



Indira Gandhi National Open University
Staff Training and Research Institute of
Distance Education

MDE-415
Research For
Distance Education

Block

1

**INTRODUCTION TO RESEARCH IN DISTANCE
EDUCATION**

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MDE-415: Research for Distance Education

(New Course in place of ES-315: Research for Distance Education)

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October, 2013

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Further information about the Indira Gandhi National Open University Courses may be obtained from the University office at Maidan Garhi, New Delhi 110068.

Published by **Prof. C. R. K. Murthy**, Director, Staff Training and Research Institute of Distance Education (STRIDE), IGNOU, New Delhi on behalf of the Indira Gandhi National Open University, New Delhi.

Cover Design: Sabyasachi Panja

Printed at:

MDE-415 RESEARCH FOR DISTANCE EDUCATION

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BLOCK 1 INTRODUCTION TO RESEARCH IN DISTANCE EDUCATION

Block Introduction

“Introduction to Research in Distance Education” is the First Block of the Course, Research for Distance Education. The purpose of this Block is to present you with a basic orientation to Research in Distance Education. There are four Units in this Block.

1. Introduction to Educational Research: Purpose, Nature and Scope
2. Research Paradigms in Distance Education
3. Research in Distance Education and
4. Formulation of Research Problems.

Unit 1 deals with the purpose, nature and scope of educational research within a three tier paradigm of training, problem solving and search for truth.

In Unit 2 the three paradigms and different areas of research are explained as identified by various scholars.

Unit 3 presents a review of international and Indian research in distance education. The references are made to a number of macro and micro level studies. The Unit refers to the recent research studies in distance education.

In Unit 4 we discuss methods of formulating research problems of significance with an eye on originality and feasibility. The Unit also describes the important sources that help you in selecting, identifying and defining a problem.

The 2nd, 3rd and 4th Units of this Block present an updated version of the source materials of the previous edition. By no means the international and Indian references should be treated as exhaustive. They are only indicative of the range of research being conducted in distance education, but conceptually comprehensive.

We will appreciate your comments and suggestions for further improvements.

Hope you will enjoy studying this Block.

LET US BEGIN HERE

The Course on **Research for Distance Education** is divided into five Blocks. This is the first Block. It comprises four Units in all. A schematic representation of the design of Units. is given below.

Unit X

X.0 Introduction

X.I Objectives

X.2 Section 1 (Main Theme)

x.2.1 Sub-section 1 of Section 1

x.2.2 Sub-section 2 of Section 1

Check Your Progress

X.3 Section 2 (Main Theme)

x.3.1 Sub-section 1 of Section 2

x.3.2 Sub-section 2 of Section 2

Check Your Progress

| | | |

Check Your Progress:
The Key

X.n Let Us Sum Up

As the scheme suggests, we have divided the units into sections for easy reading and better comprehension. Each section is indicated distinctly by bold capitals I and each sub-section by relatively smaller but bold² upper and lower typeface. The significant divisions within sub-sections are in still smaller but bold** upper and lower typeface so as to make it easier for you to see their place within sub-sections. For purposes of uniformity, we have employed the same scheme of “partitioning” in every unit throughout the course.

We begin each unit with the section ‘Introduction’ followed by ‘Objectives’ which articulate briefly

- What we have presented in the unit, and’
- What we expect from you once you have finished working on the unit.

In the last section of each unit, under the heading, ‘Let Us Sum Up’, we summarise the whole unit for the purpose of recapitulation and ready reference.

Besides, we have given self-check exercises under the caption ‘Check Your Progress’ at a few places in each unit, and at the end of the unit “Possible answers” to the questions set in these exercises.

What, perhaps, you ought to do is to go through the units and jot down important points as you read in *the space provided in the margin*. (**Broad margins in the booklet are there for you to write your notes on**). Make your notes as you work through the materials. This will help you prepare for the examination and also help in assimilating the content. Besides, you will be able to save on time. Do use these margins. This will help

you to keep track of and assimilate what you have been reading in the unit.

We hope that we have given enough space for you to work on the Check Your Progress exercises. The purpose of giving self-check exercises will be served satisfactorily if you compare your answers with the possible ones given at the end of each unit after having written your answer in the blank space. **You may be tempted to have a furtive glance at the possible answer(s),** as soon as you come across an exercise. But we do hope that you will overcome the temptation and turn to the possible answers (which are not necessarily the best answers) only after you have written yours.

These exercises are not meant to be submitted to us for correction or evaluation. Instead, the exercises are to function as a study tool to help you keep on the right track as you read the units.

We suggest the following norms to be strictly practised while you are working through the assignments.

- Write your roll number legibly.
- Before you put anything down in words, assimilate what you have read, integrate it with what you have gathered from your experience to build your answer, and preferably prepare a concept map before starting to write it.
- Make the best use of the Block and additional reading materials by diligently working through the assignments.

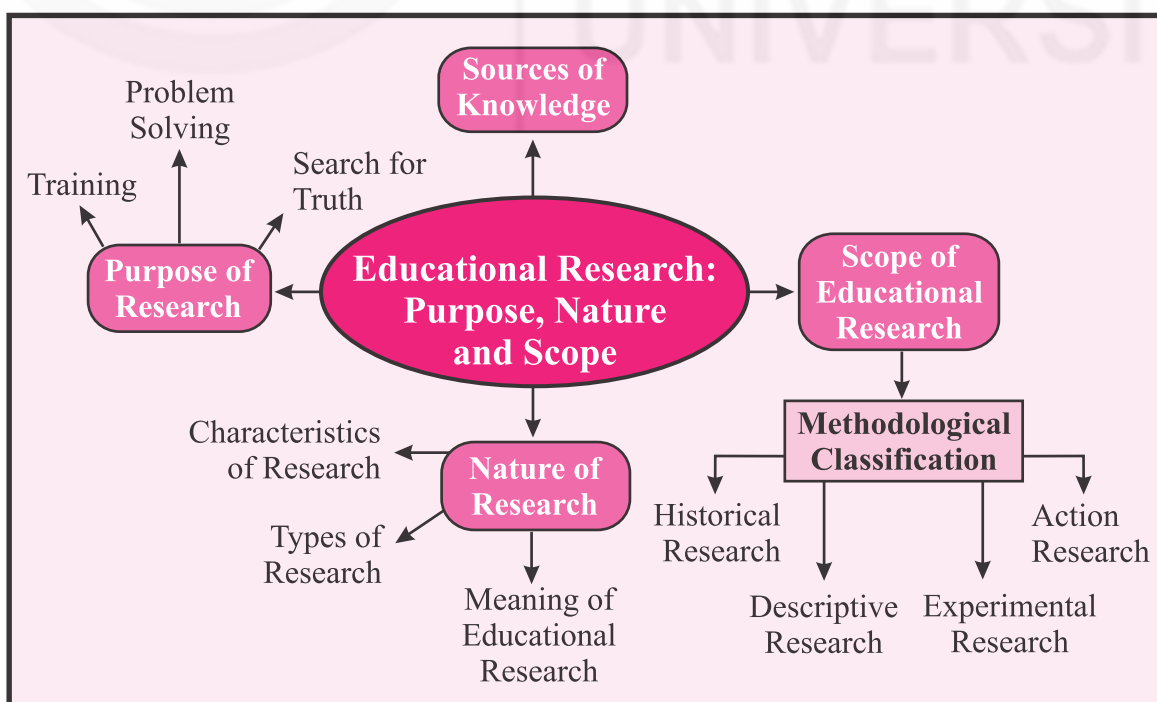
Mail us

At the end of this block, we have provided a feedback questionnaire. Please fill it after you complete this block and send it to us. Your feedback shall be highly useful for future revision and maintenance of the course. Also please take note of the time you devote to studying this block. May be, you complete this block after 4-5 sittings. But for every sitting kindly note the time separately so that you can categorically say how much time you took to read this Block. You can send the feedback form by post or you can email the same to: mparhar@ignou.ac.in. In the email, please mark in the subject area - FOR COURSE COORDINATOR-MDE-415. You may also - contact us for any difficulties related to the programme in general and MDE-415 in particular.

UNIT 1 INTRODUCTION TO EDUCATIONAL RESEARCH: PURPOSE, NATURE AND SCOPE

Structure

- 1.0 Introduction
- 1.1 Objectives
- 1.2 Sources of Knowledge
- 1.3 Purpose of Research
 - 1.3.1 Training and Research
 - 1.3.2 Problem Solving
 - 1.3.3 Search for Truth: Scientific Inquiry and Theory Development
- 1.4 Nature of Research
 - 1.4.1 Characteristics of Research
 - 1.4.2 Types of Research
 - 1.4.3 Meaning of Educational Research
 - 1.4.4 Scientific Approach in Educational Research
- 1.5 Scope of Educational Research
 - 1.5.1 Methodological Classification
 - 1.5.2 Area-wise Classification
- 1.6 Let Us Sum Up
- 1.7 Check Your Progress: The Key



1.0 INTRODUCTION

You have been an active participant in the process of education, initially as a student, and now as a teacher or counsellor or as an educational administrator. While carrying out educational activities, you have to take decisions about how to plan learning experiences, how to organize an institutional activity like examinations or admissions, how to develop a distance education programme or how to deliver a course through distance education. While taking those decisions, you must have used your own experience and knowledge.

The following questions, however, always come to mind in such situations:

- Is personal knowledge and experience an adequate source in planning an educational activity?
- Are there other sources of knowledge?
- Are there sources of knowledge that bring in a synthetic manner experiences of a large number of educational practitioners like you?

In this Unit, you shall briefly learn into possible sources of knowledge for the practitioners of education to arrive at more dependable and tested answers. That is precisely what educational research purports to do. In this Unit, we discuss the fundamentals of educational research, namely, its purpose, nature and scope. While we shall also refer to the broad field of education, our focus will be on open and distance education – a subject of your present concern.

1.1 OBJECTIVES

On the completion of this Unit, you should be able to:

- Explain the purpose and importance of scientific research,
- Describe the nature of educational research, and
- Identify the areas in which distance education research is being increasingly undertaken.

1.2 SOURCES OF KNOWLEDGE

Human beings have always sought answers to their questions through various methods: experience, customs and tradition, deductive and inductive reasoning, and scientific approach.

Information for making educational decisions come from many sources which include personal experience, expert opinion, tradition, intuition, common sense and belief about what is right and what is wrong. Each of these sources may be inadequate if you take it as the only basis for making decisions. Although experience is a familiar and well-used source of knowledge, it would have its limitations as a source of truth.

Customs and traditions have been a traditional source of knowledge; this is equally true in education where educators rely on past practices as a dependable guide. But one has to be careful that notions of past are not blindly idealized. It is wise to value customs and

traditions, but be open to examine their relevance in the present context. For example, the customary or traditional notion of education is that of a face to face interaction; does it imply that open and distance education is not feasible?

Both deductive and inductive reasoning have made significant contribution towards developing a systematic approach to establish truth. In fact, integration of important aspects of both, deductive and inductive methods, led to the evolution of the scientific approach, which all of us are mostly concerned within research.

Deductive reasoning is a thinking process in which one proceeds from general to specific statements, through logical arguments. Inductive reasoning derives its argument and strength from the observed phenomena. As both, deductive and inductive reasoning have their limitations, it was only a matter of time that scholars integrated the most important aspects of both methods to evolve a scientific approach.

Scientific approach is generally described as a process in which investigators move inductively from their observations to hypotheses and then deductively from the hypotheses to the logical implications of the hypotheses. They deduce the consequences that would follow if a hypothesized relationship is true. If these deduced implications are compatible with the organized body of accepted knowledge, they are then further tested with the help of empirical data. On the basis of the evidence, the hypotheses are accepted or rejected.

This approach, or 'research' as source of information, has been increasingly used to prepare strategies and arrive at definite conclusions. As research systematically describes or measures reality in an objective way, it is a better source of knowledge, than one's own experience, customs and traditions, deductive or inductive reasoning.

Check Your Progress 1

Describe the roles of inductive and deductive reasoning in the scientific approach to research?

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

(b) Compare your answer with the one given at the end of this Unit.

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1.3 PURPOSE OF RESEARCH

It is clearly evident from our discussion in the previous pages that a researcher deals with a wide range of associations, from concrete day-to-day activities and problems to a philosophical level of search for truth. The purpose of research can be captured in a hierarchical/taxonomic fashion.

- The lowest level or the first level in the purpose of research is training.
- The second level is research for problem solving, and
- The third and the highest form is research in search of truth or knowledge generation.

1.3.1 Training in Research

Research in education, as much as in distance education, are largely of two types.

- One leading to postgraduate degrees like, M.Phil or Ph.D.
- The other dealing with project research.

Training takes different shapes depending on whether the project is a post- doctoral activity or pre-doctoral activity by persons who have not been trained in research methodology. Many of you who undertake programmes like Master of Arts (Distance Education), may have been working in schools, colleges, universities or even outside these systems and have not done a doctoral programme involving a course on research methodology. Even those of you who have doctoral degrees in language, linguistics or science, may not have a course on research methodology. However, executing a research project in a scientific manner needs training in research methods. This course on research methodology provides the theoretical background for your research project. This print material is supplemented by interactive contact programmes, primarily to strengthen the conceptual aspect of research methodology. This will also facilitate the right choice of research designs, tools and techniques. Hence, training in research methodology is an important purpose of research in distance education, particularly this programme.



Fig. 1: Training in Progress

Those who have had the opportunity of undergoing a professional course on research methodology followed by some research project, would already be well aware of this course and may not need any formal input but can still refine their skills.

1.3.2 Problem Solving

The second purpose of research is diagnosing and solving the problems in the system. In this case, the system is distance education. While we talk of problem solving, it is necessary to develop a more comprehensive view of it. For instance, it may also mean a realistic understanding of a situation on the basis of data and statistics. Let us take the case of the personal contact programmes – a universally practised method of student support services in distance education. A project that undertakes to study the difference in the performance of those who attend the personal contact programmes and those who do not, provides a sound empirical basis of assessing the role of Personal Contact Programmes. Similarly, most of the countries, including India, invest considerable amount of money on educational mass media, television in particular. The studies that assess the extent of media utilization shall show the differential performance of those learners who use media and those who do not, provide a revised understanding of the role of media in distance education. Such examples can be multiplied but may not be necessary. In other words, a series of studies will go into diagnosis and develop better understanding of the practices in a system. This may also include study of socio-economic background of students.



Fig 2: Problem Solving Session

Another set of studies may actually get into experimenting with an innovative solution. For example, a distance education institute can model its counseling sessions into a two-week or three-week module, tutorial or lecture modes, group interactive mode or group assignment mode and so on. At the end of such exercises, the institute may assess the

differential performance of the distance learners exposed to differential treatment. This will provide the distance learning institution an empirical basis for designing the sessions. Similarly, there are several alternative formats in the medium of television, e.g. lecture, interview, documentation, drama and docu-drama. The programmes can be developed in different formats and their impact on distance learners assessed. There can be experiments in the administrative area as well. For example, most distance education institutes send printed instructional material by post, a common practice all over the world. Some of the universities in the western world offer it online so that a distance learner can either read it from the monitor or download the text at his/her work station. Some institutes deliver printed instructional material to the study centres by trucks. Students are advised to come and collect the material from the study centres. The analysis of this practice has shown that it causes minimum loss of material and is also quite cost-effective.

Examples of research for problem solving can be multiplied. The important point is to recognize that research can contribute to solving day to day problems. All the research projects in distance education can actually take the shape of problem solving.

It is important to recognize that there is no clash of interests between purposes of research for training and problem solving. Both can go hand-in-hand. This is particularly true for project research in MA (DE) where most of the participants are not trained in research methodology but many of them are well experienced in distance education and are very familiar with the problems in the system.

1.3.3 Search for Truth: Scientific Inquiry and Theory Development

Search for truth is the biggest challenge in research. Research in search of truth is often classified as pure research in the otherwise controversial pure- applied research continuum. The search for truth, from the angle of research, is the ability to generalize and thus, create knowledge. Such generalizations are derived from occurrences in repeated instances. You would have come across words like significant at .05 or .01 levels. These typical research statements basically promise that such and such instances will happen in 95% or 99% of the cases; and to that extent the phenomenon is generalizable. Generalizations are drawn primarily on two basis, namely, repeated observation in various possible situations and application of statistical designs where the variables are statistically controlled. Generalizations are drawn through tests of significance, levels of confidence, and such other types of analyses.

Project research which is the prime focus of this course is unlikely to achieve this sophisticated level of search for truth. However, it is quite possible for you to undertake a study that could come close to generalization through application of statistical models and methodologies. Such research, however, will be based purely on quantitative techniques. There are qualitative methods of research as well. Such methods can also be applied in search of truth. Important emphasis, however, is on the use of scientific approach to research.

The scientific methods can be explained in a series of steps, the exact formulation of

which varies from one author to another. The steps are as follows:

- certain phenomena are observed,
- a problem situation which develops therein, is noted and clarified,
- crude relationships are tentatively identified and elaborated,
- a more or less formal hypothesis is derived,
- a design is developed to test the hypothesis,
- the hypothesis is verified or refuted, and
- the results are subjected to further tests and refinements.

Finally, the conclusions of research are integrated with the existing knowledge of the subject. The process involves such subsidiary steps as:

- review of relevant experience,
- manipulation of factors,
- measurement of the quantities,
- defining of variables, and
- analysis and interpretation of data.

Facts and Theories

Scientific enquiry starts with facts and then moves towards theorizing. To be useful, facts must be organized, and the primary purpose of the scientific method is to develop a mechanism of organizing the facts, as they accumulate, and become meaningful from the stand point of their objectives. Through empirical investigations, scientists gather many facts. As these facts accumulate, there is a need for integration, organization, and classification in order to make the isolated findings meaningful.

Science must remain close to facts. It is only when isolated facts are put in a perspective by integrating them into a conceptual scheme promoting greater understanding that we approach the domain of science. When isolated facts are integrated into a conceptual scheme which promotes a better understanding of their nature and significance, it is clear that the facts have been already put in proper scientific perspective. Significant relationship in the data must be identified and explained. In other words, theories must be formulated. Theory may be defined as “a set of interrelated constructs (concepts), definitions and propositions that present a systematic view of a phenomena by specifying relations among variables, with the purpose of predicting and explaining the phenomena” (Kerlinger, 1973).

Theory knits together the results of observations, enabling scientists to make general statements about variables and relationships among variables. For example, in Boyle’s Law, a familiar generalization summarizes the observed effects of change(s) in temperature on the volumes of all gases by the statement – “When pressure is held constant, as the temperature of a gas increases, its volume is increased and as the temperature of a gas is decreased its volume is decreased”. This statement of theory not only summarizes previous information, but predicts other phenomena by telling us what to expect of any gas under any change(s) in temperature.

Just as fact underlies theory, theories underlie facts – each raising the other like a spiral to an increasingly precise scientific formulation. Facts derive their significance from theoretical framework into which they bring facts into focus. This is well stated by Van Dalen (1973).

“.....there is a constant and intricate relationship between facts and theory. Facts without theory or theory without facts lack significance. Facts take their significance from the theories which define, classify and predict them. Theories possess significance when they are built upon, classified, and tested by facts. Thus, the growth of science is dependent upon the accumulation of facts and the formulation of new or broader theories”.

This is particularly true in the early stages of scientific development, since in its early stage, research must confine its efforts to seeking answers to highly specific and particularized problems. In the later stage, it tends to strive towards unity by breaking down the very barriers that had made its earlier progress possible. Scientific theories attempt to organize the tiny, rigorously defined bits of knowledge into a more meaningful and realistic structure. This is precisely the function of theory.

Hypothesis and Theory

A hypothesis, when accepted, explains a small number of facts and the relationship between them. Generalization, as the term denotes, is a hypothesis based on broader phenomena. Theory, explains even more facts and their inter-relations. Theories themselves range from the simple to the more sophisticated. Finally there are laws, which have the greatest scope and generality.

In spite of the strong case that has been made for the role of theory in research, it will be appreciated that a theory has to be amended or abandoned when the discovery of new facts can no longer accommodate it. Alternatively, it may be subsumed by a wider, more embracing theory when it is realized that the situation which is contained by the theory is one instance of a more general case. Theories generated by the means that we have indicated, do not lead to ‘eternal truth’; rather, they should be looked upon as useful conceptual frameworks which are adequate for present purpose or a given situation. Thus every theory is subject to modification as and when we get new facts and evidence that contradict the generalizations made earlier on.

Purpose of Theory

There are several purposes to be served by a theory in the development of science. We shall briefly consider three of them here. First, theory summarizes and puts in order the existing knowledge in a particular area. It permits deeper understanding of data and translates empirical findings into a more easily retainable and adaptable form. The theory of oxidation for instance, places into focus many of the chemical reactions common to everyday life.

Secondly, theory provides a provisional explanation for observed events and relationships. It identifies the variables that are related and the nature of their relationship. A theory of

learning, for example, could explain the relationship between the speed and efficiency of learning and such other variables as motivation, reward and practice.

Lastly, theory permits the prediction of the occurrence of phenomena and enables the investigator to postulate and, eventually, to discover hitherto unknown phenomena. At the time when the 'Periodic Table' was being completed, for instance, certain gaps were noted in the sequence of the elements. Since theory provided that, there should have been no gaps, scientists were spurred on to look for the other missing elements. In time, these were found, anticipated by theory. Theory, therefore, stimulates the development of new knowledge by providing the lead for further inquiry.

Developing a Theory

It is important to stress that good theories are not born out of imagination, they do not originate merely through arm chair reflection. A theory is built upon collected facts. The investigator then searches, makes intelligent guesses as to how the facts are ordered, adds missing ideas or links, and puts forward a hypothesis; deduces what consequence should follow from the hypothesis and looks for further facts which are consistent or otherwise with the deductions; builds a wider generalization or conceptual framework on more facts; and eventually outlines a theory. Theories are solidly based on evidence. And they are important practical tools which enable us to advance our knowledge still further. Once a theoretical framework has been elaborated we know what facts to look for to confirm or to deny the theory; also, we have a conceptual framework inside with which our evidence can be tested.

