the second entry is a translation and hence the name of the translator is mentioned after the names of the author and the title, (3) in the third entry the name of second author is given in the normal form, and (4) the fourth entry is the report of an organization and there is no individual named as the author. Instead, the organization is listed in place of the author.

c) Bibliographic entry for articles published in journals. The article published in periodicals is not printed as an independent, separate publication bearing the title of the article. Hence the entry of an article lists the names of the author, the title of the article within double quotation marks and the name of the journal underlined, followed by volume number, date of publication' within parentheses and finally the pages comprising that article, Some examples follow:

Eells, Walter C. "Intentions of Junior College Students," *Junior College Journal,* VII (October, 1936), 3-10.

Kann, Robert A. "Public Opinion Research: A Contribution to Historical Method." Political Science Quarterly, LXXIII (September, 1958), 374-396.

It may be noted that (1) the name of the article writer is written last name first, (2) the title of the article is placed within double quotation marks so also is the comma placed at the end of the title, (3) the name of the journal is underlined as the publication bears that title, (4) the volume number of the journal is written in roman numbers and the date of publication is placed thereafter within parentheses, and (5) the pages of the journal containing that article is the last entry.

9.2.5 Summary

A) Quotations

Material from original sources only may be quoted as an evidence or as an illustration of some point made in the report.

Quotations of upto fifty words may be integrated in the text and typed in double space like the rest of the report. The material quoted (1) should be placed, within double quotation marks, and (2) its original source should be mentioned.

Quotations exceeding fifty words should be (1) separated from the main text by double spaces, (2) indented a few spaces from the left-hand margin, and (3) typed in single space retaining paragraphing of the original source.

Any omission made in the quoted material should be indicated by three dots. All words printed in italics should be underlined; portions underlined by the investigator for the sake of emphasis should be followed by the words "italics mine" placed in parentheses. Any word added should be placed within brackets. Punctuations coming at the end of the quoted material should be retained within the double quotation marks except colons and semi-colons.

B) DOCUMENTATION

The research report should document sources where ideas presented may be found in available literature on the subject. Two major forms of documentation are footnotes and bibliography.

a) *Footnote.*

A number should be placed half a space above the line at an appropriate place in the material to be documented in the footnote. The footnote is placed at the bottom of the same page separated from the text by a short line starting from the left-hand margin placed double space below the text. The number of the footnote is typed one and a-half spaces below the shortline and the particulars of the source are typed two spaces below the s fort line. The footnote includes name of the author, title of his work, place published, name of the publisher, year of publication and the page referred to. The first line of each footnote is indented a few space inside the left-hand margin.

Subsequent references to a work are brief and use abbreviations of la tin words such as ibid, Loc. cit., op. cit. depending upon whether the second reference is the immediately next reference from another page, from the

same page or whether some other references intervene between first and second reference.

b) *Bibliography.*
A list of all work consulted and found useful during the study is places at the end of the research report. The list may be arranged alphabetically in accordance with the last names of authors or may be grouped according to subjects.

Bibliographic entry for books contains the name of the author (Last name first); title of the book with main word capitalized and each word underlined separately; place of publication, name of publisher and year of publication. In case of reports, the name of the agency producing the report replaces the name of the author.

Bibliographic entry for journal article contains the name of the author title of the article enclosed in double quotation marks; title of the journal underlined; volume number, date of publication and pages of the journal containing the article.

The first line of each bibliographic entry beings with the left-hand margin whereas the second and subsequent lines are Indented quite a few spaces.

The bibliography of thesis or dissertation contain, in addition to the particulars listed above, a brief description of the subject dealt and the element found useful for the study.

SELF-ASSESSMENT QUESIONS No. 3

1. In the following quotations-made in r research report finds mistakes of presentation and writes it in appropriate column.

	Quotation	Mistake
a)	"the greatness of Bacon lay precisely in his passion to be like Plato,"	
b)	"His achievement was not the less great because it was indirect."	
c)	"His philosophical works, though little read now, "moved the intellects that moved the world" in the truest sense of the word."	
d)	"It is only & bundle of sensation, one bundle of memories;"	
e)	Only knowledge, then is power and freedom: and the only permanent happiness the pursuit *of* knowledge and the joy! understanding." (Italics ours)	

2. Some foot note entries are given in column 'l below. Indicate in column 2 what the entry signifies about the source or the immediately preceding footnote it signifies that

Footnote	It signifies that
Col (1)	Col. (2)
[15]Thid., p. 105	
wells, op. cit., p. 89	
[19]L.oc. cit.	
[20]Ibid., p. 127.	
[25]Durant, Stay of Civ., p.30	
[26]LOC. cit.	
[27]0p. cit., p. 35	

3. Read the documentation entries given in column 1. If you think that a particular entry is a footnote put Fin column 2. Put B if you think that the entry is from the bibliography. Now try to identify if there is any mistake in the entry which is in conflict with its being a footnote or a bibliography and indicate it in column 3.