Theories always involve terms that refer to matters that cannot be directly observed. For example, gravity itself cannot be directly observed, though the effects of gravity can be. Gravity and gravitation are both theoretical terms. The terms of a theory or theoretical statements are sometimes referred to as constructs. Thus, many theories of learning refer to a motivational factor in behaviour. Now motivation is not directly observable. It is a theoretical term; or, you may refer to it as a construct. The term implies that it is a construction of the scientist's imagination.

Levels of Theorizing

A product of all research in behavioural sciences is a set of conclusions that involves theoretical terms. These conclusions may be at a sophisticated level of theorizing or at a level of theorizing that is quite low. Most psychologists would agree that it is wise to keep theorizing down to the level that involves a minimal use of abstract terms. We may think of six levels of theorizing, which we briefly discuss below.

Level 1. Hypothesis formation: This is the level of hypothesis formation. Any hypothesis which is to be used as a basis for research goes beyond the facts on which it is based.

The purpose is to establish the existing state of affairs. Nearly all surveys are conducted for this purpose. Thus, students of education may conduct a survey of what the pupils think of a particular aspect of the curriculum; how much time is spent by pupils in watching television, etc. Direct study of aspects is probably the simplest to undertake though this does not mean that it is easy to plan and execute.

Level 2. Elementism: Examples of theories at this level are primitive forms of classification in terms of some significant set of ideas or idea. In the case of education and distance education, classification of abilities derived from factor analysis, or the classification of teaching acts that may be the result of extensive classroom observation, would come under the level of elementism.

Level 3. Descriptive theories and taxonomies: Formulation of descriptive theories and taxonomies occurs at a more complex level than mere classification. An example of theorizing at this level is the taxonomy of human learning provided by Gagne. Gagne classified learning into eight different categories, which vary from the most simple to the most complex. Bloom's taxonomy of cognitive behaviours can also be placed under this level.

Level 4. Classification: For development of any kind of useful classificatory system, there is a need for a set of theoretical ideas to underlie the classification. The classification of animals acquired significance only after it was realized that, the species could be fitted into a system in which the evolutionary relationships between animals became the basis for classification.

Although the concept of evolution became a basis for systematic classification of living creatures the theory of evolution itself represents theory construction at a higher level. In this type of theorizing, abstract ideas are introduced to explain relationships between observed phenomena. The classical conditioning theory of Pavlov falls into this class of theorizing. The dog learns to salivate at the sound of the bell because the sound of the bell and the presence of food are conditions that become linked in some unseen way in the brain of the animal. Theories at this level may still be quite primitive; for example, it is quite difficult to carry out theorizing at higher levels in behavioural and social sciences.

Levels 5 and 6. Postulates and theories: the higher levels: These are levels of theorizing observed in physical sciences. At the highest level, a theory consists of a set of basic statements called the axioms of theory, which tell us what the theory is all about. Such axiomatic statements or postulates as they are called, include primitive terms. These are terms that are intuitively understood and cannot be otherwise completely defined.

One distinction that can be made between Level 5 and Level 6 is that the former is reserved for incomplete theories. And the latter, i.e., Level 6 theories represent the ultimate in scientific formulations. They represent the closest approximations to what one might call the accurate description of universal laws.

Check Your Progress 2

Describe briefly the different stages of development of a theory.

Note: (a) Space is given below for your answer.

(b) Compare your answer with the one given at the end of this Unit.

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1.4 NATURE OF RESEARCH

There is no universally accepted definition of research. We can, however, consider research as a systematic process of analyzing a problem, identifying the factors or variables involved in the phenomenon, collecting and analyzing information (data) on such variables to find answers to certain crucial questions. These answers contribute further to increase human knowledge. Orderliness is the hallmark of research. Research has to have an organic unity. (A 'design' also becomes essential if the knowledge which accrues from research is to be verified; for, it must be verifiable by anybody who takes the trouble to do so). In fact, research is considered to be a formal, systematic, intensive process of carrying on the scientific method of analysis. It involves a more systematic structure of investigating, usually resulting in some sort of formal record of procedures and results or conclusions.

1.4.1 Characteristics of Research

The major characteristics of any research, are: objectivity, precision, design and verifiability. Let us look at these attributes more closely:

Objectivity: Ideally, research is beyond the subjective bias of the researcher. The researcher makes deliberate efforts to eliminate personal preference resisting the temptation to seek only such data that supports his/her hypothesis. The scientific

research has no onus to persuade or prove. The emphasis is on testing, rather than proving the hypothesis. The researcher is willing to suspend personal judgement and permit the data and logic to lead independently to a sound conclusion. Objectivity is achieved through standardization of research instruments, choosing appropriate research design and tools and ensuring dependability of data.

Precision: Research uses a technical language, so as to convey the exact meaning to the reader, e.g., validity, reliability, random sampling, etc. The most precise expression in quantitative research is a mathematical equation or statistical finding which explains or represents the truth. Precision in qualitative research is achieved through words rather than numbers. Precise language describes the study accurately so that the study may be replicated or the results correctly used.

Design: As mentioned earlier, the researcher has to have a systematic design. This will imply that any scientific inquiry will, in general, undergo the following steps:

- definition of the problem,
- statement of the hypothesis,
- collection and analysis of data,
- testing and confirmation or rejection of hypothesis, and
- reporting of results.

Only if the research has an orderly design, it can be replicated for verification.

Verifiability: This is an important characteristic of every research. Research design and findings are presented to the professional community for other researchers to analyze, confirm or reject them. Research is a social enterprises and its information is open for public scrutiny. This characteristics of research, i.e., verifiability, is related to the criteria of objectivity and precision. Only through further investigation or replication of studies can the results of a single study be confirmed or revised. Through this process, a body of new knowledge is developed and new questions identified.

Verifiability is achieved primarily through two different approaches: first, analyzing the same data on the same sample through alternative analytical tools (statistical methods), second, replicating the study on a different sample.

1.4.2 Types of Research

We can think of two major types of research—fundamental or basic research, and applied research. This classification is based on the goal or objective of the research.

Fundamental Research: This type of research aims at obtaining the empirical data that can be used to formulate, expand or evaluate a theory.

This type of study is not oriented in design or purpose towards the solution of practical problems. Its essential aim is to expand the frontiers of knowledge without any intention of practical application. Of course, the findings may be eventually applied to practical problems that have social value. For example, advances in the practice of medicine are dependent upon basic research in biochemistry and microbiology. Likewise, progress in

educational practise has been related to progress in the discovery of general laws of learning through basic research in psychology, education and sociology. The primary concern of basic research, however, is the creation of knowledge solely for the sake of knowledge. Its design is not hampered by considerations of special usefulness of the findings.

Applied Research: Applied research is directed towards the solution of an immediate, specific and practical problem. This is a research performed in relation to actual problems and under conditions in which they are found in practice. Through applied research, educators are often able to solve their problems at the appropriate level of complexity. For instance, in the classroom teaching-learning situation, we may depend on basic research for discovering the more general laws of learning, but applied research must be conducted in order to determine how these laws operate in the classroom. This approach is essential if scientific changes in teaching practices are to be effected.

It needs to be noted that there is not always a sharp line of demarcation between basic and applied research. Certainly, applications of theory help in solving practical problems. We apply theories of learning in the classroom. On the other hand, basic research may depend upon the findings of applied research to complete its theoretical formulations. An experiment in classroom learning could shed some light on a learning theory.

Furthermore, observations in a practical situation serve to test theories and may lead to the formulation of new theories.

Check Your Progress 3

Write the four main characteristics of research? Can you expect all of them to be present in applied research on an educational problem? Give reasons for your answer.

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

(b) Compare your answer with the one given at the end of this Unit.

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1.4.3 Meaning of Educational Research

Educational research is the way in which one acquires dependable and useful information about the educational process. It may be broadly defined as any systematic striving towards understanding, on perceiving a certain complex educational problem of more than immediate personal concern and stated in a problematic form (Harris, 1960, Encyclopedia of Educational Research). Travers (1969), for example, defines educational research as “an activity directed towards the development of an organised body of scientific knowledge about the events with which educators are concerned”. Its goal is to discover general principles or interpretations of behaviour to explain, predict and control events in educational situations.

1.4.4 Scientific Approach in Educational Research

Unlike physical and biological sciences, education and social sciences deal with living humans. Hence, the subject of educational research poses much greater complexity than that in natural sciences. The usual criticism is that educational and other social science research largely emanates from ill conceived notion of research and its application in complex human setting. The educational researcher needs the wisdom to choose research designs and methodologies that are responsive to the problem; this is, in contra- distinction to the obsessive use of complex quantitative methods. The issue is that of a careful balance between quantitative and qualitative techniques of research depending on the nature of the problem, the nature of data and even the sample drawn for the study.

Although problems of discovering principles of human behaviour are difficult, they are not impossible. Social scientists will need to carry out observations as carefully as are done in physical sciences. Subjective, qualitative judgments’ need to be supplemented by more exact, quantitative measurements which are not easy to achieve in the case of human beings. This lack of ‘quantifying’ and ‘generalizing’ of data, quite often becomes a drawback in educational research as well. Whereas exact sciences tend to become increasingly quantitative in their units, measures and the terminologies, in social sciences most of the matter is qualitative and does not approve of quantitative statements. We may talk of growing indiscipline, but unless we can measure it, we cannot generalize the concept.

Research in education adopts both quantitative and qualitative techniques. Social sciences have not been able to establish generalizations equivalent to theories of the natural sciences or, to predict events accurately. Perhaps, social sciences will never realize the objective of science as completely as natural sciences do. In fact, there are several limitations involved in the application of the scientific approach in education and the other disciplines of social sciences. Let us try to see what they are:

(i) Complexity of subject matter:

A major obstacle is the inherent complexity of the subject matter. Natural scientists deal with physical and biological phenomena. A limited number of variables that can be measured precisely are involved in the explanation of many of these phenomena, and it is possible to establish universal laws. For example, Boyles’ Law on the influence of pressure

on the volume of gases, which deals with relatively uncomplicated variables, formulates the relationship between phenomena that are apparently unvarying throughout the universe.

On the other hand, social scientists deal with the human subjects. They are concerned with the subject's behaviour and development both, as an individual and as a member of a group. There are so many variables acting independently and in interaction, that must be considered in any attempt to understand complex human behaviour. Each individual is unique in the way he or she develops, in the mental equipment, in social and emotional behaviour and in application of the overall personality. The behaviour of humans in groups and the influence of the behaviour of group members on an individual must also be dealt with by social scientists. A group of first- graders in one situation will not behave like first-graders in another situation. There are learners, teachers, and environments, each with variables that contribute to the behavioural phenomena observed in a setting. Thus, researchers must be extremely cautious about making generalizations, since the data obtained in one group situation may not be valid for another group.

(ii) Difficulties in observation:

Observation, the sine qua non of science, is more difficult in the social sciences than in natural sciences. Observation in social sciences is more subjective because it frequently involves interpretation on the part of the observer. For example, the subject matter for investigation is often a person's responses to the behaviour of other. Motives, values and attitudes are not open to inspection. Observers must make subjective interpretations when they decide that behaviours observed indicate the presence of any particular motive, value or attitude. The problem is that social scientists' own values and attitudes may influence both the observations and the assessment of the findings on which they base their conclusions. Natural scientists study phenomena that require little subjective interpretation.

(iii) Difficulties in replication:

A chemist can objectively observe the reaction between two chemicals in a test tube. The findings can be reported and the observations can be easily replicated by others. This replication is much more difficult to achieve in social sciences. An American educator cannot reproduce the conditions of a Russian educator's experimental teaching method with the same precision of replication as that with which an American chemist can redo a Russian chemist's experiment. Even within a single school building, one cannot reproduce a given situation in its entirety and with precision. Social phenomena are singular events and cannot be repeated for purposes of observation.

(iv) Interaction between an observer and subjects:

An additional problem is that mere observation of social phenomena may produce changes that might not have occurred otherwise. Researchers may think that X is causing Y, when, in fact, it may be their subjective observation that X causes Y. For example, in the well-known Hawthorne experiments, changes in the productivity of workers were found to be due not to the varying working conditions but to the mere fact that the workers knew they had been singled out for investigation. Investigators are human beings, and their presence as observers in a situation may change the behaviour of their human

subjects. The use of hidden cameras and tape recorders may help minimize the interaction in some cases, but much of research in social science includes the responses of human subjects to human observers.

(v) Difficulties in control:

The range of possibilities of controlled experiments on human subjects is much more limited than in natural sciences. The complexities involved in research on human subjects present problems in 'control' that are unparalleled in natural sciences. In the latter, rigid control of experimental conditions is possible in the laboratory. Such control is not possible with human subjects. The social scientists must deal with many variables simultaneously and must work under conditions that are much less precise. They try to identify and control as many of these variables as possible, but the task is very difficult.

(vi) Problems of measurement:

Experimentation must provide for measurement of the factors involved. The tools for measurement in social sciences are much less perfect and precise than the tools of the natural sciences. We have nothing that can compare with the precision of the ruler, the thermometer, or the numerous laboratory instruments. We have already pointed out that an understanding of human behaviour is complicated by the large number of determining variables acting independently and in interaction. The multivariate statistical devices available for analyzing data in social sciences take care of relatively few of the factors that are obviously interacting. Furthermore, these devices permit the researcher to attribute the variance only to factors operating at the time of measurement. Factors that have influenced development in the past are not measurable in the present, and yet they significantly influence the course of development.

Since research in behavioural sciences including research in education is complicated by these factors, researchers must exercise caution in making generalizations from their studies. It will often be necessary to conduct several studies in an area before attempting to formulate generalizations. If initial findings are consistently confirmed, then, one would have more confidence in making broad generalizations.

Despite these handicaps, education and social sciences have made great progress, and their scientific status can be expected to increase as scientific investigation and methodology become more systematic and rigorous in their research activities.

Check Your Progress 4

Write the constraints in applying scientific method to educational research?

- Notes: (a) Space is given below for your answer.
(b) Compare your answer with the one given at the end of this Unit.

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1.5 SCOPE OF EDUCATIONAL RESEARCH

Scope of educational research can be viewed from the angles of substantive areas of education and research methodology. The two parameters are interrelated and are represented in the matrix below.

Methodology →	Historical	Descriptive	Experimental	Action Research
Area of Education ↓				
Philosophy of Education				
Teacher Education				
Curriculum				
Other (s)				

Let us first look at the scope from the methodological perspective.

1.5.1 Methodological Classification

In sub-section 1.4.2, we discussed the two categories in which all research can be fitted in. This categorization, that of basic and applied research, is true for educational research as well. In addition, educational research can be categorized differently under four types: **Historical research, Descriptive research, Experimental research and Action research**. Brief notes on all these types and the methods involved therein are given below to continue the discussion.

Historical research

This type of research describes **what was**. The process involves investigation, recording, analysing and interpreting the events of the past in order to make generalizations; these generalization are helpful in understanding the past, building a perspective about the present, and to a limited extent, in anticipating the future. The main purpose of historical research, therefore, is to arrive at an exact account of the past so as to gain a clearer perspective for the present. And this knowledge further enables us, at least partially, to predict and control our future existence/activities.

Descriptive research

This type of research describes **what is**. It involves the description, recording, analysis and interpretation of conditions that exist. It involves some type of comparison or contrast and attempts to discover relationships existing between variables. Much educational research is aimed at describing the characteristics of students and the educational environment. The nature of prevailing conditions, educational practices and existing attitudes must be determined before we can move on to solving problems about learners, institutional organization or the teaching of a subject. Research of this nature may not answer basic questions, but it does permit the gathering of information which serves as a basis for future research. It is detailed in Block 2 Unit 4.

Experimental research

This type of research describes **what will be** when certain variables are carefully controlled or manipulated. The focus is on the relationship between two sets of variables. One set of variables is deliberately manipulated (experimental treatment of the independent variable) to examine its impact on another set of variables (dependent variables). For example, in one of the experimental studies, a distance education tutor held specially designed contact classes (independent variable or treatment) for a particular group of distance learners and studied its impact on their performance in the university examination (dependent variable). The experimental research involved systematic recording of data and scientific analysis later. This type of research leads to developing testable hypotheses, generalizations and predictions. This methodology is derived largely from the physical sciences. We will bring you more details on experimental research in Block 2 Unit 4.

Action research

Action research involves the application of the steps of the scientific method to educational problems. Although it is similar in some respects to experimental research, action research differs principally in the extent to which findings can be generalized. Primary concern for action research is problem solving, hence, it is focused on the immediate application and not on the development of a theory. Many action research projects are carried out in a single classroom by a single teacher; and the others, by all the teachers in an institution or even any aspect. Its findings are to be evaluated in terms of local applicability, not in terms of universal validity. Its purpose is to improve institutional practices.

A typical example of action research in a distance education institution:

The institution was receiving complaints of not receiving study material in time. The material was sent by post. It was decided to send the study material to the study centers and the students were advised to collect the study materials from the study centers personally. The data on number of complaints, cost of loss on transit, additional cost at study centers, cost of transport were studied on comparative basis with the practice through postal delivery. The study indicated net reduction in complaints and the matching cost involved.

In this case, the problem of delivery of material was solved through action research. We will bring you more details on action research in Block 2 Unit 4.

Interdisciplinary fields of inquiry

Education is an interdisciplinary field of inquiry that has borrowed concepts and theories from physics, biology, psychology, sociology, anthropology, political science, economics and other disciplines. The methodologies used in educational research are also derived from several disciplines, e.g. systems analysis from biology, experimental designs from physical and natural sciences, observation and interviewing from anthropological sciences, testing from the discipline of psychology, and the like.

1.5.2 Area-wise Classification

Educational research can be classified in several alternative forms. In fact, classifications can produce a multi-dimensional model. Human mind is competent in visualizing three dimensional models. Let us look at one possible 3-D classification:

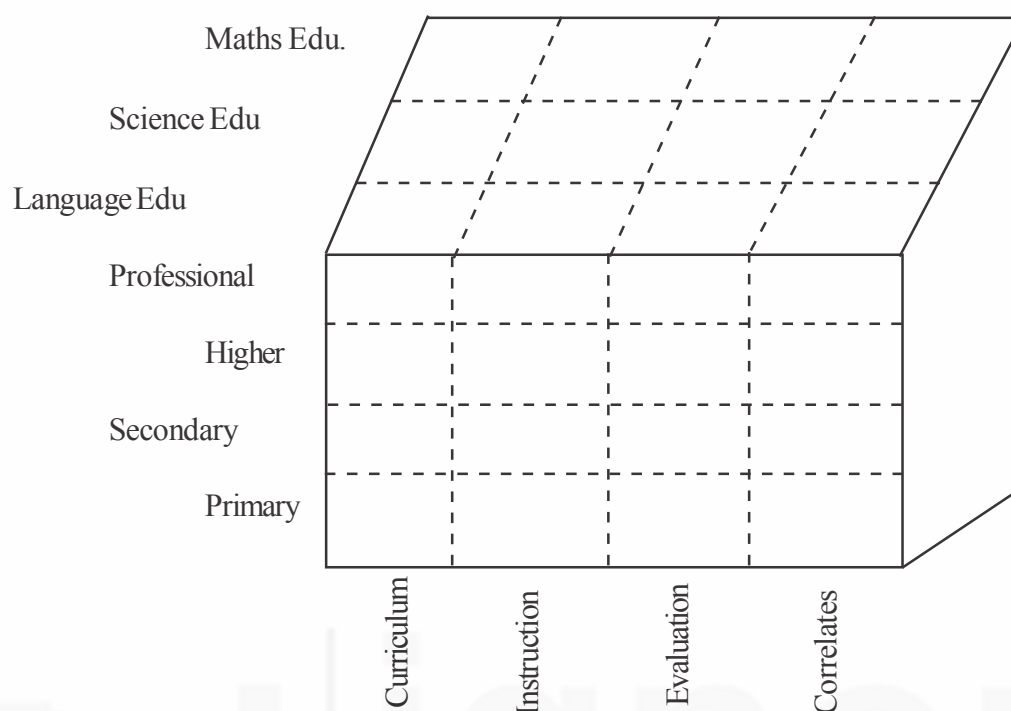


Figure 3: An Exemplar 3-D Model of Classification of Educational Research

The 3-D model implies that a research can be, say, in language education in the area of curriculum and at the primary level. Such studies can be classified in any of the three categories. In research trend analysis, authors often use cross-references to accommodate the findings of such studies.

Open and Distance Education has been one area in educational research. It will be interesting to see the different areas within Open and Distance Education that have attracted the attention of researchers. Let us examine a few such classifications in Table 1.

The table 1 reveals that there are certain common areas of research, like learners, course development and delivery, evaluation, etc. Depending on the author and his/her understanding of open and distance education system, some classify research into further details, e.g. Panda et al 1997 looked at institutional policies and management, or media and technology separately, whereas other reviewers subsume research in media and technology in broader heads like instruction and course delivery. Similarly, you must have noticed that research on teaching and teacher behaviour are taken as one area. There are voluminous and famous works on research on teaching by Travers and Others. You will read more on research areas in open and distance education in Unit 3 of this Block.

Table 1: Classification of Research in Open and Distance Education

Panda et al (1996)	Rourke and Szabo 2002	Parhar 2003	Lee et al 2004	Zawachi - Richter 2009
Concept, Growth and Development	Administration	Need Assessment	Design Related Topics	Macro Level: Distance Education System and Theories
Learners & Learning	Evaluation	Learning Styles of Distance Learners	Development Related Topics	Meso Level: Management organization and technology
Curriculum Course Planning & Development	Foundations	Instructional Strategies	Management Related Topics	Micro Level: Teaching and Learning in Distance Education
Instruction & Teaching	Instructional Design	Cost Effectiveness	Evaluation Related Topics	
Economics of DE	Instructor Characteristics	Assessment and Evaluation	Institutional and Operational Theory and Research Related Topic	
Evaluation & Program Evaluation	International Perspectives			
Staff Development	Learner Characteristics			
Institutional Policy & Management Media & Technology	Technology and Media Trends			
Immediate & Long-term Impact				
Attitude towards the system				

Check Your Progress 5

Describe the major areas of educational research.

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

(b) Compare your answer with the one given at the end of this Unit.

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1.6 LET US SUM UP

In this Unit, you have read that there are various methods, for example, experience, authority, custom and tradition, deductive and inductive reasoning, by which you can gather and create knowledge. But of all these approaches, the scientific approach, which is an integration of deductive and inductive approaches, accrues as the most systematic and objective method. We also discussed the meaning of research in general—which can be roughly thought of as systematic inquiry.

An important step in scientific inquiry is theory development and we discussed the complexities of 'theory development' at various levels. The nature of educational research has also been discussed in this Unit, with a brief description of various types of educational research. Under the scope of educational research, we have included many fields of education in which research is undertaken, e.g., curriculum, educational administration, economics of education, etc.

1.7 CHECK YOUR PROGRESS: THE KEY

1. In deductive reasoning, the investigator proceeds from general to specific statements. In inductive reasoning, the argument and strength is derived from the observed phenomena.
2. Theory starts with facts. Knowledge and observation of facts lead to hypothesisation, classification of significant ideas and taxonomies. At still higher levels, theoretical ideas are classified, axiomatic statements or postulates are made and finally theories giving a complete description of the universal laws governing a given phenomenon or situation are formulated.
3. The four main characteristics of research are: objectivity, precision, design and verifiability. All of them need not be present in applied research on an educational problem because, solutions to an educational problem are sought at different levels of complexity.
4. Complex human behaviour involving
 - a great number of independent and interactive variables,
 - difficulty in observing the behaviour of participants,
 - replicating the experiments,
 - eliciting responses from subjects and controlling the complex behaviour of human subjects, and
 - the problem of precisely measuring human behaviour, are some of the constraints in applying scientific method to educational research.
5. The major areas of educational research are related to development, curriculum, teaching, sociological academic issues affecting education, educational administration, development of educational technology and problems of individual differences among learners.

All the above areas are interrelated and the research findings in one area would influence the thinking in other areas, and thus lead to an integrated approach to educational research.

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Introduction to Research in Distance Education

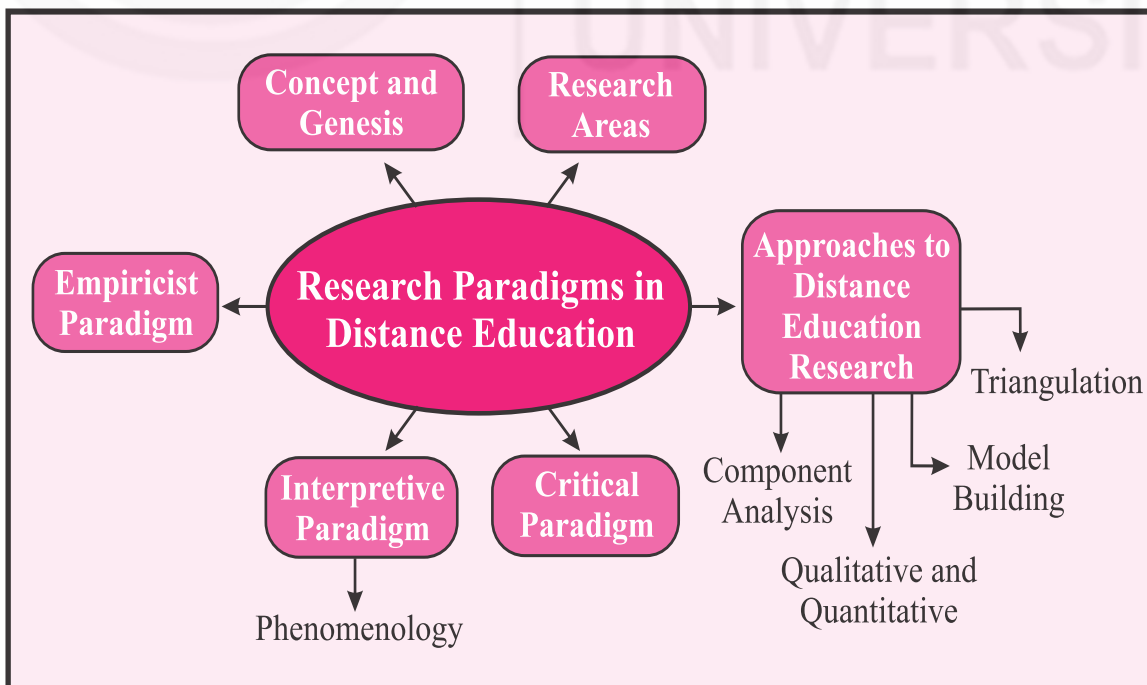
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UNIT 2 RESEARCH PARADIGMS IN DISTANCE EDUCATION

Structure

- 2.0 Introduction
- 2.1 Objectives
- 2.2 Research Paradigms in Distance Education
 - 2.2.1 Empiricist Paradigm
 - 2.2.2 Interpretive Paradigm – Phenomenology
 - 2.2.3 Critical Paradigm
 - 2.2.4 Phenomenography and the Second Order Perspective
- 2.3 Approaches to Distance Education Research
 - 2.3.1 Qualitative and Quantitative Approaches
 - 2.3.2 Triangulation Approach
 - 2.3.3 Component Analysis Approach
 - 2.3.4 Model Building
- 2.4 Research Areas
- 2.5 Let Us Sum Up
- 2.6 Check Your Progress: The Key



2.0 INTRODUCTION

Distance education has significant components which are more industrial than academic in nature. The development of distance education is being shaped by technological, demographic and political forces, as well as distance teaching experiences of the practitioners. These components bring in changes in this system rapidly and radically. In other words, you can say that research is essential to know the effect of changes so that future decisions in the field of distance education can be shaped according to the results of the present study and previous developments. It will provide a basis for decision making and policy formation (Koul, 1993).

You are already aware that distance education is not simply a mode to deliver learning materials through different media, but a form of educational experience which requires analysis in terms of the range of strategies, the techniques and tools used to improve its practice. There is always a concern for directing research activities in distance education to the real needs of the participants – those engaged in teaching at a distance, the distance learners, those who provide support services and the administrative and management systems which deliver distance education. As a student of this course, we hope that this Unit will familiarise you with the developing traditions of research activities in distance education, to understand why research is directed towards certain problems or phenomena and to design research activities for producing knowledge. The Unit deals with the models, patterns or ways in which you can go about conducting research in distance education. We will inform the possibilities, approaches and limitations of various tools and techniques, models etc. This will enable you to analyse, theorise and pose questions which deal with a large number of teaching and learning issues, macro perspectives involving social and political effects, impact of distance education system, and communication issues.

This Unit will serve as a guide for the beginners of research in distance education. It is assumed that the field of distance education has produced and will continue to yield growing bodies of knowledge. But, knowledge does not grow naturally or inexorably. It is produced through the critical inquiries of practitioners or scholars – and is, therefore, a function of the kinds of question asked, problems posed and issues framed by those who conduct researches. To understand the methods and findings of research carried out in the field of distance education, one should appreciate and utilise the varieties of ways in which research questions are formulated. The framing of research questions, like that of an advocate asking questions in a court of law, limits the range of permissible responses and prefigures the character of possible outcomes. In other words, it is essential that a researcher understands the questions that have been asked and the manner in which those questions have been framed, both conceptually and methodologically. As a researcher, you should know why research is formulated in a specific fashion, what the alternative approaches to inquiry are, how to work on a research project, how to select a tool and how to prepare a design for research. The paradigms of research will provide you a solid background in each of the research discourses and allow you to explore the trends of research from a global perspective. In a way, these paradigms inform us about problems and procedures which are consistent with researching within a specific social, cultural, economic and political framework. Keeping in view the above facts, this Unit provides you a detailed discussion pertaining to paradigms of research.

2.1 OBJECTIVES

On the completion of this Unit, you should be able to:

- Describe the concept of ‘paradigm’,
- Distinguish between the three paradigms of research,
- Explain the approaches to distance education research, and
- List the different areas of the research in distance education.

2.2 RESEARCH PARADIGMS IN DISTANCE EDUCATION

There are a number of issues pertaining to the nature of research in distance education: for example, whether the proposed research topic is as per the need of the situation; how shall the topic be viewed by the wider community of distance educators engaged in research activities; what sort of theoretical interpretation might lie behind the research questions; what is the status of research in distance education and how to theorise and generate knowledge in distance education. To answer these questions it would be useful to introduce the idea of various model and approaches to research. Many researchers have talked about the way scientists use models known as maps or paradigms to develop a framework for distance educational research.

The paradigm approach provides for a solid background in each research exercise and helps us to follow up, in depth, specific areas. This background is an essential part of the development of models in distance education research.

There is always a concern for directing research activity in distance education to the real needs of the participants – those engaged in teaching at a distance and those who provide services to deliver distance education. It is also essential to connect research in education and social sciences. For example, there are some commonalties between much of what occurs in distance education and the work done with individualized instruction, independent study, and technology. Coldeway (1990: 388) emphasised that the enormous amount of work done on personalised instruction systems could be used to form base line data to begin research in distance education. The research should deal with micro perspectives such as teaching and learning at a distance and macro perspectives involving social and political effects, impact of the distance education system, communication technology, etc., which will form a mine of information. In other words, although distance education is very different from education in a conventional setting, research carried out on conventional campus based students can provide a framework for developing research paradigms for students studying at a distance.

The Concept and Genesis of Research Paradigms

The concept of paradigm has turned out to be useful in inspiring critical thinking about “normal science” and the way shifts in basic scientific thinking occur. A paradigm determines the criteria according to which one selects and defines problems for inquiring and how one approaches them theoretically and methodologically. A paradigm could also

be regarded as a cultural artifact, reflecting the dominant notions about scientific behaviour in a particular scientific community, be it national or international and at a particular point in time. In other words, we can say that paradigms determine scientific approaches and procedures which stand out as exemplary to the new generation of scientists – as long as they do not oppose them. A ‘revolution’ in the world of scientific paradigm occurs when one or several researchers at a given time encounter anomalies’; for example, they may conduct experimental studies, make observations, which in a remarkable way do not fit the prevailing paradigm. Such anomalies can give rise to a crisis after which the universe of research under study is perceived in an entirely new light. Previous theories and facts become subject to thorough rethinking and re-evaluation. It is relatively easy to point out changes in paradigms in natural sciences. For example, in physics paradigm shift occurred from Aristotle via Galileo and Newton to Einstein. But when research activities in social sciences emerged in the nineteenth century, a conflict was observed in the field of research concerning both the purpose and method of inquiry. Alternative perspectives have been proposed and accepted by many. The value of alternative approaches was not denied, since scholarly debates and the exploratory use of these alternative approaches, add vitality to the field. During the 1960s and 1970s, scholars from different social science disciplines studied educational problems with many disciplinary affiliations. Most of them have a background in psychology or other behavioural sciences, but quite a few of them have humanities background in philosophy and literature. Thus, there cannot be a single paradigm prevailing like in the normal science in the multi-faceted field of research in education. So, the scholars contributed new methods and new perspectives.

Some scholars argue that there are two main paradigms – the (i) scientific and the (ii) humanistic which are not exclusive, but complementary to each other. Nevertheless, it can be argued that the drawing of a distinction between these two approaches cannot be sustained to the extent that they are regarded as two different paradigms. The twentieth century has seen the conflict between these two as employed in researching educational problems. The one which is modeled on the natural sciences shows emphasis on empirical quantifiable observations and analyses data with mathematical tools. The other paradigm is derived from the humanities with an emphasis on holistic and qualitative information for interpreting data.

A review of relevant literature indicates four major paradigms:

- (i) **empirical** – analytic (roughly equivalent to quantitative science)
- (ii) **interpretive** – symbolic (qualitative or hermeneutical inquiry)
- (iii) **critical** - (where criteria relating to human betterment are applied in research)
- (iv) **phenomenography**

Let us now examine each of these in detail.

2.2.1 Empiricist Paradigm

This paradigm emphasises careful and controlled observation as the basis for knowledge. The observer is dispassionate and independent of the object of observation. Knowledge is objective, generalisable and can be used to predict and control future events (Smith et.al.

1990). In other words, within an empiricist research paradigm, the activities or processes proceed in a hypothetical - deductive way. Here we have a theory behind the particular problem we wish to investigate. The theory provides the concepts which pose the research problem. The hypotheses arise from the theoretical framework made up from the concepts and variables interacting with each other. Holmberg (1990: 159) emphasised that scholarly work that tests propositions and modifies theoretical approaches has to be intersubjectively rational, exact, and of non-partisan character.

Since research processes, according to this view, should proceed by the hypothetical – deductive problem method, you need to have some kind of theory for a particular problem you wish to investigate. This theory or model will provide the language and concepts which pose the problem. Your hypotheses will arise from the theoretical framework made up from the way the concepts or variables interact with each other.

For example, you want to explore the relationship between distance teaching and independent learning. For this problem the following hypotheses can be formulated with the eventual aim of operationalising the statements and finding ways of empirically testing them. These hypotheses are:

1. Distance learning is possible without a counsellor or teacher.
2. Emotional involvement in the study promotes deep learning and goal attainment.

You can notice that if we are to move to an empirical approach for testing the above hypotheses, we are faced with a problem of deciding what we might measure, how to go about measuring emotional involvement, deep learning and goal attainment. So within empiricist research, a hypothesis must focus on a meaningful problem, have clearly defined concepts. After this, to verify our assertion that there exists a relationship between emotional involvement and deep learning, we have to construct and conduct the test. We also have to design the research activity, whether to select the experimental approach or any other method. If we decide to be experimental in our approach, we have to manipulate the extent of emotional involvement to see whether there is any effect on deep learning. Who will be our subjects? Also, we have to take into account the practical and ethical considerations in attempting this empiricist approach. You can see that you have to prepare a typical pattern for empiricist approach. The steps involved are:



Deriving a theory is a deductive principle, but a theory which is based on evidence can be proved only by the induction approach. For example, a researcher observes again and again that friendly communication (feelings of belonging and personal relations between learner and tutors) influences not only motivation but also achievement favorably. General opinion among educators supports the researcher in assuming that what he/she has

induced from the cases is based on the theory or a law. A theory to this effect is developed and various hypotheses derived from it – and, in fact, agreeing with what has been noticed in practice, and tried empirically. In other words, assumptions are then deduced from theory. In distance educational research we investigate facts concerning the student (numbers, age group, qualifications, socio-economic status, etc.), the use of media and methods, organisation and administration. Accepting this kind of fact finding in research activity implies the assumption that there is, in fact, a reality that can be observed objectively.

Activity 1: Prepare an outline of a research exercise in an area that you are interested in by using the steps of empiricist paradigm.

2.2.2 Interpretive Paradigm - Phenomenology

This paradigm emphasises social interaction as the basis of knowledge. The researchers use their skills as ‘social actors’ to understand the subjective worlds of others. Here knowledge is subjective, constructed through mutual negotiation and is specific to the situation under investigation. The difference between empiricist and interpretive paradigms is that the empiricist approach focuses on prediction and control, but the interpretive approach is concerned with the understanding of a particular situation by the researcher.

The interpretive approach focuses on the intentions behind human actions, seeks to uncover, and interpret the meanings of all that is happening, being done or being understood by those who are involved in the activity under investigation (Nunan 1990: 26). This type of research includes qualitative methods of study. Here the focus is on the observed present, but the findings are contextualised within a social, cultural and historical framework.

The dominant influence within the interpretive paradigm has been research on students approach to learning. The research study focusing on students' learning, particularly following the phenomenography of Marton and Saljo (1976) explained the deep and the surface approaches. The idea of approaches to learning, though apparently simple, is very useful in understanding why students learn differently under the same circumstances. It is not a learning style inherent in students which they manifest in all situations, but a characteristic of interaction between an individual and learning task. So, it is the interpretation of an intention and an action. It only has meaning with reference to a situation with certain types of content.

From phenomenography approach (you will learn about it in 2.2.4), Marton and Saljo (1976) came to this important point about distinguishing deep from surface learning and explained that students would adopt the means of processing academic tasks according to their intentions or perception of their course and the task. If learners merely wished to display symptoms of having learned, they would adopt a surface level approach. If they wanted to grow in understanding, they would adopt a deep level strategy. The approaches to learning movement has influenced distance education literature. From the above discussion you must have realized the impact of interpretive paradigm on deep and surface levels of learning. But what is the **phenomenological** approach? Let us discuss in brief about two **phenomenological** approaches before you proceed to the strength and limitations of interpretive paradigm.

Phenomenology – It is concerned with an interpretive understanding of human action. As a philosophical movement, phenomenology was founded by Edmund Husserl. Its main concern is to provide philosophy with a foundation that will enable it to be a pure and autonomous discipline free from all presuppositions. Its method is essentially descriptive, and the aims are to uncover the fundamental structures of intention, consciousness and the life-world. The idea of the life-world of 'lived-experience' which is always taken for granted even by empirical sciences, is one of the two main concepts of phenomenology, which has interested many social scientists including psychologists. Nevertheless, critics have argued that when phenomenological concepts are transferred from their original domain to the context of social science, their meaning is radically transformed. In a wider context, we can say that phenomenology has influenced the researchers' analysis of the constructs and the interpretation in reality. For example, an important point about students learning approaches is that one depends upon the student's perception of the course, the teaching and the learning environment. A range of constructs such as heavy workload, didactic teaching, content oriented assessment and a fact-filled syllabus have been consistently met with a surface approach. The constructs made by the researcher, through phenomenological analysis, in a learning environment help to study the behaviour of the distance learner as the researcher tries to explain in accordance with the constructs whether the learner has deep or surface level learning. The phenomenological analysis of learning approaches has provided the researchers with interpretable tools which are sensitive to the context of the department or the individual learner or teacher; so it helps in designing courses and planning curriculum more conducive to students employing a deep approach.

Phenomenological and interpretive researches derive their responses for the subject and blur the distinction between subjects and objects. Phenomenological concern attends to how subjects make sense of the world. How do learners, or teachers or whoever

interprets social practice and situations in which they find themselves? Phenomenologists look to the 'object' of study for descriptive first order constructs. What were formerly objects, for example, students, teachers or educational administrators are now subjects.

Phenomenologist adopts an attitude of epochs, where past beliefs, opinions, attitudes, experiences, ideologies, and frames of references propose that the discourse of research emanate from the subjects. Subjects expose first-order constants by which they organize and make sense of their daily lives. Researchers then develop second-order scientific and explanatory constructs that account for first-order constructs.

Some issues such as defining the perceived social situation, collecting data through unstructured and informal approaches should be handled properly to collect relevant information. In any interpretive study, the researcher may sometimes receive information which is not intended for public disclosure. Being a participant and an observer, the researcher carries a number of responsibilities to deal with a particular situation with moral considerations because the construction of meaning from an observational account and informal interviews is a key activity in interpretive paradigm. The limitation of the interpretive paradigm is that there is no inherent mechanism for moving beyond interpretation. If this paradigm is followed, the researcher depends on the level of interpretation and there is no mechanism for moving on towards remediating the identified problems.

2.2.3 Critical Paradigm

The critical paradigm emphasises that knowledge is problematic and capable of systematic distortion. It represents the interests of some groups within society and has the potential to be either oppressive or emancipating. This approach shares the assumptions of the interpretive approach but adds the above element. One of the concerns of the critical paradigm is to understand the theory as well as practices.

Now, to reconceptualise this research activity, let us take the example of learning styles of a distance learner. In this case, our first concern will be to try and understand the practices of distance learners as they engage in learning. As a participant in this research, the researcher will be setting up strategies which involve learners in critical reflections about their actions as learners at a distance. The researcher has to listen to their language and conceptual understanding of the way in which the learners are emotionally involved in influencing their abilities to learn and attain their goals. The researcher may anticipate the introduction of social and political contexts in this approach.

Sometimes the researcher may change the situation in order to provide a greater degree of control to the learner. For example, warmth in human relations, and rapport with teachers at a distance could be collectively redefined in ways which change the practices of those attempting to facilitate learning at a distance. The use of collective redefined actions by previously isolated and independent students to achieve changes in their involvement within the educational enterprise may also be explored. This is because the critical paradigm sees knowledge developing as participants are actively involved in construction and reconstruction of theory and practice. The approaches involved in this

paradigm are emancipatory praxis and critical pragmatism. For example, emancipatory praxis identifies a 'guidance' role for expert researchers in facilitating involvement of participants; critical ethnography supports emancipatory action; and critical pragmatism extends beyond the typical critical approach and helps for post- structural analysis.

In the critical paradigm, the researcher has to identify the social group of the participants/ subjects through dialogue and analysis of the intentions of the participants. He/she has to study the historical development of the social conditions and the current social structure to understand the group. The researcher has to collect data with the help of participant observation and in-depth interview. He/she has to involve himself/herself to visualise the social situation. The key feature of this paradigm is its concern for finding the truth/facts without distortion or bias. It focuses on sociological and political issues as a research problem.

One mode of research associated with the critical paradigm is action research which is a form of participatory and collaborative research, aimed at improving educational settings and teaching and learning practices. Action research aims to help practitioners investigate the connections between their own theories of education and their own day-to-day educational practices. It aims to integrate the research act into the educational setting so that research can play a direct and immediate role in the improvement of practice and its aim is to overcome the distance between practitioners to become researchers. Groups of participants may be tutors/counsellors/teachers of distance learners, heads of institutions, parents and other community members – any group with a shared concern.

Check Your Progress 1

Explain the importance of paradigms in distance education research.