	Documentation Entry	'F or B'	Mistake
	Col(1)	Col (2)	Col (3)
a)	Gardner, J.F. and Shoemaker, S. P. History of France. New York: A. B. C. Publications, 1909		
b)	Wrenn, C. Gilbert. Student Personnel Work in College. New York: Ronald Press, 2961, pp. 35-95		
c)	Allen Border. Cricket in Australia (Karachi: Ideal Publications, 1995, p. 95		
d)	Gandhi, M.K. "The Philosophy of Ahinsa," International Journal of Politics, 13 (January, 1942), 35-78		
e)	Asif Iqbal and Miandad, Javaid, The Victory at Sharjah (Karachi: Glory of Islam Publishers, 1998), p. 69		
f)	Khan, Yahya, "The Great Surrender," Islamic Revolution, XXXV (January, 1993)		

9.3 Assembling the Research Report

You have studied the organizational framework of the research study and mastered the guidelines for writing the report and the techniques of documentation. Using these skills you should be in a position to write the report. At this stage all you need to know is the arrangement of papers containing title, table of contents, chapters of the report, appendices and the bibliography. You also need to know the typing requirements of a research report. This section would deal with these aspects mostly through sample pages of a research report.

9.3.1 Arrangement of the Materials

The material presented in a research report fall into three parts: I preliminaries, II) the text, and (III) reference material.

I *Preliminaries.*

The preliminaries of a thesis or a dissertation consist of the following:

The title page. It should include the title of the study, the name of the investigator, the degree for which the research was carried out, the department and the university where the study was conducted, and the data of completion of the study.

The title of the study should not be too long but it should give enough indication of the content to be of interest to readers.

The title of the study is typed in capital letters.

a) The entire page is so typed that each line is in the centre of the page. A sample title page is at Annexure I. However, the student should follow the instructions of the University in this regard.
b) Preface. Preface in the sense in which it is used in books is not required in theses or dissertations. However, he may like to make a mention of special assistance the researcher received from individuals, institutions, libraries, typist, etc., under the heading of "Acknowledgments." This is, however, optional.
c) Table of contents. The table of contents should contain all major headings of the text. Listing of all sub-headings would be superfluous.

The tides of chapters are generally written in capital letters. All major headings are aligned to the left-hand margin, page numbers are aligned to the right-hand margin and a series of dots intervene in between.

A sample table of contents is at Annexure II.

d) List of tables, charts, illustrations, etc., Tables are numbered in the text in the order of their occurrence. A list of tables giving table numbers, headings, and the page is repaired separately from the table of contents. Similarly, figure: re numbered in the text in order of their occurrence and a separate table of figures is provided. Other illustrations, maps, etc., if any, are treated similarly.

II *The text.*

Chapters constitute the main text of a research report. For the convenience of the reader the material presented in a chapter is divided into different sections. Each section is further divided into subsections. In the interest of consistency, a system of headings should be followed.

There is a hierarchy of headings used in research reports. The guiding principles are as follows:

i) A heading underlined is higher in hierarchy than a heading without underlining.
ii) A heading placed in the centre of the page is higher in hierarchy than a heading placed along with the left-hand margin.
iii) A heading placed in line with the left-hand margin is higher in hierarchy than a paragraph heading.

Thus suppose, we want to present some material dealing with the problems of education in Pakistan. While discussing we would like to discuss problems of different sub-sectors of education. Again, while discussing problems of say primary education, we would like to discuss problems of teaching, students, curriculum, finance, etc.

Before we start writing we should devise a system of beading. One system is suggested below:

Problems of Primary Education

Problems of Teachers

Absence of service structure. The absence of a service stru-true. *Inadequate facilities for professional growth.*

Problems of Students

Unrelated curricular Most of what is taught has no relation with *Absence of physical facilities.* Physical facilities for students

Problems of .Secondary Education

Problems of Teachers

Notes: No periods are placed at the end of centre or vide headings.

A period is placed at the end of the paragraphy heading and the running matter begins after two spaces.

If the division and sub-division of side and paragraph headings is too large some readings are introduced without underlining. An example of these systems then below:

Problems of Primary Education Problems of Teachers

Absence of Service Structure

Lack of opportunities of horizontal promotion. There are only *Absence of vertical promotion.* The qualification for supervisory *inadequate facilities for Professional Growth*

Problems of Students

Even side headings and paragraph headings without underlining can be introduced as lower order headings.

Tables and figures should be numbered serially throughout the text. Brief tables and figures can be placed within the text whereas large tables should be placed in the form of an appendix at the end of the text. The tables or figures should be placed in the text after reference has been made to them in the text. The table should preferably be on the san4e page on which reference is made to it. The discussion of data contained in the entire

should come next and should preferably be on the same page. In any cast the entire table should be on one page. To facilitate reference to data presented in different cells of the table, columns may be numbered. An example follows:

> A comparison of the plan allocations and actual utilization of funds during the plan period would now be made. Table 15 shows

Table-13: Plan Allocations and Utilizaions during the First Three Plans

(Million Rs.)

	First Plan		Second Plan		Third Plan	
Sub-sector	Allocation	Utilization	Allocation	Utilization	Allocation	Utilization
Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7
Primary						
Secondary						
College						

III Referenced material

Reference material consists of appendices and bibliography. Usually everything important is included in the text and there is no need for providing any appendix. However, copies of questionnaires, copies of significant correspondence, tests and other data gathering devices used in the study are always included in the appendix. When a large number of tables, charts, graphs or other illustrative materials are included in the study, it is much more convenient to group all of them together and place them in one place instead of scattering them all over the text. This arrangement makes reference to these much easier. Bibliography is generally the last item in the research report.

9.3.2 Typing Instruction

The typing can best be done by the investigator himself. However if he cannot do it, he should at least be in a position to give proper instruction and guidance to a typist who is prepared to work with patience and follow all instructions carefully.

The original copy to be submitted to university should be typed on 22 by 28cms $(8\frac{1}{2} by 11\frac{1}{4})$ heavy white bond paper. Get one copy more than required by the university typed. This extra copy is for your record.

The research report should be typed on only one side of the page and should be typed double spaced all through except for long quotations. Leave generous margins on all side of the paper. Usually $1\frac{1}{4}$ are left at sides and an inch at top and bottom. Page numbers may be typed at the right hand corner or at the centre of the page, usually six spaces from the top of the page. The typing should start four spaced below the page number. The page on which a chapter begins should have more space left at the top, say four to six spaces below the normal page. A sample page showing these is at Annexure III.

ANNEXURE-I

Sample Title Page

A STUDY OF THE EFFECTIVENESS OF THE TEACHING KIT
IN TEACHING PRIMARY SCHOOL SUBJECTS IN THE
SCHOOLS OF ISLAMABADAND RAWALPINDI

By
Wasiqul Haq Khairi

A Thesis Submitted in Partial Fulfillment of the Requirements for the
Degree of MA in Educational Planning and Management