Notes: (a) Space is given below for your answer,
(b) Compare the answer with the one given at the end of this unit.

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2.2.4 Phenomenography and Second Order Perspective

Phenomenography has been extensively dealt with by Marton (1997). According to him, “Phenomenography is the empirical study of the limited number of qualitatively different ways in which various phenomena in and aspects of the world around are experienced, conceptualized, understood, perceived, and apprehended”. Phenomenographers call it a ‘second order perspective’.

This point can be explained with the help of an example taken from a piece of phenomenographic research. One of the ways in which children experience numbers is as “fingers-numbers” which is stated by Nunan (1987) and quoted by Marton (1997). Children frequently lay the numbers 1 to 10 in their fingers present in two hands, calling one of the little fingers ‘1’ (one), the ring finger ‘2’ and so on. Numbers larger than 5 are then understood as 5+ some fingers. In carrying out simple arithmetical tasks, children try to keep the undivided ‘5’ together. Hence, when solving problems like $2+7=9$, they reverse the addends and transform the problem to $7+2=?$ where 7 is “undivided” $5+2$ and the problem as a whole becomes $(5+2)+2=?$.

From the above example, you can understand a concept of something or a way of experiencing something. The two expressions are being used interchangeably. It is a way of being aware of a phenomenon. One might be aware of 7, when one perceives it as $5+2$, when one looks at one’s hand or as $6+1$ or $4+3$, it might be an immediate experience of the number 7; it might be the result of reflection or some other possibilities. So, here the perceptions differ in a qualitative way.

Phenomenography is a research specialization. The researches were carried out at the University of Goteborg, Sweden, in the early 1970s. The point of departure for these studies was one of the simplest observations that can be made about learning, namely, that some people do better at learning than others. These observations led to the first question which was to be investigated empirically, (a) what does it mean to say that some people are better at learning than others? This in turn led to the second question, (b) why are some people better at learning than others?

This phenomenographical study was carried out with individual tasks provided to the learners under comparatively natural conditions and learners were allowed to read the text provided to them. Thus, after completing their reading, the students were interviewed about what they understood the text to have been about. The interview also pertained to their experience of the situation and they were specifically asked how they had gone about learning the text. All the interviews were recorded and subsequently transcribed verbatim. On examining the transcripts of the students’ accounts of how they had understood and remembered the text as a whole, it was found that there were different ways of understanding the text; thus, a hierarchically ordered set of categories were devised and termed the “outcome space”. By referring to this outcome space, the categories of description could be compared with one another to judge how appropriate, in relation to specified criteria, the understanding they represented was. Thus a way was found for answering the second question as to why are some people better at learning than others. Further research for answering the second question demonstrated the relationship between approaches to learning i.e. surface and deep on the one hand and the quality of the outcomes on the other. This phenomenographic study developed the

notion of two approaches to learning. The idea of approaches to learning is very useful in understanding why students react differently in the same circumstance.

Thus, two key issues regarding phenomenographic study are:

1. Different ways of understanding a specific content which learners developed in a certain situation; sense was made of these in terms of differences in the approaches the learners adopted to the specific learning task, that is, in terms of differences in their ways of experiencing the specific situation.
2. The second issue is that in developing the phenomenographic research, the focus of interest was to shift away from that which emerges in a specific situation and toward the learner's pre-conceived ideas about the phenomena dealt with in the specific situation. For example, the way in which children understand numbers, is of vital importance to the way in which they deal with problems in arithmetic.

The above discussion points out that, phenomenography is the empirical study of the limited number of qualitatively different ways in which various phenomena can be experienced, understood, perceived and conceptualised. This may be considered as a way of finding out how the development of knowledge and skills within the domains can be facilitated.

In this section, we discussed the research paradigms in distance education and phenomenography which has significant contribution to research studies pertaining to students' learning.

So, our research can serve various interests: It can seek forms of knowledge, it can be shaped by various media and it can give rise to a form or pattern of paradigm.

Having presented to you the four research paradigms, we shall now examine a few methodological issues and approaches.

2.3 APPROACHES TO DISTANCE EDUCATION RESEARCH

In the above discussion in sections 2.1 and 2.2, you saw how a research method is a particular way of studying a problem. With the increasing number of research studies in distance education, much emphasis is laid on methodological issues and approaches to research in this field. In this section, we will present to you a few issues and approaches of research.

These approaches will provide you with guidelines by which you can design a research problem, develop field techniques to collect data, interpret data and arrive at generalisations.

2.3.1 Qualitative and Quantitative Approaches

Qualitative methods help us to examine the nature of human behaviour and experience and also social conditions. But quantitative methods focus on objective and standardised

means of inquiry and application of statistical analysis for attainment of objectivity and generalisations.

Qualitative methods permit the researcher to study selected issues, cases or events in depth. Qualitative data are collected through direct observation, participant observation, in-depth interviewing, case studies, recorded documents, open-ended questionnaires and journals. Quantitative methods use standardised measures that fit diverse opinions and experiences into predetermined response categories. This approach measures the reactions of a large number of individuals to a limited set of questions, thus facilitating comparison and analysis of the data with the help of close-ended questionnaires, attitude scales, rating scales and postal surveys.

The qualitative-quantitative debate has persisted in the field of research. It has been more of a philosophical debate than that of research practices. Qualitative methods have been the subject of considerable controversy among social scientists. The philosophical and theoretical perspectives which under grid qualitative methods include phenomenology, naturalistic, behaviorism, and psychology. The philosophical roots of qualitative methods emphasise the importance of understanding the meanings of human behavior and the socio-cultural context of social interaction. This method estimates validity, reliability and objectivity of a social situation and tries to picture the empirical social world as it actually exists to those under investigation, rather than as the researcher imagines it to be.

A large number of works on quantitative methods offers the use of this method in the context of distance education. Various qualitative research methods like ethnography, case study, grounded theory (Minnis, 1993, Marland 1989; Coldeway 1990) and the methodology of critical reflection put forward by Evans and Nation (1989) are considered to be more promising in this context.

In recent years, the debate has softened. A consensus has gradually emerged that the important challenge is to match appropriate methods to research questions and not to advocate any single methodological approach for all research situations. Both qualitative and quantitative data can be collected for/under the same study.

2.3.2 Triangulation Approach

As a reaction to the debate between the qualitative and quantitative approaches, significant researches have highlighted many flexible and eclectic approaches. One of the eclectic approaches in distance educational research is triangulation. The choice of research methods follows not from research doctrine, but from decisions in each case as to the best available technique. The problem defines the method used not vice versa. Equally, no method (with its own built-in-limitations) is used exclusively or in isolation; different techniques are combined to throw light on a common problem. Besides viewing the research problem from a number of angles, the 'triangulation' approach facilitates the cross-checking of otherwise 'tentative-findings'.

As you know, qualitative approach puts more emphasis on participant observation, open-ended questionnaires, in-depth interviewing and analysis of documents. On the other hand, quantitative approach uses close-ended questionnaires and survey methods for

collection of data. As a precaution against subjectivity in both the approaches, the triangulation method insists on cross-checking the important findings through the use of different techniques, coding and appropriate checking of open-ended questions, and independent interpretation of data by different members of the research team. While using this approach, theoretical principles and methodological ground rules can be discussed and made explicit, criteria for selecting or rejecting areas of investigation can be spelt out and evidence can be presented in such a manner that others can judge its quality.

This method attempts to eliminate bias or error and as a result increase the probability of a truthful explanation. There are three major goals of triangulation, namely: convergence, inconsistency and contradiction.

Convergence is the first goal of triangulation approach. Here, the result of data collected from different sources, methods and investigations are combined to provide evidence about a single phenomenon.

Inconsistency refers to the inconsistency among the data. Often multiple measures produce conflicting evidence that do not confirm a single proposition.

Contradiction – This refers to the data collected from various sources being not only inconsistent, but also contradictory.

In the context of distance education, some of the research problems are complicated, often confounded with a variety of interlocking variables. Sometimes, it may even be difficult to carry out the research. A triangulation method may prove effective in dealing with a variety of variables. For example, a researcher wants to study the development of the distance education system during the nineties. He/she has to consider a variety of interlocking variables pertaining to instruction, management and logistics. The variables associated with the instructional system are learning strategies, instructional materials, feedback and support system, etc. In management system, the components are organizational structures, policies and procedures of an institution, leadership and use of researchers. Finally, logistics include technical quality, programme delivery and instructional environment.

The researcher uses the triangular approach for increasing the validity of research findings. He/she uses multiple methods and multiple data sources. The approach helps the researcher to eliminate bias or error and as a result, increases the probability of a truthful explanation.

2.3.3 Component Analysis Approach

The term ‘component’ refers to one of the features or parts of a system. For example, in distance education system the components are learners, instructional materials, support services, etc. Here, the components that directly affect learners are of particular interest for research. It begins with an analytical phase to identify the nature of each component and how they possibly interact. Once the components are identified, it is possible to determine the contribution each component has towards the overall effect.

For example, a distance education programme has the following components:

- i) Printed course package,
- ii) A set of audio and video-cassettes,
- iii) Interactive radio and television,
- iv) Access to counselling sessions, and
- v) Set of policies related to admission and evaluation processes.

The above components work together to produce a particular effect i.e., achievement, rates of course completion, etc. Suppose a researcher wants to determine which of these components are most important in producing a particular effect, say, completing a programme. The first stage in component analysis research would be to analyse each component in the course to determine whether it exists at a level of quality. For example, to determine the instructional components in the printed package, one has to analyse the well-written objectives, clear presentation and self check questions that match the objectives of the components. It may be useful to begin research work with formative evaluation than to determine the overall effect of a programme. Component analysis approach is a good way to combine the benefits of evaluation with a potential programme of more generalisable research (Coldeway 1990: 394).

2.3.4 Model Building

Model building approach provides ways of addressing important research questions that are ignored while designing the framework of research. It serves to integrate various knowledge bases together. Information outside of distance education can also be used to guide decision making. Calvert (1989) proposed a conceptual framework indicating relationships between various input, process and outcome variables. The framework helps to construct a model of a distance educational research programme. Model building for distance educational research is useful to begin with a research problem and to predict the difficulties in conducting the research and to estimate the reliability and external validity.

Check Your Progress 2

List the four approaches to distance education research.

Notes: (a) Space is given below for your answer

(b) Compare the answer with the one given at the end of this Unit.

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2.4 RESEARCH AREAS

Considering the extensive practice of distance education and the investigations made of this practice, there is good reason to categorise these research studies. Studies conducted by various distance education practitioners show uneven distribution across the areas of research. The categorisation of research activities into various areas are done by Panda (1992), Jegede (1993), Holmberg (1996) and others during the 90s. Some reviews by (Berge and Mrozowski 2001, Lee et al 2004 and Zawachi Richter 2009) categorized research studies in the last decade. These studies emphasise that the core areas of research in distance education have an identity, a sense of questioning and the capacity for qualitative analysis with reference to theoretical approaches. Evans (1990) mentioned that there are more than 600 universities and colleges with higher distance education programmes in China. Most of them have established research institutes of higher distance education. The issues evoking researcher's interest in China are: reform problems of distance education, problems arising from satellite television and broadcast education, cooperation and union in distance education and studies for foreign distance education. Sherman and Nedza (1990) classified the areas of distance education research into six categories. They have explained that interest in research in the field of distance education is worldwide. They have suggested a broad range of topics of research conducted in developed and developing countries:

- i) Research, Philosophy and Information,
- ii) Student Support and Success,
- iii) Curriculum Development and Special Courses,
- iv) Tutor and Faculty Development and Evaluation,
- v) Technology in Distance Education, and
- vi) Administration.

Holmberg (1996) analysed the character and scope of distance education as a field of scholarly enquiry which adds weight to the view that distance education is a well delineated field of academic inquiry. Further areas of research in distance education as stated by Holmberg are history, target group, student bodies, the administrative practices, student evaluation, etc. In an analysis of periodical literature published in four referred journal of Open and Distance Education, Mishra (1997) categorised the papers into seven groups: Distance Education in Perspective (18%), Students and their learning (21.88%), Learning materials and related issues (9.41%), Technology issues (14.12%), Management issues (9.14%), Distance Education: Theory, research and training (11.63%) and Distance Education in practice (15.78%).

You will read about the various categories by different authors in Unit 3 of this Block. In the above discussion, we have made an attempt to outline the areas of research in distance education identified by various distance education practitioners. These areas of concern are being subjected to investigation by various researchers world over.

Check Your Progress 3

What are the four broad areas of research which require priority attention in developing countries?

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

(b) Compare the answer with the one given at the end of this Unit.

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2.5 LET US SUM UP

In this Unit, we have discussed the need for research and development. In section 1 of this Unit, we have focussed on the three paradigms of research. They are: empiricist, interpretive and critical paradigms. At the end of the Unit we have explained the research areas identified by various practitioners.

2.6 CHECK YOUR PROGRESS: THE KEY

1. A paradigm determines the criteria according to which we select and define the problem. It also acts as cultural artifact, which reflects the scientific behaviour in any

community. In distance education it provides a background in the research exercise and helps to go into depth.

2. a) Qualitative and quantitative approach, b) Triangulation, c) Component analysis, and d) Model building.

A research paradigm provides a solid background in each of the research discourses and allows us to understand research problems clearly. It helps us to know the procedure and background for conducting research in distance education.

3. The four broad categories which, according to expert views, need priority attention are:
 - i) Developing Study Skills
 - ii) Professional Development
 - iii) Management and Planning
 - iv) Student Evaluation

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Introduction to Research in Distance Education

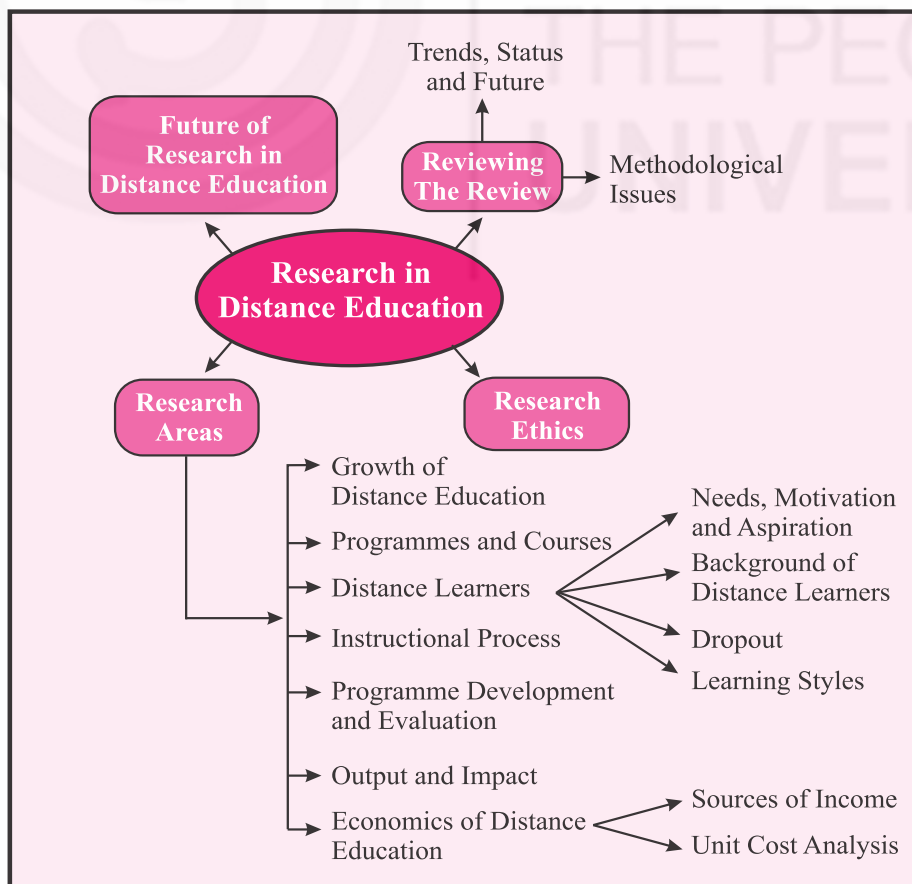
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UNIT 3 RESEARCH IN DISTANCE EDUCATION

Structure

- 3.0 Introduction
- 3.1 Objectives
- 3.2 Reviewing the Review
 - 3.2.1 Trends, Status and Future Development
 - 3.2.2 Methodological Issues
- 3.3 Research Areas
 - 3.3.1 Growth of Distance Education: Policies, Patterns and Organization
 - 3.3.2 Programmes and Courses
 - 3.3.3 Distance Learners
 - 3.3.4 Instructional Processes
 - 3.3.5 Programme Development and Evaluation
 - 3.3.6 Output and Impact of Distance Education
 - 3.3.7 Economics of Distance Education
- 3.4. Research Ethics
- 3.5 Future of Research in Distance Education
- 3.6 Let Us Sum Up
- 3.7 Check Your Progress: The Key



3.0 INTRODUCTION

Distance Education is an innovative and steadily growing system of education in the world, both at the school and higher education levels. Various types of distance education institutes have emerged world over. These are; single mode distance education universities (Open Universities) to conventional universities offering same or similar courses through conventional and distance education mode (Dual Mode Universities); and programmes offered on the Internet (Virtual Universities). With the innovation of the virtual universities and death of distance, there is a quantitative as well as qualitative shift in the higher education.

Research in Distance Education is a distinct area of academic interest and is emerging since 1960s. With the beginning of the British Open University in 1969, a more serious and systematic attempt to study the components of Distance Education started which helped to improve the distance teaching learning process. Later, a few other universities Fernuniversitat in Germany, Center for Research in Distance and Adult Learning (CRIDAL); Hong Kong, Staff Training and Research Institute of Distance Education (STRIDE); Indira Gandhi National Open University (IGNOU); New Delhi, etc. opened specialized research departments that can contribute to research in open and distance education. The focus of research in DE differed from country to country.

In this unit an attempt has been made to introduce you to different areas of research on Distance Education in India and abroad. Under each area, a synoptic view has been projected on the basis of findings of the studies.

3.1 OBJECTIVES

On the completion of this Unit, you should be able to:

- Prepare a review of research in distance education
- Analyze the Indian and international trends of distance education research in a few selected areas of research,
- List the findings of studies conducted in different areas of distance education ,
- Identify the gaps and overlaps of research conducted
- Appreciate the concerns for ethics of distance education research, and
- Work out further research priorities in distance education in your own country.

3.2 REVIEWING THE REVIEW

Number of authors reviewed the researches in distance education. During 90s more than nine authors reviewed the researches (Sherman and Nedza 1990, Scriven 1991, Panda 1992, Rekkedal 1993, Jegede 1994, Calvert 1995, Mishra 1997, Koble and Bunker 1997 and Holmberg 2000) from various angles. Scriven categorized the articles into nine headings whereas Panda reviewed the studies in India under nine themes. Mishra did the analysis of periodical literature (*Indian Journal of Open Learning*) and came out with

seven major and 34 subgroups of research topics. Koble and Bunker did the analysis for *The American Journal of Distance Education* (1987-1995) under seven major categories. Jegede identified research priorities for Australia and came out with 22 major groupings. Holmberg classified the studies into two major headings- Endogenous and Exogenous. You can read these reviews by accessing these articles from the internet or from the journals where the article is published.

From the year 2000 till 2010, few other authors reviewed the researches in Distance Education. Reviewers categorized researches into various categories (table1) and emphasized on one or more areas of distance education.

Table 1. Comparative Categorization of Research in Open and Distance Education

Berge and Mrozowski (2001)	Rourke and Szabo (2002)	Parhar (2003)	Lee etal (2004)	Zawachi-Richter(2009)
Roles of Key Participants	Administration	Need Assessment	Design Related Topics	Macro Level: Distance Education System and Theories
Technology Selection and Adaptation	Evaluation	Learning Styles of Distance Learners	Development Related Topics	Meso Level Level:Management Organization and Technology
Design Issues	Foundations	Instructional Strategies	Management Related Topics	Micro Level:Teaching and Learning in Distance Education
Strategies to Increase Interactivity	Instructional Design	Cost Effectiveness	Evaluation Related Topics	
Learner Characteristics	Instructor Characteristics	Assessment and Evaluation	Institutional and Operational Topic	
Learner Support	International Perspectives		Theory and Research Related Topic	
Operational Issues	Learner Characteristics			
Policy and Management	Technology and Media			
Equity and Accessibility	Trends			
Cost/Benefit trade-offs				

These reviews are important for the future researchers (students), practitioners and policy makers. The researchers can locate a problem for future investigation and can also formulate the theoretical framework for their own study. The practitioners can make use of the findings for problem solving, quality assurance or re-development. Finally the policy makers who are in the field of distance education can plan and structure the decisions based on the reviews. Also they provide suggestions for planning, development, production and distribution, implementation of various distance-learning activities.

Analysing the reviews from 2000 - 2010, you will notice that the review by Berge and Mrozowski 2001 adopted Sherry's (1996) ten categories of research in distance education. Rourke and Szabo (2002) did a content analysis of the articles published in the Canadian Journal of *Distance Education* from the year 1986-2001. After analysis he categorized the studies in nine categories. Parhar in 2003 reviewed articles published during 1998-2001 in the four leading journals in the world on distance education. The articles were analysed for the content. A set of five categories were identified in this review which is presented in the Table 1. Lee et.al. also did the content analysis of the research articles. He developed a system of six broad categories for grouping distance education literature. He further identified the sub categories under each six category. An important study was undertaken in the year 2009 by Zawachi- Richter where the author validated classification of research areas in distance education through a Delphi study method. The author classified the studies under three levels - Macro, Meso and Micro level. Further 5, 7 and 3 areas respectively were derived to organize the studies in distance education. In another study by the same author/s (Zawachi- Richter et. al in 2009) reviewed distance education literature to describe the status and identify the gaps and priorities area in distance education. Authors reviewed five distance education journals between 2000 and 2008. The review concluded that distance education research is strongly dominated by issues related to instructional design and individual learning process.