ALLAMA IQBAL OPEN UNIVERSITY
January, 1989

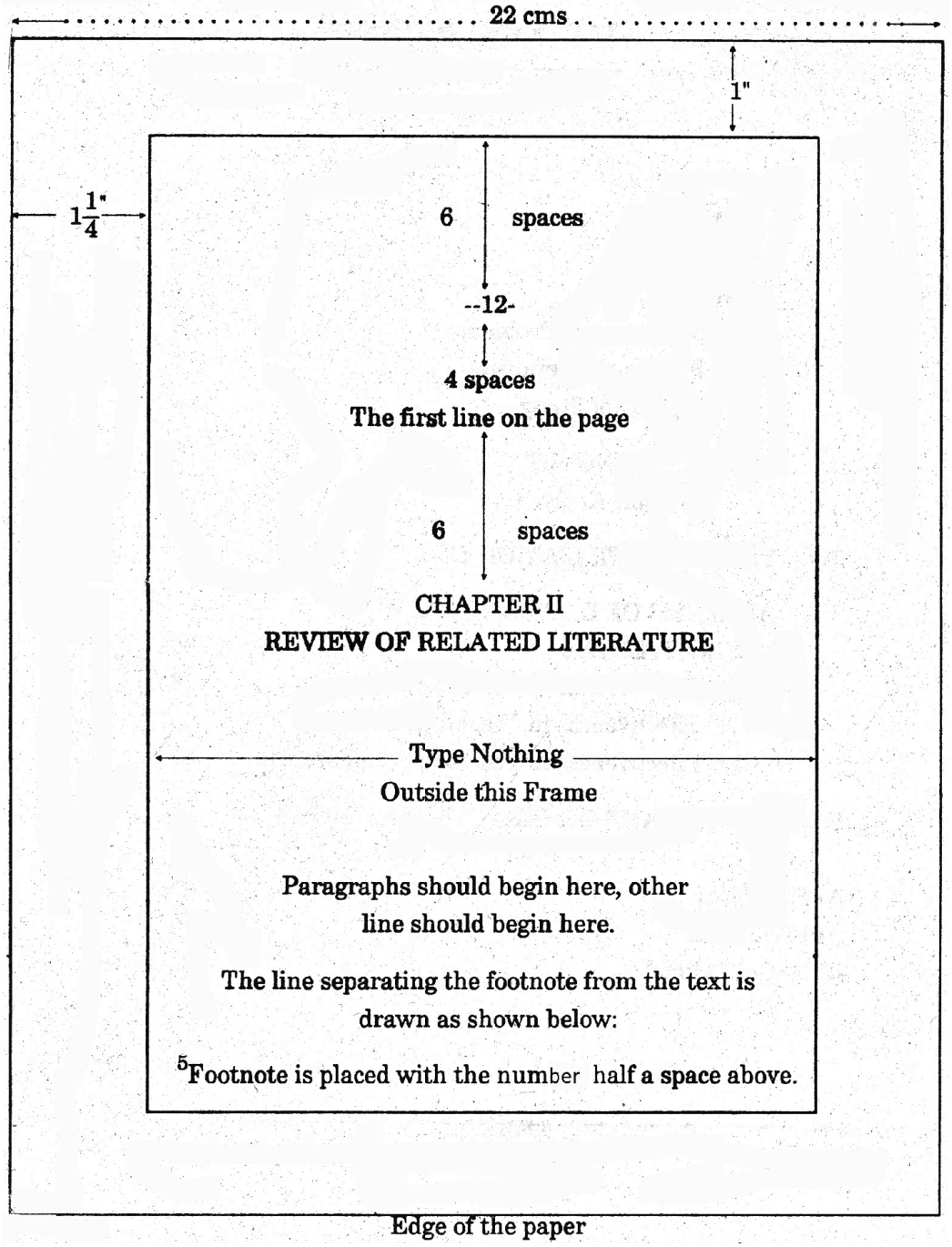
ANNEXURE-II

Sample Table of Contents Page

TABLE OF CONTENTS

ANNEXURE III

Sample Typing Paper with Margins and Spaces



KEY TO SELF-ASSESSMENT QUESTIONS

S.A.Q. No. 1

1.	F	2.	F	3.	T	4.	F	5.	T
6.	F	7.	F	8.	F	9.	T	10.	T

S.A.Q. No. 2

1. Forty-five (correct 45)

2. 125 (one hundred and twenty-five)

3. I (the investigator)

4. Forty-five point six (correct 45.6)

5. Words "monumental" and "Dr" should be deleted.

6. Ninety-five and eighty-three (correct 95 and 83)

7. % (correct 54 per cent and 96 per cent)

S.A.Q. No. 3

a) There should be only three dots instead of live,

b) The period placed outside the double quotation marks should have been inside.

c) The words starting with moved and ending with world, placed within double quotation marks should have been placed within single quotation marks.

d) The semi-colon should be outside the double quotation marks.

e) The words "italics ours" should have been placed where the underlining ended, that is after the word happiness.

2. 15 It is from the book cited in footnote 14, but from a different book.

18 It is from Wells' book cited sometime back.

19 This quotation has been cited from p. 89 of Wells book cited in footnote number 18.

20 This quotation is again from Wells' book but from p. 127.

25 This quotation has been taken from Durant's *Story of Civilization,* which has been cited earlier somewhere.

26 This quotation is again from p. 30 of Durant's book cited in footnote number 25.

27 This quotation is from p.35 of Durant's *Story of Civilization.*

3. a) B, The name of the second author should be written first name first.

b) B, Pages are not given In bibliography, these should be deleted.

c) F, A comma and not a period is put after the name of the author.

d) B, Volume number of the journal is given in, roman numerals; 13 should be written as XIII.

e) F, The name of the second author should also be given first name first.

f) B, A period and not a comma is placed at the end of the name of the author. Pages covered by the article are indicated in the end.

BIBLIOGRAPHY

1. Best, John W.: *Research in Education*. Englewood Cliffs, New York: Prentice Hall, Inc., 1959.

2. *Dalen, D.S.* Van: *Understanding Educational Research,* New York: Mc-Graw Hill. Book Co., Inc., 1962.

3. Gatner, E.S. M. and F. Cordasco: *Research and Resort Writing,* New *York:* Barnes and Nobids Inc., 1959.

4. Good, *Carter* V.: *Introduction to Educational Research,* New York: Appleton Century Crofts, hr., .1959.

5. Hillway, Tynis: *Handbook of Educational Research,* Boston: Houghton Mifflin Company, 1969.

6. Hubble, G. Shelton: *Writing Term Papers and Reports, New* York: Barnes and Nobles, 1968.

7. Keithlcy*, M. Ervin: A Manual of Style for the Preparation of Reports,* University of California 1979.

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