3.2.1 Trends Status and Future Developments

Most of the reviewers focused either on the research trends, status, research gaps or the future developments of distance education research. Taylor (1989), Jegede (1994), and Moore (1995) listed some gap areas where research is needed. These are policy and administration, instruction and course design, learners and learning process of distance learners, efficiency and effect, and so on.

Some scholars reviewed research on open and distance education in a particular country or a group of countries. For example, Walker (1997) reported research in open and distance learning within Australia, New Zealand and the Pacific; Baumeister (1998) reviewed research in European countries, and Rockwell (1999) identified future research needs for distance education in the state of Nebraska USA.

Moehle, Horst and Schoenherr and Kurt (2000) reviewed research during the last forty years. They concluded that research in distance education is mainly concerned with the future social professional needs, student support systems, media and virtual open and distance learning.

A few highlights from the trend analysis by the previous reviewers are worth mentioning here:

- Simultaneous diversification and convergence of techniques, changing relationships with students, changing relationship among the institutions and educational adaptation, (Miller 1993).
- Researchers have moved beyond experimental comparative studies and have introduced new methodologies such as discourse analysis (Saba 2000).
- Experimental research do not display rigor in their design and technology related research studies were popular (Jegede 2001).
- Attempts have been made to develop far reaching theories of distance education (Holmberg 2000).

3.2.2 Methodological Issues

Some other scholars have reviewed the research in distance education from the angle of methodological issues and approaches. These reviews offer meaningful guideline for assessing validity of research findings on designing research projects, develop field-based techniques for data collection, and interpret data. The implications of such reviews are particularly helpful for fellow researchers in distance education. Generally speaking, the studies use either qualitative or quantitative techniques.

In India, Panda (1992) analyzed the DE research literature and found that most of the studies are descriptive, surveys or experimental studies with poor methodological footing. Mishra (1997) critically analysed 361 papers published in four leading international journals of DE. He found that most studies followed descriptive method followed by survey. Later in another review Mishra (2002) categorized techniques into eight areas. Naidu (2004) suggested five (case studies, co relational studies, experimental, phenomenological studies and research synthesis) research methods for pursuing research in distance education.

International literature (Coldeway 1990; Jegede 2001, Minnis 1985; Marland 1989, Saba and Twitchele 1988) reveals that various qualitative research methods based on the descriptive analysis like ethnography, case study and grounded theory and the methodology of critical reflection put forward by Evans and Nation (1989) are considered to be more promising to understand the distance education phenomenon. Morgan (1984) reviewed the literature that used only qualitative research design. Saba (2000) reported that researchers have moved beyond experimental comparative studies and introduced new methods such as discourse analysis and in depth interview of learners. Coldeway (1988) and Suens and Stevens (1993) advised that researchers had often made errors and should have a clear understanding of issues like sampling, statistical significance, validity and reliability, etc.

Review by Berge and Mrozowski (2001) reports that out of 890 research articles, three fourths of the articles and dissertations (74.83%) involved descriptive research while 6% used an experimental approach to research problems. Lee et.al (2004) found that researchers used case study, experimental methods to conduct researches. Zawachi-

Rictor (2009) in the analysis regarding the research method shows that there is a trend towards qualitative research methods. On journal wise analysis the study showed that *American Journal of Distance Education* prefers to publish qualitative studies and *Journal of Distance Education* published papers which applied mixed method design. *Journal of Distance Education* published qualitative studies.

3.3 RESEARCH AREAS

There is a rapid development in research in distance education and large number of research articles being published all over the world. There are several sources namely published and unpublished research reports and doctoral dissertations, research articles in printed refereed journals and online journals, ICDL listings, Internet etc. The review in this unit is based on research articles published in printed journals, books and various other sources.

Majority of the research articles published in the journals were analyzed for its content. In the present unit we have tried to summarise the findings of the researches. Effort is made to include the studies from all the different areas of distance education. Though it is not possible to include all the studies but the important ones are highlighted.

Based on the national and international reviews, a set of categories were developed and accordingly the findings of the research studies were assigned to each category. These categories are:

- **Growth of Distance Education: Policies, Patterns and Organization**
- **Programmes and Courses**
- **Distance Learners**
- **Instructional Processes**
- **Programme Development and Evaluation**
- **Output and Impact of Distance Education**
- **Economics of Distance Education**

3.3.1 Growth of Distance Education

Although Distance Education institutions are fast coming up in many countries all over the world, they do not fit into any one particular model. The reasons for the diversity in their structure, growth and functions are to be located in their differing goals as well as the socio-academic environments. The policies, patterns and organisation of distance teaching institutions reflect the specific concerns of each institution in meeting its educational goals. Research in this area is important in understanding, assessing and evaluating the needs of a particular institution/country with a view to shaping its programmes and implementing them. Thus, understanding of research conducted abroad would be very useful for us.

In India, the first study under this category was conducted by Dutt (1976). The study was conducted on the trend of enrolment in correspondence courses from 1971 to 1976 taking into consideration the nature of courses, annual compound rate of enrolment and

levels of courses. There have been instances of studies on organizational aspects of correspondence courses by Anand (1979), Balasubramaniam (1986), Biswal (1979), Dutt (1984), Khan (1982), Nagaraju (1982), Pugazhenth (1985), Rao (1980), Sahoo (1985a & 1989), Sudame and Pugazhenth (1986), Satpathy (1989), Singh (1979), and UGC (1986). Almost all the studies highlight the gradual growth of DE in the country as a mere extension of the system of regular courses offered through traditional universities. Therefore, the courses have had limitations in meeting the academic and the socio-economic needs of distance learners.

Similarly there have been several attempts outside India to conduct studies in this area. Beardsley (1975), Kinsey (1975), Kuznestov (1975), Meirerhenry (1975), Wedemeyer (1975), Chamberlain (1977), Guiton (1977), Nolan (1977), Perry (1977), Pogano (1977), Sims (1978), Green (1980), Schuyer (1981) and Rumble and Borden (1983), Wiley (2009), Simpson (2006) are some of them. The common findings from these studies are that the organisational structures for DE are generally integrated within a larger system of education, usually, a large university complex. Within each educational set up, the DE systems follow certain overall policy statements on their roles and functions. The systems, however, have unique policy making models. Beauduin (2009) proposed a viable model (Consortia) for distance education in developing countries. Wiley wrote on a decade of development –open learning and Simpson reviewed the ways in which student success can be predicted in conventional and distance education.

Wei (2010) expressed that distance education and adoption of open learning in Chinese radio and TV universities is not an indication that they will copy wholesale. It will be developed in accordance with specific, political, social, cultural environments in Chinese context.

3.3.2 Programmes and Courses

Out of 40 DE institutions (which include Directorates of Correspondence Course and Open Universities), 14 to 30 institutions offered 37 degree level courses at undergraduate and post-graduate levels towards the end of the eighties. While courses belonging to Arts, Commerce and Education have been more popular, courses in other fields like Science, Law and Management have been gaining ground in this system (Sahoo 1989). While correspondence institutions are likely to introduce innovative courses, the approving bodies of parent universities look upon innovative proposals with suspicion and discourage experimentation in most instances (UGC, 1986). On the other hand, some of the potential students, dropouts and products of correspondence courses have shown their keenness to join innovative courses of applied and interdisciplinary nature, provided they are introduced through DE (Sahoo, 1985). However, nothing much has happened in this regard.

3.3.3 Distance Learners

A large number of studies conducted in India have focused on distance learners. Some of these studies focus on the needs and aspirations of learners, their motivation to continue and complete courses, background of learners, dropout and the factors influencing learners' decisions to pursue their studies.

Needs Motivation and Aspirations of Learners

Studies by Anand (1979), Khan (1982), Koul (1982), Kumar et al. (1986), Pillai and Mohan (1983), Singh (1983), Sahoo (1985), UGC (1986), and Mishra (1988) reveal that improvement of qualifications and desire for continuing with higher education acted as the major motivation for students in India for joining correspondence courses. A comparative study (Biswal, 1979) on academic motivation of distance and conventional students revealed that correspondence students had lower level of academic motivation than that of their regular counterparts. At the university level, learners joined correspondence courses in preference to regular conventional courses because of several personal and socio-economic reasons. The reasons as identified by Koul (1982) and Sahoo (1985), are: non-availability of time, mental maturity of learners, non-existence of colleges in one's locality and heavy expenses to be met in formal college education. Upreti (1988), Gautam (1990) and Pugazhenthì (1991) explored the characteristics and aspirations of the learners who had joined teacher education programmes through the distance mode. Upreti (1988) found that majority of the learners who had joined B. Ed. had graduated in humanities and social sciences. Gautam (1990) reported that there was a positive relationship between learners characteristics and success in distance learning at B.Ed. level. Pugazhenthì (1991) reported that the age of the teacher trainees in distance mode ranged from 25 to 61 years. Singh et al (2012) compared the levels of male and female students in Open Education System with that of Traditional Education System. The study concludes that it is the presence or absence of extrinsic motivation which is predominantly responsible for the difference in the students of the two systems.

Internationally, in the area of needs and aspirations of learners for joining different courses, two types of studies have been conducted. One, pertaining to the stage prior to entering the institutions and the other, at the post-entrance stage. In the pre-entry stage, in the case of one study at the Open University in U.K., the target learners were asked about their awareness of the existence of the Open University (Perry, 1977). The study revealed that over a period of five years (1971 to 1976) in the U.K., only 64% of the total adult population had come to know about the university. From 1971 to 1976, the percentage of men and women being aware of the Open University increased by two fold.

The studies of the second category, i.e., at the post-entry stage revealed that students who had already entered the correspondence education stream had done so to improve academic qualifications and to improve occupational efficiency (Childs 1966; National Extension College, 1967; Fairbanks, 1971; Glatter and Wedell 1971; McIntosh 1978; Peters, 1978; Idle et al 1978). Further, motivation for improvement in social status had prompted many students to join the courses (National Extension College, 1967 and McIntosh, 1978). In one of the studies of the second category (Waniewicz, 1981), an attempt was made to analyse the motivational factors of students on the basis of age and sex. The study revealed that job-related goals were the best motivating forces for most young men between 18 and 24 years and women between 25 and 44 years. Women above 45 years stated that their joining was motivated by their hobbies, recreation and family concerns. However, it could be observed that factors like (1) changing personal or family circumstances and (2) financial problems of unemployed individuals had obstructed

many potential students who could not join any educational correspondence programme (McIntosh, 1978).

Background and Characteristics of Distance Learners

Studies on the socio-economic and academic background of distance learners in India reveals significant facts regarding DE system in the country. Unlike the age cluster of regular college students between 16 to 23 years, the age of the majority of correspondence students is between 16 and 35 years (Anand, 1979; Gomathi, 1982; Khan, 1982; Pillai and Mohan, 1983; Sahoo, 1985; and UGC, 1986).

While most of the lower age group (16-25 years) candidates opted for undergraduate courses (Khan, 1982; Sahoo, 1985; and UGC, 1986), most candidates of the upper age group (20-60 years) enrolled in post graduate courses (Sahoo, 1985). In the case of one of the diploma programmes of IGNOU, a large group of students belonged to 30 to 40 years age group (Mishra, 1988). The majority of learner population were men (Biswal, 1979; Gomathi, 1982; Pillai and Mohan, 1983; Sahoo, 1985; UGC, 1986 and Sahoo, 1989). Most of them were from upper castes (Anand, 1979; Pillai and Mohan 1983; and Sahoo, 1985); they were employed and belonged to different cadres of vocations like teaching, clerical jobs, administration, sales service, farming, mechanics and labour, although they mainly came from teaching and clerical jobs (Gomathi, 1982; Pillai and Mohan, 1983; Sahoo, 1985 and UGC, 1986). Almost all the students on management courses of IGNOU are employed and a large number of them have less than 10 years service experience. However, students with more than 25 years experience were also admitted to the course (Mishra, 1988). A sizeable number of them (30%) were first generation learners. Moreover, a large number of learners had 1 to 10 years' gap between their last qualifying examination and enrolment in the present courses (Sahoo, 1985). With regard to socio-psychological characteristics of the school level students of correspondence courses, Singh (1980; 1983) found that the age of students varied from below 20 upto 40 years with major concentration around 18 - 21 years (Dewal, 1982). A majority of the school level distance students had 4 to 10 years time gap between their having left a regular school and joining the DE course (Singh, 1980; 1983). A majority of these students were married, hailed from upper castes, with moderate economic position and around one-third of them were employed (Singh 1980; 1983; and Dewal, 1982).

Studies of learner characteristics concern themselves with several variables like age, sex, marital status, regional background, employment, occupation, social class and academic qualification. Further, in some of the cases analysis of learners' characteristics were done taking into consideration the courses within the correspondence education system and parallel systems outside. Kember et. al. (1992) studied the socio-demographic characteristics of participants in nine distance education courses. Chan and Holford (1993) conducted telephone survey of potential participants — their motives deterrents to participation and plans for future. With regard to the age of the students, it was found that in the U.K. a very high percentage of correspondence students belonged to around 30 years of age (Glatter and Wedell, 1971; McIntosh, 1978,). In the U.S.A. and West Germany around 55 to 56% correspondence students were of 35 years of age (Johnstone and Rivera, 1965; Peters, 1965), in Costa Rica very high percentage of the students of Distance University were below 25 years of age (Rumble and Borden, 1983). In comparison with other adult education course students, correspondence course students

were found to be quite younger (Johnstone and Rivera, 1965). With regard to sex ratios, the studies conducted in the U.S.A. and the U.K. revealed that most of the students, i.e., around 70% were men (Johnstone and Rivera, 1965, Glatter and Wedell, 1971). In the case of the Open University in the U.K., the situation in 1971 i.e., 70% men and 30% women, changed to 56% men and 44% women by the year 1978 (McIntosh, 1978).

In Canada, however, the largest percentage of students was women especially from 25 to 34 years of age (Waniewiez, 1981). In Costa Rica, the ratio of men to women students was 54:46 (UNED, 1979). Regarding marital status of correspondence students, it was found that most of them were married and had children (Meddleton 1965; Waniewiez, 1981; Glatter and Wedell, 1971; McIntosh, 1978; Rumble and Borden, 1983). About the domicile of students, the studies like those of Peters (1965) and Glatter and Wedell (1971) revealed that in comparison with rural learners, larger numbers of urban learners were attracted towards the correspondence system. The academic backgrounds of correspondence learners at the university level varied greatly. The Open University of the U.K., which does not insist on formal schooling experiences, had attracted one third of its first batch of students during 1971 from those who had no formal education, while the rest had formal schooling (McIntosh, 1974). In another study (Perry, 1977), it was found that during 1971 only 33% of the students of the Open University fulfilled the minimum qualification requirements for entry into other British Universities. However, by the year 1975 the percentage of this category of students had increased to 46.4. In the Distance University, Costa Rica, an increasing trend was marked in the case of non-degree holders (Rumble and Borden, 1983).

In a study at the University of British Columbia, Canada showed that the students taking undergraduate distance courses were on average several years older than the students taking the same classes on campus (Bates 2000).

Studies on Dropouts

Discontinuation of studies has been a serious concern for the DE system everywhere. The rate of dropout in DE at the Central Institute of English and Foreign Languages, Hyderabad has been studied by Balasubramaniam (1976) as 57 to 66 percent and by Koul (1982) as 63 percent. At the B.A. courses of Delhi, Punjab, Bombay, Madurai, Sri Venkateshwara, and Meerut Universities, the dropout rate ranged between 8 percent and 25 percent (Yadav and Sharma, 1987). Sahoo (1985) found that during the very first semester 50 to 75 percent of the total dropouts from PG courses discontinued their studies. Koul (1982) found that 43 percent of total dropouts from a course discontinued their studies at the very outset, at zero lesson level. In general, the dropout rate at DE institutions was found to be higher than that of conventional institutions (Gupta, 1986).

Mostly, the dropouts belonged to upper age groups with larger gap of time between their last qualifying examinations and admissions to the DE courses, poorer academic and family background, rural areas and employed groups (Sahoo, 1985). In the case of dropouts, men's ratio was higher than that of women (Koul, 1982; Sahoo, 1985). Major problems coming in the way of dropouts were: responsibility at home and place of work; lack of availability of time to pursue studies, inability to attend contact programmes, lack of proper teacher-student interactions; non availability of reference materials; inadequate submission of assignment responses and difficulties faced in responding to the study

materials (Koul, 1982; and Sahoo, 1985, Fozdar et al 2006). Non- payment of semester fees was also a reason for discontinuing the studies (Balasubramaniam, 1976). While Koul (1982) found that at the Central Institute of English and Foreign Languages, Hyderabad, 20 percent of dropouts aspire to continue with their studies again, Sahoo (1985) found that 69 percent of the dropouts of the Himachal Pradesh University were interested to rejoin the correspondence courses provided certain improvements were brought about in the system. The dropouts felt the need for improvement in managerial, instructional and evaluative systems of DE (Koul, 1982; Sahoo, 1985).

The studies conducted on the dropouts in DE systems outside India are many:

Bradt (1956), James and Wedemeyer (1959); Sheath (1965); Meddleton (1965); Sloan (1966); Pulley (1971); Glatter and Wedell (1971) and Idle (1978) identified the major reasons for dropping out, as (1) job interference with study, (2) lack of time, (3) interference because of family/home responsibilities, (4) changes in career plans, (5) problems with the modes of studies and completion of lessons, (6) late submission of assignments, (7) difficulties in the nature of course itself, (8) lack of contact with the instructors, (9) lack of personal interest, and (10) other personal problems.

Several factors influencing the completion of courses have also been highlighted. The factors like expectations, initial perception of the course, promptness, and regularity in studying and completing the lessons, motivation of students, their maturity, clear cut paths for vocational growth and personal achievement were positively related with course completion (Hughes, 1955; Kuiper, 1967; Donehower, 1967 and McGill and others 1997), whereas the distance between the students' place of residence and the institutions, and heavy work load were found to be negatively related with course completion (Donehower, 1968 and McIntosh, 1974). It was also found that the percentage of women completing the courses was found to be higher than that of men (Donehower, 1968 and McIntosh, 1974).

Fenner (1998) found that attrition is higher at the beginning of a distance course than towards the end. Research into drop out in distance education (Tait and Mills 2002, Brindly, Walti and Zawacki-Richter 2004) found that attrition can be reduced by good course design and good personal support through tutors. Pierrakeas et al. (2004) found that the overall anticipated percentage of student dropouts tend to be much higher in undergraduate courses as compared to postgraduate courses.

Learning Styles of Distance Learners

An important area of research in education as well as distance education is: how do learners learn and their approaches to learning. Generally, two approaches —‘surface’ and ‘deep’— have been identified, and these approaches describe the way students tackle particular learning tasks. The approaches are context specific and directly relate to the quality of learning outcomes. Morgan's (1993) work exclusively deals with this aspect in the context of distance education. While students with surface approach to their learning are concerned with the intention of completing the learning task requirements, students with deep approach to learning are more concerned with the intention to understand the deeper meaning embedded in the learning tasks and their relationships with other tasks.

There are few studies on this issue. These studies deal with a variety of learning styles, online learning environment and approaches adopted by distance learners. Dependent learning (Smith 2000), Single Study Strategy (Morgan et.al.1998), Constructivist Approach (Jang 2000), Orientation (Lyll and MacNamara 2000), Surface Approach (Landbeck and Mugler 2000), Self Directed Learning (Tsay, Morgan and Quick 2000) are some of the approaches used by the researchers to study the learning styles. Studies have been carried out on distance learners enrolled in vocational education (Smith 2000, Grace and Smith 2001), nursing (Carnwell 2000), science (Lyll and MacNamara 2000), etc. from Open University of Taiwan, Open University of Hong Kong, South Pacific University, Australian and British Universities etc.

The findings of these set of studies reveal divergence in terms of learning styles of the learners. Learners adopted surface approach to learning (Landbeck and Mugler 2000), preferred dependent learning rather than self directed learning; learners indicated their preference for learning through observation rather than verbal presentations (Smith 2000). Studies by Li, Lee and Kember (2000) and Tsay, Morgan and Quick (2000) indicated importance of personal autonomy and self directed learning among the learners. A single study strategy on diverse groups of distance learners (Morgan et.al.1998) received a mixed response. Less experienced learners embraced the study strategy with considerable enthusiasm; more experienced learners rejected it if it conflicted with their existing study strategies. In an another interesting study, Carnwell (2000) developed relationship between approaches to study, learning styles and strategies. Three approaches— systematic wading, speedy focusing and global dipping were identified in this study. Systematic waders tend to be serialist learners; speedy focusers take a strategic view of materials and global dippers tend to study in a disorganized fashion. Taplin et.al (2001) compared the help seeking strategies used by high achievers and low achievers of Open University of Hong Kong. It was found that there were similarities between the two groups but there was a tendency of seeking help by high achievers for personal difficulties. There are gender differences in the factors influencing achievement of distance education students (Taplin and Jegede 2001).

Learning styles of distance learners is an important area of investigation. The above studies are, however, not conclusive. Hence, there is need to conduct further research on how and the nature of adult learning.

Activity 1:

Search internet to find out more research studies in the area of Distance Learners.

3.3.4 Instructional Processes

It is generally agreed that distance education adopts multi-media in an imaginative way in its instructional system and thus tries to compensate for the absence of a live, classroom teacher. Print and electronic media, when combined judiciously can play the role of a live teacher to a great extent. However, a thorough understanding of the potential of different media and learner characteristics is necessary to evolve the right kind of instructional system. Studies (Schramm 1974, Clark 1983, Russell 1999 etc) compared the

effectiveness of broadcast lecture versus face to face lecture. Findings show that when poorly designed, there are no significant differences in learning between different media or technologies. It is important to look into the conditions that lead to such findings. Bates (2005) found that technologies vary in terms of their access for distance learners, their costs, kinds of learning, type of interaction, speed, maintenance etc.

This section gives you a brief account of research studies conducted in this field.

Print Based Material

It has been noticed that all the DE institutions at the university as well as the school level depend mainly on print-based instructional material. They may be in modular forms, in self-instructional programmed learning packages, in semiprogrammed form or in some other form as prescribed by respective institutions (Biswal, 1979; Singh, 1980; Khan, 1982; Singh 1983; Sahoo, 1985; UGC, 1986). On the part of students, it was found that a large majority of them at the university level (81 to 85 percent) depend on printed lessons for completing their studies (Anand, 1979; Khan, 1982; Sahoo, 1985).

All the studies reported the usefulness of printed study materials as perceived by the students in one or the other respect (Anand, 1979; Biswal, 1979; Singh, 1980; Khan, 1982; Pillai and Mohan, 1982; Sahoo, 1985; Kumar et al 1986). In most of the cases, study materials were not available in respective DE institutions and did not follow a systematic format. While most of the students, dropouts and products of DE expressed moderate views about the different aspects of lessons like style of presentation, content clarity, suggested references and language (Sahoo, 1985 and UGC, 1986), majority of them pointed out their difficulties in studying the lessons (Singh, 1980 and 1989; Dewal, 1982; Koul, 1982; Khan, 1982; Sahoo, 1985; UGC 1986). A large number of students (41%) of six universities found the materials too heavily packed with information causing difficulties in studying all the lessons. Moreover, irregular despatch of lessons created problems for students (Singh, 1980; Nagaraju, 1982; Koul, 1982; Singh, 1983; Sahoo, 1985; and UGC, 1986). It was suggested by students and teachers that study materials be made self instructional, reviewed appropriately, edited and proof read properly, despatched in time along with references materials (Khan, 1982; Sahoo, 1985; Kumar et al. 1986). Further, it was found that the students preferred lessons written in Indian languages and most teachers emphasised on the need for acquiring necessary experience through formal training, orientations and workshops for developing effective materials (Khan, 1982; Sahoo, 1985; and Koul, 1986). Mishra and Gaba (1999) conducted an exploratory study into the “use of activities in self instructional materials by distance learner”. Study indicates that students make use of activities which are given in Self Learning Material. They also use white space given in the side margin. Majority of respondents preferred descriptive type of SAQs.

A few studies have been conducted to determine the efficiency of certain methods of instruction over others. Simich (1965) conducted a study of the comparative effectiveness of self-instructional methods of learning and the correspondence course techniques. He found that the correspondence students outscored those on individualised instruction, but the difference in achievement scores was not significant. Willingham’s (1971) study aimed at the comparative effectiveness of a combination of different methods viz., (1) students meeting the instructors who used lecture-cum-discussion

approaches three times a week, (2) students meeting tutors once in a week and taking correspondence study, and (3) students taking usual correspondence courses. No significant difference could be seen in the achievement of students who followed these different methods of instruction. Green (1967) studied the effectiveness of correspondence study methods using self-instructional materials, TV and homework/ assignments. They were found equally effective in comparison with the conventional methods of teaching as there did not exist any significant difference between the achievement scores of students undergoing studies through different methods.

Electronic Media

The last few decades have witnessed a significant number of studies on media and technology in distance education and open learning – from radio, audio and audio-vision to teleconferencing, interactive video, computer conferencing and computer mediated communication. The various journals of Distance Education and other related literature has been dominated heavily by reporting on the use of sophisticated media and technology in Distance Education. This is appropriately so because distance education as an operational system depends heavily on the technology of delivery.

In this section the studies pertain to the following three media:

- Audio and Video Programmes
- Interactive Media- Audio, Video and Computer Conferencing
- Education through World Wide Web
- Mobile Technology

Audio and Video Programmes

All India Radio stations at Delhi, Jalandhar, Hyderabad and Tamil Nadu used to broadcast educational programmes for correspondence courses, but Distance Education Institutions of the regions concerned, could not make full use of radio broadcast facilities. Nagaraju (1982) witnessed usefulness of radio programmes in inservice teacher training programme of Kerala State. However, he found that all the trainees did not listen to all the radio programmes of the training course. Cassettes have been used to correct pronunciation and delivery in the teaching of languages (UGC, 1986). TV support was not available in the past for any DE programmes (Biswal, 1979; Khan, 1982; Sahoo, 1985 and Balasubramaniam, 1986). Doordarshan allowed 90 minute telecasts in a week for IGNOU programmes.

Interactive Media

Several researchers examined the use of video, cable TV and the teleconferencing mode in DE. Though video film was found to be more effective (Mandal and Shah 1992), majority of distance learners did not use audio and video support. (Srinivasacharyulu, Subba Rao and Rajamouli 1989a). The cable TV network, when properly planned and managed, can provide useful support to distance education (Chaudhari and Behari 1994). Distance learners were found to be favorably inclined to use the teleconferencing mode (Sahoo, 1994). While analysing the interactivity of

IGNOU's one-way video and two-way audio teleconference facility, Mishra (1999) found that the total duration of interaction calls was little less than one tenth of the total teleconference time. Learners were satisfied with the use of technology and teleconference facility which increased the interaction of the learners with their peer as well as the experts.

Internationally several studies reveal the preference for and positive learning gains in the use of audio conferences (Knox 1997), telecourses (Biner and others, 1997), video conferencing (Burke and others 1997), and video mail (Hase and Saenger, 1997). The effectiveness of different interactive media showed different results. Audio conferencing was found to be an effective learning tool in providing opportunities to engage in cross cultural dialogue (Henderson and Putt 1999). Studies on Interactive television (Chen and Willits 1998; Hilgenberg and Tolone 2000; Chen and Willits 1999; Kelsey 2000; Harman and Dorman 1998) focused on Moore's Theory of Transactional Distance, opportunities for critical thinking in distance education. Computer conferencing was found to enhance collaboration, critical thinking and group development based on interpersonal needs (McDonald and Gibson 1998; Bullen 1998). In another comparative study, students using CBL performed significantly better than the total group (Halabi et. al., 2000). Potter and Naidoo (2009) studied the challenges involved in conducting evaluations of interactive radio programmes in South Africa with large numbers of schools, teachers, and learners.

Education through World Wide Web

World Wide Web is one of the latest delivery approaches in education and distance education in particular. Center for Technology in Learning, U.S. Department of Education in 2010 conducted a systematic search of the research literature from 1996 through July 2008 in online learning. They identified more than a thousand empirical studies on the theme. Studies were analysed as (a) contrast of an online to a face-to-face teaching, (b) measured student learning outcomes, (c) used a rigorous research design, and (d) provided adequate information to calculate an effect. Authors did the meta-analysis and found that, on average, students in online learning conditions performed modestly better than those receiving face-to-face instruction.

There are number of other studies which range from effectiveness to intercultural issues, collaboration, willingness to use the technology, satisfaction etc. Findings show that students who had access to Web technology found web based instruction as a convenient approach (Daugherty and Funke 1998). Pajo and Wallace (2001) found the university teachers did not believe that Web Technology was more effective than conventional correspondence based distance learning. The students reported range of challenges in the delivery and development of web based instruction. These were: lack of software, student resistance, lack of technical and faculty support. Some of the other research findings are: access to the technology by the respondents (Perdue and Valentine 2000, Voyageur 2001); greater time and effort expended on distance education course development and delivery than that of traditional courses (Visser 2000); induction exercise on how to interact online before students select this mode (Brace-Govan and Clulow 2000); online interactions were at lower phases of the interaction analysis model (Kanuka and Anderson 1998); oral health professionals ranked the creation of scientifically based, frequently updated online dental education courses that

defines their educational goals as highly important (Spallck Heiko et.al.2000); and teaching an asynchronous online course does not require more effort than teaching a comparable synchronous classroom course (DiBiase 2000), collaboration in small groups (Murphy and Cifuentes 2001), online instruction to be guided and initiated by facilitators (Youngblood et.al. 2001) and minimum experience in both print and web realms (Smith 2001). Use of e-mails to increase students participation in group discussion (Woods and Keeler 2001) and foster collaboration (NG 2001) has also been reported in the studies.

There are number of studies on interculture and cross culture issues related to online education (Goodfellow et.al.(2001), Gunawardena et.al (2001) Ziegahu (2001)., Williams et.al. (2001). Findings of these studies examine the cultural differences in perception , environment, nature of courses in online learning. Tu and Corry (2001) analysed the online researches and suggested future studies in online learning community. Murphy, Zhang and Perris (2003) studied the online learning in ASIA. They pointed out that Asian countries are supporting other countries in the region and offering cross- border studies with quality. Hurd (2006) studied the students who were enrolled in foreign language course in open university; UK and Shantou Radio and Television University of China. Al-Harthi and Aisha (2010) studied the relationship between learner self regulation and cultural orientation with in distance education environment. Enoch (2006) studied that structural factors such as age, gender and ethnicity also play a significant role in the continuous existence of the usage gap of online courses. Naxin Zhao, Douglas McDougall (2008), found that the participants had a positive attitude towards online courses. The study also identified six cultural factors that affected their online learning. Peter and Nichols, (2010), in their paper considers e-learning project management from the perspective of navigating tension between faculty and instructional design/ e-learning expertise, in the context of as the bridging of two distinctive cultures.

Bolliger, and Oksana, (2009), developed an online faculty satisfaction survey (OFSS) and administered to all instructors who had taught an online course in fall 2007 or spring 2008 at a small research university in the USA. One hundred and two individuals completed the web-based questionnaire. Results confirm that three factors affect satisfaction of faculty in the online environment. These are: student-related, instructor-related, and institution-related factors.

Gunawardena et al (2010) designed online courses using a problem-centered and case-based approach to learning and utilized technologies including learning management systems such as Blackboard and SharePoint as well as instructional design tools such as Breeze, Captivate, and PowerPoint. Online self-efficacy emerged as the strongest predictor of learner satisfaction.

Mobile Technology

Mobile learning is an upcoming mode of delivery of instruction not only in distance education institutions but also in formal system. The most popular mobile devices are the mobile phones, PDAs, laptops, and ipads.

Many initiatives and research studies have been conducted to investigate the use of mobile technology in learning. M-learning has been defined as “e-learning using mobile

devices and wireless transmission” (Hoppe et al., 2003; Chang et al., 2003). While e-learning is mostly dependent upon desktop personal computing (PC) technology, m-learning is dependent upon mobile devices (Orr, 2010).

Peter (2007) describes mobile learning as a useful component of the flexible learning model and stated that it was a subset of e-learning, a step toward making the educational process “just in time, just enough and just for me”. Brown (2005) summarized several definitions and terms and identified mobile learning as “an extension of e-learning” whereas Pea and Maldonado (2006) stated that mobile learning incorporates “transformative innovations for learning futures”.

A review of the literature on m-learning reveals several initiatives, such as the implementation of m-portals (Mitchell, 2003), classrooms of the future (Dawabi et al., 2003), and practical scientific experimentation and teaching (Milrad et al., 2004). There are papers published on how to design learning materials for delivery on mobile technology (Ally, 2007); Patten, Sanchez & Tangney, 2006; Sharples, Taylor & Vavoula, 2007). M-learning provides a tool for brainstorming, quizzing, and voting through integration with online management systems in classrooms (Goh & Kinshuk, 2006), while in the laboratory it bridges individual and collaborative learning. Clarke et.al (2008), Al-Fahad (2009); Wang (2009); Garrett & Jackson (2006); Cavus & Uzunboylu (2009); Uzunboylu et.al, (2009); Manair (2007); Maag (2007) reported that students have a strong, positive reaction to integrating m-learning into the classroom. Students reported competence and ease in using the devices and performing the learning tasks (Guenter, et.al, 2008; Hsu, et.al, 2008;). Balasubramanian (2010), studied the role of mobile phones in the non-formal and informal context among rural women from resource poor communities.

Check Your Progress 1

- 1 a) List the important concerns of research in media and technology.
b) Describe which aspects of printed materials have been concentrated on by most of the studies on instructional processes of DE in India?

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

(b) Compare your answer with the one given at the end of this Unit.

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Personal Contact Programmes

All the DE institutions had the provision for Personal Contact Programmes (Dutt, 1976 and Biswal, 1979). Compulsion, optional attendance, selection of venue for personal contact programmes (PCPs), employment positions of learners, their financial difficulties, lack of proper facilities for boarding and lodging and lack of prior information to students are some of the factors which influence students' attendance at PCPs (Sahoo, 1985), as the PCPs are mostly organised in cities (Sahoo, 1985 and Balasubramaniam, 1986). Regarding attendance in PCPs, (Anand 1979) revealed that in Punjab University only 18 percent of pre-university students turned up for PCPs and only 40 percent of the first day's strength was noticed on the last (10th) day of PCP. Sahoo (1985) found that where attendance was compulsory, 70 to 80 percent learners turned up for PCPs, and where it was optional around 33 percent learners attended the PCPs of PG courses.

Srinivasacharyulu and Ramaiah (1992) found that the degree holders did not attend the contact classes at BRAOU. At school level DE programmes, Singh (1983) found, only 5 percent of the learners attended PCPs regularly and another 5 attended partially. However, Dewal (1982) found that in three DE institutions at the school level, 50 percent learners attended PCPs. This certainly must have been a special case.

No uniform policy was followed in directing teachers to select topics for teaching during PCPs (Sahoo, 1985). The planning and organisation of PCPs seemed to be inadequate (Nagaraju 1982). The topics available in study materials were repeated in most of the cases (Balasubramaniam, 1986). The usual methods used for teaching in the PCPs were lectures together with question - answer sessions (Sahoo, 1985). Even though the real purpose of PCPs was not achieved to a large extent, most of the learners in higher education expressed positive opinion about the usefulness of PCPs (Anand, 1979; Biswal, 1979; Mathur, 1979; Khan, 1982; Kumar et al., 1986; Pillai and Mohan, 1983; Sahoo 1985; and Balasubramaniam, 1986 and Rathore 1991). The utility of PCPs was experienced by learners in terms of clarification of doubts, getting inspiration for further studies, better preparation for examination and solving academic problems (Mathur 1979; Sahoo, 1985; Balasubramaniam, 1986 and UGC, 1986). Besides, the learners appreciated the teacher-student informal interaction (Sahoo, 1985). However, with regard to the school level DE system, most of the learners did not find PCPs purposeful. Most of the participants of PCPs for P.G. courses welcomed compulsory attendance (Bhusan and Sharma, 1976; and Sahoo 1985), while the U.G. students expressed a negative opinion (Anand, 1979 and Mathur, 1979). Most of the respondents among teachers, learners and dropouts favoured increased frequencies of PCPs (Sahoo, 1985) and also increased duration of each PCP (Bhushan and Sharma, 1976; Anand, 1979; and Sahoo, 1985). Usha Devi (1994) revealed that learners showed positive affirmation for the necessity of contact classes. The common recommendation in the above studies regarding PCPs was that, proper care must be taken for selection of venues, sending prompt information to participants, division of learners into appropriate groups, use of appropriate methods and media for encouraging group interaction, appropriate orientation for teachers for selecting topics, provision of library facilities, co-curricular activities and facilities for boarding and lodging of participants.

3.3.5 Programme Development and Evaluation

Under this section we would focus on the programme evaluation research. Research on programme evaluation and quality assurance of open and distance education needs to be a mandatory part of programme development and revision. Such tasks are not much carried out though, some prominent research work has come up in this area of programme evaluation and its role in quality assurance.

Vydehi (1984) evaluated the presentation of first year degree General English course of S.V. University, Thirupathi with regard to satisfaction of students needs, attainment of the objectives of courses and the instructional process and evaluation procedures adopted. Analysis of the different objectives for teaching English, methods of instruction, reactions of students and teachers and observation of PCPs were the means used to identify weaknesses of the present structure of curriculum. An alternative student-active instructional format and a new type of distance teaching materials were prepared and used in an experimental situation. A comparison of the achievement of students following conventional and the modified materials revealed results in favour of the modified approach. A similar kind of study was undertaken by Sarwal (1984) at the Central Institute of English and Foreign Languages, Hyderabad for preparation of teacher training correspondence course units for English Language Teaching. It was found that 15-week programmes were more effective than the 4-week programmes with regard to the degree of comprehension, degree of interest and degree of understanding achieved by students. Mishra, Vijashri and Garg (2009) did programme evaluation study of the undergraduate physics programme at IGNOU. They adapted the major tenants of the CIPP model. The results of this study showed that there was a need to make student support system as effective for learners, study material to be learner friendly by simplifying the mathematical details and improving the presentation of the course material. Gaba and Dash (2004) did a course evaluation PGDHE programme of IGNOU. The results portrayed in the study showed that majority of students were satisfied with self-instructional materials, assignments, the extended contact programme, and delivery mechanisms but some of the respondents were dissatisfied with academic counseling and use of audio-video programmes.

Woodley (1995) suggested that the course writers of a program should work towards perfection and make efficient material for the learners. This would have implications to course design of the programme. Klenowski (2010) explained that the concept of curriculum evaluation is integral to curriculum and may be defined as what to taught to whom, when, where, how and why. Evaluation of curriculum involves determining the value or worth of particular products or processes that includes learning objectives, documents or experiences for the purposes of informing decision making about the curriculum. Need for programme evaluation is to maintain, develop or modify a particular curriculum programme. Herein, summative evaluation is done so as to assess the outcome, merit and worth of a particular curriculum.

Neale & Bell (2008) said that the role of external or internal evaluator and its impact on the stake-holders interest needs to be ascertained. They added that universities have adopted different approaches to meet their equity objectives and there is no consistency across the system in terms of policy, structures and personnel. The reporting style has lead to some consistency in some areas among various universities.

3.3.6 Output and Impact of Distance Education

Comparative studies on the achievement of DE learners have revealed mixed findings. First, no significant differences have been found between the achievements of DE learners and regular course learners in the case of UG courses of Delhi University (Sashi, 1972) and M.A. (English) and UG Courses of Punjabi University (Biswal, 1979). The UGC (1986) study reported about comparable pass percentages of both the streams in two Indian universities. Second, the pass percentages of undergraduate DE students of Meerut, Delhi, Punjab, Bombay, SV, and Madurai Kamraj University were higher than those of regular UG students of the respective universities (Pandey, 1980 and Anand, 1979) and in the case of B.Ed. courses, the correspondence students of SV university showed better results than the regular students (Reddy, 1986). It was also found that the proportion of students who obtained third division was more in DE than in regular courses.

Third, generally the results of distance students were poorer than those of regular students. In the case of Punjab University, the pass percentage of Pre-University distance students was found to be lower than that of regular students (Anand, 1979). The mean achievement comparison of the result of M.A. programmes of Punjabi University and B.A. of Madurai Kamraj University reflected poorer performance of DE students (Biswal, 1979). In the cases of UG and PG courses of Himachal Pradesh University and Rajasthan University respectively the pass percentages of correspondence students were lower than those of regular students (Sahoo, 1985; and Gupta, 1985). As far as the higher grades/divisions in UG and PG results are concerned, the DE stream performed worse than the regular stream (Sahoo, 1985 and UGC, 1986). Similar findings are witnessed in the case of the UG level results of Utkal University (Panda, 1980; and Panda and Panda, 1986). However, in general, the top level students of both the streams achieved almost similar positions (Sahoo, 1989).

In several other studies, attempts have been made to compare the achievements of correspondence students and regular students taking similar courses. The results of such studies are generally encouraging for correspondence education. Of course, in some cases they were at par with the results of regular course students. Notable studies with the former conclusions are those of Zeigel (1924), Childs (1949), Parsons, (1957), Spencer (1964), and Central African College (1965), as they showed statistically significant differences between the mean average scores of students undergoing correspondence courses and regular courses respectively. The latter type of results emerge from the studies of Robert (1928), Dysinger and Bridgeman (1957), and Sheath (1965), as no significant differences were marked between the achievement scores of the students of the two streams. There are hardly any studies which show correspondence/distance students' achievements as worse than those of conventional students.

3.3.7 Economics of Distance Education

Whatever the advantages of Distance Education, its promotion depends, ultimately on its economic viability. The common notion is that distance education is less expensive. This may be generally true, but this idea cannot be stretched too far to say that every distance

education programme is or must be less expensive than conventional educational programmes. Cost effectiveness, cost-benefit and cost analysis are terms which need to be understood correctly in the professional context.

Literature review reveals that, in programmes offered through distance learning, costing depends on (i) the funding policy (Smith and Bramble, 2008; Panda and Gaba, 2008), (ii) the delivery method of distance learning, and (iii) the economic model the institution adopt for offering their respective programmes. Rumble (1997) has extensively discussed cost analysis issues in the design of courses, cost of media and materials, student support services, comparison of costs of distance and traditional (conventional) education system, and financing of distance education.

The research studies conducted both in India and abroad mentioned in this section would give you an idea of costing in distance education.

Sources of Income in DE System

It has been found that in the case of almost all DE institutions, one of the major sources of income is students' fees (Dutt, 1986; Biswal, 1979; Pandey, 1980; Khan 1982; Sahoo, 1985; UGC, 1986, Gupta, 1987 and Gaba 1997). The fee structure of DE in Rajasthan University analysed by Gupta (1987) revealed that the major share of tuition fee to total fees charged from learners varied from 91.70% to 97.32% during 1972-1985. In the case of Himachal Pradesh University, the income raised through learners tuition fees to total income varied from 98.3% to 96.05% during 1975-1987 (Sahoo, 1989). Dutt (1988) identified learners contribution as 28 to 50 percent of the total income of Delhi University during 1980-86. The rest of the income came in through subsidies provided mainly by the governments. Srinivasacharyulu and Ramaiah (1994) urged the state governments and other financing agencies to pay more attention to the funding of distance education institutes.

Unit Cost Analysis in DE

Unit cost analysis has been a common feature of all the studies conducted in the area of Economics of DE. Taking into consideration the data, from 1973 to 1976 of B.A. courses of 7 Universities, Yadav and Sharma (1988) found that the total unit costs varied from Rs.269.71 to Rs.451.82. In the case of UG and PG courses of the Himachal Pradesh University the total cost per student was calculated as Rs.391.60 and Rs.360.22 for the years of 1978-79 and 1979-80 respectively (Sahoo, 1985). Gupta (1987) found that the per capita expenditure at Rajasthan University ranged between Rs.133.77 and Rs.695.29 during 1972-73 to 1979-80. The UGC (1986) revealed that the average expenditure of twenty-three DE institutions was Rs.469.77 per student during 1980-81. Highest per capita expenditure was observed at Utkal University (Rs.1, 268.72) and lowest was the Kurukshetra (Rs.63.94). In the case of APOU (presently named as B.R. Ambedkar Open University) this was around Rs.1200.00 (Dutt, 1986). The cost per student of Delhi University came down from Rs.801 in 1980-81 to Rs.563 in 1985-86 (Dutt, 1988). A study at IGNOU on cost analysis (including private cost) of different programmes (Naidu, 2001) found that, on average, the MCA students spent the maximum, followed by B.Sc., B.A. and PG Diploma in Higher Education students. Kulindiaswamy (2002) analysed the capital and operating costs of

IGNOU and found that capital expenditure on buildings and campus development had been reduced over the years. On the other hand, expenditure on equipment, furniture and library had increased. Gaba et al (2011) analysed the cost of selected professional programmes offered through distance learning by the Indira Gandhi National Open University (IGNOU). Study found that the per student total cost (institutional and private) of the MCA programme was higher than that of the MBA and BCA programmes.

Most of the studies conducted on comparison of unit costs of correspondence courses and face-to-face courses revealed that the unit costs of correspondence courses were lower than those of face-to-face courses, in some cases as low as 10 percent of face-to-face course unit costs (Biswal, 1979; Pandey, 1980; and Gupta, 1985). However, Aggarwal (1986) revealed that in the case of professional training courses, the unit cost of correspondence course was higher by 39 percent than that of face-to-face courses. Of course, the nature of the institution was not considered for comparison of costs in this case. Dutt and Gaba (2006) found that the per student cost of dual-mode distance teaching institutions was less than the single mode distance teaching institutions in India because the former did not adopt proper pedagogy for the distance education system.

Some of the selected international case studies on cost of Distance Education have already been presented in Blocks 4 and 5 of the course **MDE- 417, “Distance Education: Economic Perspective”**. While going through the cases, you will notice limitations in the nature of data as well as in the conceptualization of cost in distance education and its calculation and the techniques employed across institutions.

The findings of the various cost studies suggest that while unit cost for distance education in institutions having large numbers of students is lower than that for conventional education, it may not be the case where the intake is very low. Economy of scale and low unit cost has been possible for larger institutions like Indira Gandhi National Open University and the Open University of United Kingdom, and this has been difficult in institutions operating at a level of low intake like South West London College, UK, University of Lagos, and University of Nairobi. On the other hand, in Australia, since both on-campus and off-campus students receive similar resource inputs, unit costs for both the modes seem to be comparable and same. But as the graduation rates are different (higher for on-campus mode), unit cost of graduation is expected to be higher in off-campus education.

There are studies reported under this theme which are of different nature than the earlier researches. Studies conducted on various aspects of costing of various media in education (Jamison et al, 1978; Eicher, 1980; Perraton, 1982; Fwu et al., 1992; Chambers, 1994; Bates, 1994) found that the production costs were higher for film and lower for radio; fixed costs for transmission were much higher for television than for radio; audio cassettes were likely to be cheaper than radio where the viewership was restricted; and that the cost structure of open and distance learning differs from traditional classroom teaching. Wisner and Priest 1998; Whalen and Wright 1999 studied the cost effectiveness of audio tele-training and online training. It was found that the use of audio tele-training lowered the cost of training the Army National Guard and web based training has higher fixed cost than the class room training. Ng Kwok Chi (2000) conducted a study to see the cost effectiveness of delivering online courses in open and

distance learning. The study illustrates the complex nature of applying the concepts of costs and effectiveness in practice. Osiakswan and Wright (2001) did a Cost Benefit and Return-on-Investment Analysis and found that the total cost of Remote Access Distance Learning, training provided over a voice and data network is higher than the total cost of Classroom Based Training. Jung (2005) found that online teacher training was more cost-effective than teacher training in a classroom, mainly due to the lower opportunity cost of the participants. She concluded that the total cost of online training was approximately 59 percent that of face-to-face training when learners' opportunity costs were included. The cost per enrolled student for online training was approximately 43 percent that of classroom training. In another study, Belawati (2006) estimated costs for academic activities as: learner support (44%), course development (36%), student assessment and evaluation (13%), and research (7%). If an institution is planning to shift to online learning, it does not assure a reduction in costs, especially where there is a high delivery cost (Inglis, 2008). On the other hand virtual universities need to find ways to reduce cost- per-graduate by improving the graduate/course completion rate (Jung, 2008).

It is interesting to note the shift in the nature of studies on economics of distance education. Earlier studies addressed macro issues of the system; latest focus is on micro issues like cost and/ or cost effectiveness of one media over other. This is reasonable since much of the basics of economics like comparative cost of distance education versus conventional education, comparative costs of different components of distance education, etc. has been settled. Despite the shift in the nature of studies focusing on media-specific costs, the glaring gaps are differential cost-effectiveness of different media on learning, cost-effectiveness of combination of media on a regression model, and inter-country variation in costs and effectiveness of ICT media for delivery of distance education.

3.4 RESEARCH ETHICS

Ethics of Research and Ethics in Research is described in social and medical research. William (2006) listed ethical issues like voluntary participation, informed consent, risk of harm, confidentiality, anonymity and right to service in his book.

Activity 2

Visit the website <http://www.socialresearchmethods.net/kb/ethics.php> and read more about Ethics in Research.

It is rather unusual to talk about ethical issues while reviewing research in distance education. However, this has assumed considerable significance especially when distance education has (usually) transgressed national boundaries and while information needs to be distributed accurately and with equity. The design of questionnaires, tests and experimental procedures has to be done in a manner that take into account the diversity in the circumstances of students, and in relation to the effective data collection procedures and ethical requirements.

Introduction to Research in Distance Education

Writings on such issues in distance education are very rare; and therefore this section is based mainly on the critical work of Evans and Jakupiec (1996). Sample participants in the research project need to be informed very clearly about the objectives of the research, the procedures and the implications of the research findings (and their utilisation). The distance participants in postal or telephonic interviews must be empowered so as to be able to respond to the research questions. Further, prior written consents from them ensures their freedom and reduces uncertain or unproductive travel time and cost.

Strong ethical considerations are required for the conduct and utilisation of institutional research. A fine distinction has to be made between student research and evaluation for improving courses and student services. Special care needs to be taken so that research results are being utilized for institutional improvement. Further, researchers need to exercise caution and restraint in their temptation to publish the results or present – them in a conference, when the findings, are essentially meant for institutional monitoring and quality assurance. This is more so in a situation where data are stored electronically (especially in computer) and are strictly confidential, only to be utilised for institutional monitoring and developmental purposes. However, sometimes open and distance education researchers shift from their professional role to a research role and utilise such data for their own publication. Professional ethics suggests that prior consent be obtained for utilising such data for purposes of research and publication of findings.

Evans and Jakupiec (1996) have concluded that open and distance education researchers have to keep in mind two basic principles: “(i) research in open and distance education should not expose individuals to risks of or cause unjustified political, personal, economics, physical, emotional, moral and psychological harm; (ii) researchers in open and distance education ought not to undertake research which violates principles of free informed consent.....” (p. 91).

Check Your Progress 2

What according to you, may be the right approach to consider the ethical issues in distance educational research?

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

(b) Compare your answer with the one given at the end of this Unit

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3.5 FUTURES OF RESEARCH

During the next few years, there will be significant increase in the demand for places in higher education. This will be a worldwide phenomenon; the developed countries have already projected their vision. The expert report, *Higher Education in Developing Countries: Peril and Promise* (published by The World Bank in 2000) warns the developing countries of their limited choice but to expand higher education to survive the international competitiveness in the globalized world and arrest the growing digital divide. Distance education offers a significant promise to support such expansion. Distance education needs to be retuned to service the changing needs of its learners; studies are needed on assessment of learners' needs – both within the country as well as comparative studies of needs of learners from various countries.

On the basis of the analysis of the studies in the various areas as evident from the review earlier, there are concentrations in certain areas like characteristics of distance learners and economics of distance education. In fact, both these areas have been extensively studied. Hence, there are obvious overlaps. There are certain areas where the status of research is still in the form of touch and go. This is particularly true in the crucial area of andragogy and pedagogy of distance education. You would probably appreciate that distance education has, all over the world, adopted a multi-channel learning format involving print material, PCP, audio, radio, television, interactive television and Internet. There is no study on the effect of multi-channel learning on distance education. There are separate studies on various components of the instructional process. Within the instructional process there have been very few studies on electronic media. TV and radio as media of distance education have remained almost unexplored. Similarly, research in other components of instructional processes are few and scanty to derive any significant conclusions about the pedagogy and andragogy in distance education. The studies on learning outcome through distance education and its comparability to the learning outcome in the conventional system are just one or two.

Studies are totally missing on excellence and quality of distance education – what constitute quality and what determines quality in distance education. The number of studies on organization and management of distance education is small. Indian distance education offers plenty of opportunities for research in this area. Besides, there are open universities and dual mode universities; distance education outfits in the conventional universities vary widely in their organizational structure. Some of them enjoy the status of a faculty (autonomous). Some are in the departmental status under a faculty and yet some others operate as constituent colleges. They vary widely in their academic and financial autonomy. Similarly, these institutions vary very widely in their staff structure. While a few of the departments have a large number of staff within the distance education institution e.g. about 100 in the Directorate of Distance Education of Delhi University, some others maintain a skeleton staff.

Another related area, relatively unexplored is the staff development in distance education. The nature of jobs are changing rapidly. The need for on-the-job training, in industries, business organizations as well as in service sectors is much more important now than ever before. Formal education can barely serve the needs of worker reeducation. Distance education has been deployed for capacity building. There are

however, very few researches to draw lessons for retuning the program design and delivery for greater effectiveness. Research is needed on worker reeducation – program and course design, instructional design and delivery, costing and cost effectiveness and impact on productivity.

Although large number of universities – both open and dual mode universities in various parts of the developed and developing world offer on-line education, research is still too scanty in this area. More and more agencies at all levels will resort to use Internet for educational program delivery. There is, however, little evidence of research base on the basics of pedagogy of on-line education. Future research will have to address the nitty-gritty of web-based instruction as a mode of distance education.

3.6 LET US SUM UP

Distance education has come a long way, and it is here to stay and grow significantly in the foreseeable future. Research is an important mechanism for growth and development of distance education. Research has produced conclusive evidences in certain areas and issues; it has also produced contra evidences in certain other areas. Similarly, there are over lapping researches in certain areas and there are yawning gaps in certain others. Reviewers have made meaningful contributions in identifying conclusive and contra evidences, gaps and overlaps. Yet, they carry individual opinions and perceptions of the reviewers. Using ICT, a dialogue can and should begin on research needs in open and distance education that can generate a collective view and on a continuing basis.

3.7 CHECK YOUR PROGRESS

1. (a)(i) Assessment of the effectiveness of media use and media-mix and
(ii) Designing a range of provide models for developing multi-media packages.
(iii) Testing of various media mixes in different subject/discipline areas for optimum utilisation, within a given financial allocation.
- (b) Uses of study material along with other materials; usefulness of study materials perceived by learners; difficulties in studying such materials; development, production and despatch of lesson scripts.

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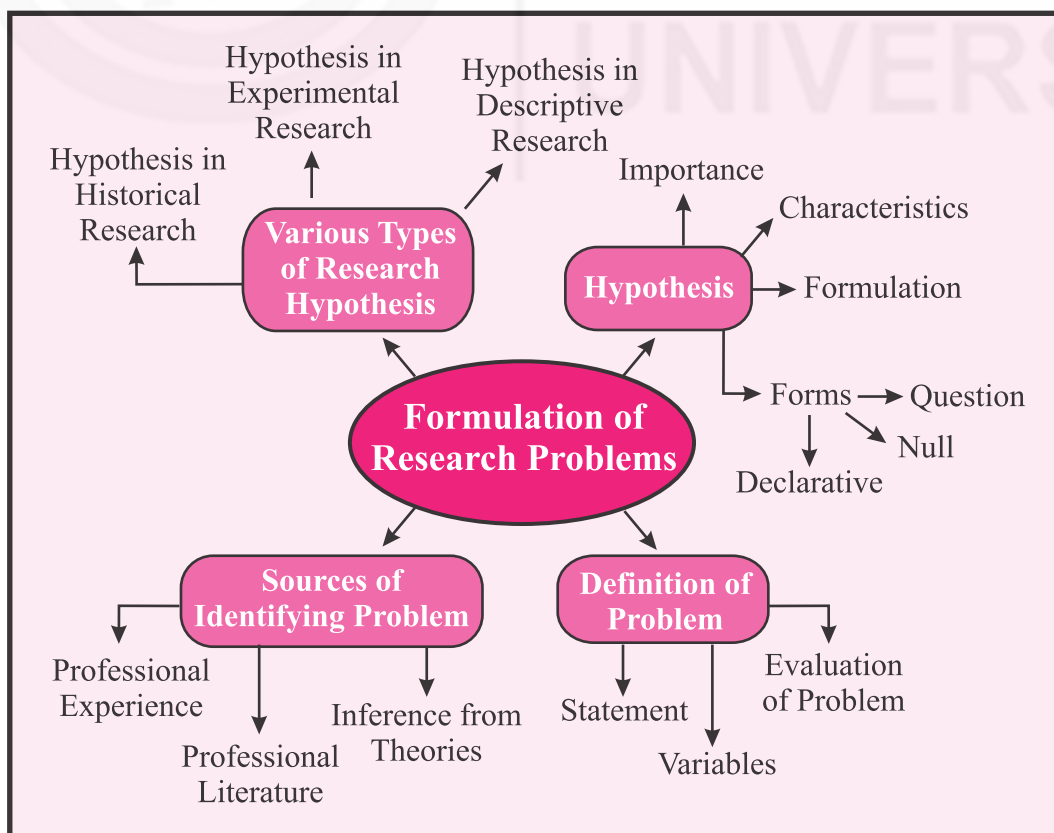
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UNIT 4 FORMULATION OF RESEARCH PROBLEMS

Structure

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- 4.1 Objectives
- 4.2 Sources of Identifying a Problem
 - 4.2.1 Professional Experience
 - 4.2.2 Professional Literature
 - 4.2.3 Inference from Theories and Other Sources
- 4.3 Definition of the Problem
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 - 4.4.1 Importance of Hypothesis
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4.0 INTRODUCTION

The first step in the research process is the selection of a suitable problem from the field chosen by the researcher. In each field or area of education, several problems exist which may have reference to pure, applied, or action research. The choice and formulation of a suitable problem is one of the most difficult tasks for a researcher, especially if he/she is a beginner. There are many sources to which a researcher may go for a suitable research problem, or from which he/she may develop a sense of problem awareness.

The features of a good research problem are its:

- i) significance,
- ii) originality, and
- iii) feasibility.

You, as a researcher, should evaluate a proposed problem in the light of your competence and professional experience, possible difficulties in the availability of data, the financial and field constraints, and limitations of time. After evaluating a broad research problem you have to narrow it down to a highly specific research problem. You formulate the problem by stating specific questions for which you would seek answers through the application of scientific method. After the selection and formulation of a research problem, the derivation of Hypothesis(es) is the next and most important step in the research process. This step establishes the problem and the logic underlying the research study. Questions which the researcher has designed to answer are usually framed as hypothesis to be tested on the basis of evidence. The formulation of the research problem and hypothesis(es) is typically determined with the help of the implications of the related literature and the deductive logic of the problem under investigation. For this, a researcher should familiarise himself/herself with the steps involved in the selection, definition and evaluation of a research problem, and also with the concept of hypothesis alongwith its various types, the features of usable hypothesis and its importance.

4.1 OBJECTIVES

In this Unit, you will concentrate on the selection, definition, statement, and evaluation of the research problem. It also deals with the nature, importance and formulation of a hypothesis, the features of a usable hypothesis, its various types and utility in the research process. On completion of this Unit, you should be able to:

- Describe the important sources for the selection or identification of research problems,
- Explain what is meant by the 'definition' of the problem,
- Describe the criteria which are helpful in the evaluation of a research problem, and
- Explain the meaning of hypothesis, what its importance is, and types of hypotheses.

4.2 SOURCES OF IDENTIFYING A PROBLEM

A thorough understanding of known facts and ideas in the field of your interest as a researcher constitute the first and the most important step in selecting a problem for your study.

A thorough knowledge of the research studies conducted in the field provides you with details about the problems which have remained unresolved. A survey of suggestions for further research given at the end of research reports and reviews of research would help you to get an idea about the gaps which exist in the knowledge pertaining to your field of educational research. Periodicals and bibliographies of educational research are helpful in keeping you informed about the research going on in the field in which you are interested and show competence.

The choice and identification of a suitable problem is usually difficult. For a beginner to identify a research problem is always a very difficult task. This may be due to his/her limited knowledge of research processes or his/her unpreparedness for identifying the problem. He/she may not be familiar with the problems in the field which need solution through research. Even an experienced researcher finds it difficult to list all the problems that need to be researched. Each researcher selects a problem because of his/her own needs and purposes. The following, are, however, some important sources which would help you identify a suitable and significant problem.

4.2.1 Professional Experience

Professional experience of a researcher is one of the most fruitful resources which could suggest research problems. For example, if you are a classroom teacher, or academic counselor or working in any distance learning institute, you must be confronted with a number of problems in your day-to-day academic activities. In the classroom, there is a dynamic interaction between you as the teacher and your learners, between learners themselves, and between learners and learning materials. Such interaction provides you with a variety of problems to be solved through research. You may also be confronted with a number of behavioural problems in and outside the classroom. You have to make decisions about the probable effects of classroom instruction on your learners behaviour so as to establish a relationship between instructional objectives, learning experiences and learning outcomes in terms of behavioural changes in the learners. The learner behaviour may be analysed in terms of their academic achievement, interests, attitudes, motivation, values and some personality characteristics. You have to take decisions about the effectiveness of certain innovative teaching methods and techniques so as to base future classroom instructions upon empirical evidence rather than upon your subjective opinion. The teacher may wish to get answers to certain important and significant questions pertaining to certain components of the teaching- learning process. What are the organisational or management techniques that are employed? How are learning materials presented? How do students, teachers and parents feel about the use of certain innovations in the classroom? What out-of-school activities affect students and the teaching- learning process? How does the isolation of a distance student affect his/her progress in a course?

The educational administrators and planners may find subjects of research in the areas concerning decision-making, scheduling, teacher recruitment and placement, instructional supervision, and several other matters with which they are concerned.

Contacts and discussions with research oriented people are also helpful to researchers in identifying crucial problems and issues concerning education. Participation in conferences, seminars and workshops and listening to the learned speakers are very helpful in locating research problems. The Distance Education Council in India has identified some areas of research. They also provide financial aid for doing research in those areas.

4.2.2 Professional Literature

The study of professional literature will not only expose you to pressing research problems but will also suggest the way in which research is conducted. Research reports, bibliographies of books and articles, periodicals, research abstracts, yearbooks, dictionaries, research guides etc. would suggest areas in which research is needed.

Some specialised sources are:

- Encyclopedia of Educational Research,
- Dissertation Abstracts International,
- Psychological Abstracts, and similar publications are rich sources of research problems.

Some journals are:

- Open Learning
- The Journal of Distance Education
- The American Journal of Distance Education
- Indian Journal of Open Learning

The above publications are exclusively devoted to identifying and bringing into sharp focus the varied research needs in the different areas and aspects of Education and Distance Education in particular. Besides these printed materials, the other important sources for educational research are computerized databases. Most prominent amongst them is the Educational Resources Information Centre (ERIC) database, EBSLO, PsycINFO etc. International Council for Distance Learning (ICDL) database provides information about research literature on Open and Distance Education.

All published research reports generally conclude by making suggestions about further research. These suggestions are helpful to researchers for making decisions about methods and procedures employed by other researchers in similar studies with different samples.

Many research studies are criticised for weaknesses in design, treatment and analysis of data, contradictions and inconsistencies in the results, and so on. Thus, researchers can make significant contributions not by repeating these studies, but by making necessary

Another important source of identifying the research problems lies in the generalisations that are drawn from various theories pertaining to education, psychology, sociology, etc., known to the researcher. For example, the application of general principles involved in various theories to specific problems of Distance Education makes an excellent starting point for research in this area. Various theories of personality, intelligence, motivation, etc. are helpful in identifying problems pertaining to classroom situations and practices. It is only through research that you can profitably test the validity, scope, and practicability of various theories in educational situations.

Technological and social changes, and curricular developments constantly give rise to new problems and issues for research. Such innovations as teaching by television, programmed instructions, computers, and other hardware and software techniques need to be carefully evaluated through the research process.

List at least four sources for identifying research problems in the area of education. Which one may be a better source in the case of distance education and Why?

(b) Compare your answer with the one given at the end of this Unit.

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4.3 DEFINITION OF THE PROBLEM

After a problem has been selected, the next task for you is to define it in a form amenable to research. The definition of a problem amounts to specifying it in detail and narrowing it down to workable size. Each question and subordinate questions to be answered are specified at this stage and the scope and limits of investigation are determined. Usually, it is necessary to review previous studies in order to determine just what is to be done. Sometimes, while defining the problem, it is necessary to formulate the point of view or educational theory on which the research study is to be based. In case certain assumptions are made, they must be explicitly stated. Formulation of the problem includes:

- i) stating the problem in the form of statements or questions which make the problem clear and understandable,
- ii) identification and operationalisation of the variables concisely, and
- iii) evaluating the problem in terms of its significance, novelty and feasibility.

Let us now touch upon each of the above points one by one.

4.3.1 Statement of the Problem

A good statement of a problem must clarify exactly what is to be determined or solved or what is the research question. It must restrict the scope of the study to specific and workable research questions. So, you are required to describe the background of the study, its theoretical basis and underlying assumptions, and specify the issues in concrete, specific, and workable questions. All questions raised must be related to the problem. Each major issue or element should be separated into its subsidiary or secondary elements, and these should be arranged in a logical order under the major divisions.

4.3.2 Operationalisation of Variables

In stating a problem, the researcher should make sure that it is neither stated in terms so general as to make it vague nor specified so narrowly as to make it insignificant and trivial. The most important step in this direction is to specify the variables involved in the problem and define them in operational terms. To illustrate, suppose you state that you want to study the “Effectiveness of television on the performance of students in Course One of Master of Arts (Distance Education) offered by the Indira Gandhi National Open University”. This statement is broad and it communicates in a general way what you want to do. But it is necessary to specify the problem with much greater precision. For this the first step is to specify the variables involved in the problem and define them in operational terms.

The variables involved in the problem are, “effectiveness” and “performance”. Please note that these expressions are to be understood beyond their dictionary meanings. For example, the dictionary meaning of “effectiveness” is “producing the desired effect”. This meaning is not sufficient for research purposes. It is important for you to specify exactly

what indicator of effectiveness you will use or what you will do to measure the presence or absence of the phenomenon denoted by the term “effectiveness”. Similarly, you have to define the other variable “performance” also in terms of the operations or processes that will be used to measure them. In this study, you might choose to define “effectiveness” as the improvement made by the Diploma students in scores on a standardized achievement test in Course One. The term ‘performance’ might refer to the scores on the achievement test in Course One.

It is worth noting that the problem should be stated in a way that it indicates a relationship between two or more variables. It should involve neither philosophical issues, values nor questions of judgement that cannot be answered by scientific investigations. For example, should television be more effective in increasing performance level of students?

Such value questions cannot be answered through research. Similarly, the question “what is there in television teaching that enhance performances” is a philosophical question which cannot be probed easily.

4.3.3 Evaluation of the Problem

It is worthwhile for you to ask yourself a series of questions before you undertake the research. The questions should be helpful in the evaluation of the problem on various criteria. All such questions must be answered affirmatively before the study is undertaken. What are the questions that we should ask?

i) Is the problem researchable?

There are certain problems that cannot be effectively solved through the process of research. A researchable problem is always concerned with the relationship existing between two or more variables that can be defined and measured. The problem should be capable of being stated in the form of workable research questions that can be answered empirically.

ii) Is the problem new?

There is no use in studying a problem which has already been adequately investigated by other researchers. To avoid such duplication, it is essential to examine very carefully the literature available in the field concerned. The problem should be selected only when you are convinced that it is really a new problem which has never before been investigated successfully. However, it must be noted that a researcher may repeat a study when he/she wants to verify its conclusions or to extend the validity of its findings in a situation entirely different from the previous one.

iii) Is the problem significant?

The problem should be such that it is likely to fill in the gaps in the existing knowledge, to help to solve some of the inconsistencies in the previous research, or to help in the interpretation of the known facts. The results or findings of a study should either become

a basis for a theory, generalisations or principles. Besides, they should lead to new problems for further research or have some useful practical applications.

iv) Is the problem feasible for the particular researcher?

A research problem may be researchable, new or significant, and yet not feasible because of the following considerations:

- a. *Research competencies:* The problem should be in an area in which the researcher is qualified and competent. He/she must possess the necessary skills and competencies that may be needed to develop and administer the data gathering tools, and interpret the data available for analysis. The researcher should also have the necessary knowledge of research design, qualitative and quantitative techniques of data analysis etc. that may be required to carry out the research to its completion.
- b. *Interest and enthusiasm:* The researcher should be genuinely interested in and enthusiastic about the problem he/she wants to undertake for research.
- c. *Financial considerations and feasibility:* The problem should be financially feasible. The researcher should ascertain whether he/she has the necessary financial and temporal resources to carry on the study. Each project has a cost, particularly in the case of DE projects where students are dispersed. The cost is an important element in feasibility. It is important to estimate the cost of the project and assess the availability of funds. This will determine whether the project can be actually executed.
- d. *Administrative considerations:* In addition to personal limitations, financial and time constraints, the researcher should also consider the nature of data, equipment, specialised personnel, and administrative facilities that are needed to complete the study successfully. He/she should check whether he/she is able to get the co-operation from various administrative authorities for collecting various types of data.
- e. *Time:* Projects are a time bound exercise. Most of you, if not all, are already engaged in more than one activity in office, at home and at social organizations. It is important to assess the time required to complete a study. Besides the assessment of total period, it is necessary to identify the period of the year in relation to the nature of the study. For instance, if you wish to study instructional transactions in personal contact programmes your project must be timed so that you can actually observe a series of sessions in personal contact programmes.

At this stage, we should like you not to proceed further until you complete the exercise given below.

Check Your Progress 2

In the light of our discussion till now think of a research problem either in Distance Education or in your own area of specialisation. State the variables of the problem you have identified and state briefly how it is new, significant and feasible for research.

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

(b) Compare your answer with the one given at the end of the Unit.

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4.4 HYPOTHESIS

After you have identified a problem, you may formulate certain answers in the form of hypotheses. These guesses are based on the past experiences or informal observation or information gained from others. A hypothesis is defined as “A tentative proposition suggested as a solution to a problem or as an explanation of some phenomenon (Ary et.al. 1985).

4.4.1 Importance of Hypothesis

It is an agreed fact that, whenever possible, research should proceed from a hypothesis. Hypotheses are particularly necessary in studies where the cause-and-effect relationships are to be discovered. These, however, may not be so important in research studies in which the issue is of determining the status of a given historical, social or educational phenomenon.

It may be mentioned here that hypotheses are not essential to all researches, particularly, in the early stages of exploration of a problem. And it should not be assumed that failure to develop a hypothesis is necessarily a sign of lack of scientific orientation. However, a hypothesis may be conceived as an assumption which merits consideration and needs to be tested against the available empirical evidence. That is why it is suggested that a hypothesis is to be used as a pivot around which the investigation resolves, limiting thereby the field of investigation to a definite target and also determining the observations to be made and the ones to ignore.

A good hypothesis has several basic characteristics. We discuss some of them as follows:

- i) *Providing direction:* Hypotheses provide direction to research and prevent review of irrelevant literature and collection of useless or excessive data. They enable you to classify the information from the stand point of both 'relevance' and 'organisation'. This is necessary because, a given fact may be relevant with respect to one hypothesis and irrelevant with respect to another, or it may belong to one classification with regard to first hypothesis or to an entirely different classification with regard to the second. Thus, hypotheses ensure the collection of relevant data necessary to answer questions arising from the statement of the problem. For example, in a research problem, 'Study habits and achievement of Distance Education Learners', the researcher may frame the hypothesis – learners putting in more study hours achieve more in the examination. The researcher will collect data about the number of hours being put in by learners for study and their achievement in the examination.
- ii) *Hypothesis should be testable:* Hypotheses should be stated in such a way as to indicate an expected difference or an expected relationship between the measures used in the research. The researcher should not state any hypothesis that she/he does not have reason to believe that it can be tested or evaluated by some objective means. Hypotheses are the propositions about the relationships between variables. These can be tested empirically. There is no relationship between attendance to personal contact programmes in a distance education course and achievement in examination. Such propositions can be tested by means of empirical data.
- iii) *Hypothesis should be brief and clear:* Hypothesis should be stated clearly and briefly. It makes problems easier for the reader to understand and also for the researcher to test. The statement should be a concise statement of the relationship expected.

4.4.2 Characteristics of a Good Hypothesis

There are some important aspects to be looked into to judge the worth of a hypothesis in research. A good hypothesis must be:

- i) consistent with known facts and theories, and might be even expected to predict or anticipate previously unknown data,
- ii) able to explain the data in simpler terms,
- iii) stated in the simplest possible terms, depending upon the complexity of the concepts involved in the research problem, and

- iv) stated in a way that it can be tested for its being probably true or probably false, in order to arrive at conclusions in the form of empirical or operational statements.

4.4.3 Formulation of Hypothesis

Hypotheses are formulated to explain observed facts, conditions, or behaviour and to serve as a guide in the research process. The statements or tentative generalisations which constitute hypotheses are partly based on facts and explanations, and partly conceptual. Hence, there are certain necessary conditions that are conducive to the formulation of hypothesis. These are:

- i) *Deducing a hypothesis inductively*: You may deduce a hypothesis inductively after making observations of behavior, noticing trends or probable relationships. For example, as a teacher you observe your learners behaviour in the classroom. On the basis of your experience in the educational institution, you may attempt to relate your behaviour with that of the learners, to various teaching-learning methods as well as to the change in the institution itself and so on. On the basis of these observations, you may be able to formulate a hypothesis that attempts to explain these behavioural relationships in an educational setting.
- ii) *Limiting the problem*: Here you need to state that the basic understanding of the literature pertaining to the problem under investigation also becomes essential in view of the fact that the already existing corpus of knowledge on the particular problem is too detailed to be incorporated in the process of hypothesis formulation. Hence, the researcher must have the ability to comprehend the available evidence in support or against the expected relationships so as to remain within the limits of the problem while formulating the hypothesis.
- iii) *Deriving a hypothesis deductively*: Hypotheses are also derived deductively from the theory. Such types of hypothesis, called “deductive hypotheses” are formulated by studying a particular theory in the area of one’s interest and deducting a hypothesis from this theory through logic. This is possible when a researcher has a versatile intellect and can make use of it for restructuring his/her experiences in research. Creative approach to problem solving so badly needed by a researcher, is the product of intellectual adventure, sound attitude and agile intellect. This view is more relevant to descriptive and historical research in which the abundance of literature with a number of contradictory/supplementary theories may divert the researcher from the right path. Therefore, you have to exercise great restraint and display considerable patience to keep yourself on the right path. You have to develop certain habits and attitudes, besides saturating yourself with all the possible information about the problem and also think open-mindedly about it before proceeding further in the conduct of the study.
- iv) *Hypothesis from analogies, conversations, etc.*: Analogies also lead a researcher to clues that may prove to be useful in the formulation of hypotheses and for finding solutions to problems. For example, a new social situation resembles an old one with respect to a particular set of factors. If the researcher knows that the factors correlate in a particular fashion in the old situation, he/she may hypothesize in terms of trends in the relationship to be expected in the new social situation. However, it is

to be mentioned here that use of analogies must be made cautiously as they are not fool-proof tools for finding solutions to problems.

Sometimes, especially the inter-disciplinary research conversations and consultations with experts are also found to be useful in the formulation of hypotheses. To study the relationship of increasing literacy rate in the rural population with the changing pattern of agricultural development requires consultation with experts in agriculture, education, planning etc. while formulating hypotheses. However, formulating hypothesis on the basis of analogies, anecdotes and conversations should be done rarely, only as exceptions.

4.4.4 Three Forms of Hypothesis

To arrive at some conclusions pertaining to a particular research problem, a hypothesis is generally stated in testable form for its proper testing. It may be stated either in declarative form, the null form or the question form. What do these three forms mean?

Declarative hypothesis

When a researcher makes a positive statement about the outcome of the study, we get a declarative hypothesis. For example, the hypothesis 'The performance of the creatives on problem solving tasks is significantly higher than the non-creatives' is stated in the declarative form. Here, the researcher makes an attempt to predict the future outcome. This prediction is based on the theoretical formulation of what should happen in a particular situation if the explanations of the behaviour (performance on problem solving tasks) which the researcher has given in his/her theory are correct.

Null hypothesis

A null hypothesis is a non-directional hypothesis that proposes no difference or no relationship. The usual form of such hypothesis is: "There is no significant difference between the performance of two groups of students, one following the conventional system of education and the second following distance-mode of education. Since a null hypothesis can be statistically tested, it is also known as "statistical hypothesis" or "testing hypothesis". The proponents of null hypothesis emphasize that the researcher must remain unbiased throughout his/her research efforts. This view is defended on the basis of the fact that in this case the researcher neither predicts a result nor indicates a preconceived attitude that may influence his/her behaviour during the conduct of the study. On the other hand, those who criticize the use of null hypothesis argue that the researcher should indicate the direction of the outcomes of the study, wherever possible. It is further argued that predicting the results of a study is less awkward in phrasing a relationship, than in using the 'no difference' phrase that is usual in the null form.

A null hypothesis challenges the assertion of a declarative hypothesis and also denies it altogether. It says even where it seems to hold good, it is so due to mere coincidence. It is for the researcher to reject the null hypothesis by showing that the outcome mentioned in the declarative hypothesis does occur and the quantum there of is so significant that it cannot easily be said to have occurred by chance. The reasons for rejecting the null hypothesis may differ. Sometimes the null hypothesis is rejected only when the probability

of its having occurred by a mere chance is 1 out of 100 or .01 out of 1. In such instances, we consider the probability of its having occurred by chance to be too little to be considered, and we reject the chance component of the null hypothesis and take the occurrence to be due to a genuine tendency.

Hypothesis in question form

In the question-form-hypothesis, instead of stating what outcome is expected, a question is asked as to what the outcome will be. e.g. if you are interested to find out whether instructions through video programmes have any positive effect on the learning of the students of Master of Arts (Distance Education). The declarative form of the hypothesis will be: 'Will Instruction through video programmes affect the learning of student of Distance Education?' This statement shows that instructions through video programmes is not related to learning.

It is easier to state a hypothesis in question form because it appears to be quite useful to write down all the questions that one wants to answer in a particular research study. On the other hand, a researcher faces difficulties in predicting the outcome of the study and stating the hypothesis in declarative form. But it is worth noting that the question form is less powerful than the declarative or null form as a tool for obtaining valid information, and it is generally advisable to state a hypothesis in directional i.e., declarative form to arrive at valid conclusions and generalizations. However, this last statement should not be taken as if it were a law in the practice and theory of research.

Let us examine and compare the three forms of hypothesis on "Effect of video programmes on learning of students in distance education".

Declarative	Instruction through Video Programmes will increase the learning of the students enrolled in the Masters in Distance Education in comparison with those who do not have such provision.
Null	There will be no difference in learning outcomes of the two group of students, one following instructions through video programmes and the other having no such facility.
Question	Will instructions through video programmes affect the learning of student of Distance Education?

Check Your Progress 3

Give your own examples for each of the three forms of hypothesis.

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

(b) Look at the samples given at the end of this Unit

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4.5 HYPOTHESISING IN VARIOUS TYPES OF RESEARCH

There is no rigid rule about the choice of the form of hypothesis. You can choose any form which your research problems warrant. However, there are various conventions followed in selecting the form of hypothesis in relation to various types of research such as Historical, Experimental and Descriptive research etc. In this section we shall discuss how hypotheses are usually formulated in Historical research, Experimental research and Descriptive research.

4.5.1 Hypothesis in Historical Research

The hypotheses in historical research are useful in explaining events, conditions or phenomena of the historical period in question. For example, it may be hypothesized that 'The educational innovations highlighted in the National Policy on Education 1986 are based upon practices that have been previously tried in Indian Education since 1947', or

‘The observations of European school systems by Indian Educators during the nineteenth and the first half of the twentieth century exercise significant influence on Indian educational practices’. The hypotheses for historical research may not be formal hypotheses to be tested. Rather they are written as ‘explicit’ statements that tentatively explain the occurrence of events and conditions. It has been argued that an explicit statement or a systematic awareness of the hypothesis used in determining what facts were significant, clarifies the relationship between the investigator’s, ideas and the facts he/she reports, and it minimizes the possibility of employing trivial, biased, conflicting, faulty, or archaic hypotheses.

While formulating hypotheses in historical research, the investigator may formulate questions that may be most appropriate for the past events which he/she is investigating and then directs his/her research efforts seeking answers to these questions with the help of gathered evidence. For example the researcher may frame question – what educational practices have been tried in Indian Education since 1947? What educational innovations have been highlighted in National Educational Policy of 1986? If the evidence is compatible with the consequences of the hypothesis, it is confirmed. If the evidence is not compatible, or is negative, the hypothesis is not confirmed. It is through such synthesis that historical facts are established.

4.5.2 Hypothesis in Experimental Research

In experimental research a hypothesis states that the antecedent condition or phenomenon (independent variable) is related in cause and effect relationship to the occurrence of another condition, phenomenon, event or effect (dependent variable) in a particular setting. To test a hypothesis, the researcher attempts to control all the conditions except the independent variable which he/she manipulates. Then he/she observes the effect on the dependent variable presumably because of the exposure to the independent variable.

In view of the intricacy of casual effect of the independent variable, it is advisable for the researcher to give sufficient attention to the formulation of hypothesis alongwith the experimental plans and statistical procedures. The experimental plans and statistical procedures merely help the researcher in testing the hypothesis and contribute little to the development of theories for the advancement of knowledge. For example, a researcher wishes to study the effect of some type of supplementary materials used in a particular class taught by closed-circuit television. The experiment is supposed to compare the use of supplementary learning material alongwith some other methods. Hence, it may be hypothesized either in declarative form : ‘The achievement of learners who use programmed supplementary materials will be superior to the achievement of learners who follow non-programmed supplementary materials’ or in null form: ‘The achievement of learners who use programmed supplementary materials will not differ from the achievement of learners who use non-programmed supplementary materials’. Knowledge cannot be advanced by working on either of these hypotheses.

It may be mentioned here that the hypotheses derived or developed from existing theories contribute to the development of new theories and knowledge only through the method of experimentation.

4.5.3 Hypothesis in Descriptive Research

Different types of hypotheses have been in use in descriptive research in education and distance education. For example, to study the effectiveness of distance education in a country it may be hypothesized that 'The regional disparities in higher education have decreased over the period 1970-1986 with the increase in centres of distance/ correspondence education in Indian Universities'. Also public opinion surveys require hypotheses to study the opinion of people with regard to various educational issues. For example, to study the popularity of educational television in the country, it may be hypothesized that 'The educational television programmes are preferred more by the urban students than the rural learners'. Some studies in education require not only testing but also tracing relationship between serious facts to have a deeper insight into the phenomenon. For example, a researcher wants to study the relationship of socio-economic status and achievement-motivation with the enrolment of rural learners in higher education through correspondence. This requires the hypothesis: 'There is a significant relationship between Socio-economic status and rural learners in higher education through correspondence as compared to that of their urban counterparts'.

Similarly some researchers are concerned with developmental studies, especially in the identification of trends and predicting what is likely to happen in the near future. To illustrate, the researcher may be interested in the study of opening of non-formal education centres in a changing social order. He/she may hypothesize, 'The new colonies in the industrial townships require more non-formal education centres than the rural areas in Maharashtra'.

4.6 LET US SUM UP

In this Unit, we have discussed the issues related to selection, definition, statement and evaluation of research problems along with hypothesis formulation in various types of research.

To select a research problem we may depend on various sources: our personal experiences, the existing theories in the field concerned, etc. A research problem should contribute to the existing body of knowledge and lead to further research. It should be testable and feasible.

A hypothesis, can be derived either inductively or deductively or through analogies, consultations, etc. A good hypothesis must be simple and clear; it must state the expected relationship between variables, and thus make a prediction.

A hypothesis can be stated in a declarative form, null form or question form. Hypotheses are formulated and stated differently depending upon the requirements of various types of research such as historical research, experimental research and descriptive research.

4.7 CHECK YOUR PROGRESS: THE KEY

- 1) The four sources of identifying research problems in the area of education are:
 - (a) the researcher's own understanding and knowledge of the area of research and research studies already conducted in that particular area, (b) professional experience of the researcher, (c) professional literature and (d) generalisation made by various disciplines such as education, psychology, sociology, etc.

In distance education, the researcher's own professional experience may be a better source of identifying a research problem because it would provide him/her with the necessary information regarding the relevance and the feasibility of the research contemplated.

- 2) Here you may have any research problem. But we give you a model. "The educational value of audio-video programmes on Distance Education" could be a research problem. It is significant because, the idea of multi-media approach to distance teaching has to be tested empirically in a given situation. The impact of audios and videos on distance learners will decide whether to continue with multimedia approach or not. It is also feasible since it could be taken up by researchers in Distance Education/Educational media, and the financial and other requirements could be met in certain cases.

- 3) Declarative Hypothesis: "An urban distance learner performs better than his/her rural counterpart."

Null Hypothesis: "There is no difference between the performance of an urban and a rural distance learners."

Hypothesis in Question Form: "Is there any significant difference between the performance of urban and rural distance learners?"

Reference

Ary, D., Lucy, C. Jacobs and Razavich, A. (1972) *Introduction to Research in Education*, Third Edition, New York: Holt, Rinehart and Winston Inc.



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STAFF TRAINING AND RESEARCH INSTITUTE OF DISTANCE EDUCATION

Dear Student,

While studying the units of this block, you may have found certain portions of the text difficult to comprehend. We wish to know your difficulties and suggestions, in order to improve the course. Therefore, we request you to fill out and send us the following questionnaire, which pertains to this block. If you find the space provided insufficient, kindly use a separate sheet.

Questionnaire

Enrolment No.

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1. How many hours did you need for studying the units?

Unit No.	1	2	3	4	5
No. of hours					

2. Please give your reactions to the following items based on your reading of the block:

Items	Excellent	Very Good	Good	Poor	Give specific examples, if poor
Presentation Quality					
Language and Style					
Illustrations Used (diagrams, tables, etc.)					
Conceptual Clarity					
Check your Progress Questions					
Feedback to CYP Questions					

3. Any other comments:

Mail to:
Course Coordinator (MDE-415)
STRIDE, IGNOU, Maidan Garhi
New Delhi - 110068, India

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