
UNIT 1 INTRODUCTION TO EDUCATIONAL RESEARCH

Structure

- 1.1 Introduction
- 1.2 Objectives
- 1.3 Knowledge: Nature and Types
 - 1.3.1 What is Knowledge?
 - 1.3.2 Types of Knowledge
- 1.4 Sources of Knowledge
- 1.5 Nature and Conceptions of Social Reality
- 1.6 Purposes of Research
- 1.7 What is Educational Research?
- 1.8 Scope of Educational Research
- 1.9 Types of Studies in Educational Research
- 1.10 Let Us Sum Up
- 1.11 Unit-end Activities
- 1.12 Points for Discussion
- 1.13 Suggested Readings
- 1.14 Answers to Check Your Progress

1.1 INTRODUCTION

It has been estimated that knowledge almost doubles after every eight years. You may wonder why it is so and how it happens. In fact, human curiosity is the main reason for increase in knowledge. This knowledge is what may be called 'human commonwealth'. It knows no boundaries. People from all countries use this commonwealth and contribute to it. The present age has rightly been called the age of knowledge; knowledge generation is today as important as communicating it and helping others construct it for themselves. This is true of education as well.

The second major reason for creating knowledge can be attributed to the problems that face us in various fields, including education. Today, various countries are in competition with each other to acquire more knowledge and to generate it. This is because knowledge has truly become power. The most advanced countries in today's world are those that have a strong system of generating knowledge through research and development (R & D) activities. New knowledge leads to new technologies and new technologies sell because they fuel further development; they help us solve our problems, be these in the field of education or in other areas of human life.

The third reason responsible for generating knowledge is because of the decisions we take in our lives, especially in our professional life. Taking quick and right decisions has never been easy; but they who are more informed have always an edge over others. This holds good in education too. India is eager to improve her education system and make it more responsive to the needs and aspirations of her people so that the country may progress and prosper. Unless our education system generates knowledge to help solve our problems, our education system cannot be a top - class system. If we want to improve our higher education, the task should start at least 15

year earlier, at the level of primary education. This is because education is cumulative and no nation can build a superstructure on weak foundations. This task of generation of knowledge in the field of education is carried out through educational research.

In this Unit, we shall examine ‘what is knowledge?’ and ‘what are the various purposes of research?’ Later on we’ll study about the nature and scope of educational research and also about different types of studies in educational research.

1.2 OBJECTIVES

After completing this unit, you will be able to:

- explain the types of and traditions in knowledge;
- describe various sources of knowledge;
- differentiate between the objectivists’ and the subjectivists’ conceptions of social reality;
- list purposes of research;
- describe the nature and scope of educational research; and
- explain the major types of studies in educational research.

1.3 KNOWLEDGE: NATURE AND TYPES

1.3.1 What is Knowledge?

It is not easy to define knowledge. Most dictionary definitions of knowledge do not do justice to the concept of knowledge. The word ‘knowledge’ has been derived from the verb ‘to know’. Loosely defined, knowledge consists of all that a person knows and believes to be true. This would be called ‘personal knowledge’.

Personal knowledge differs from one person to another. This is because much of one’s personal knowledge may be unexamined, untested and therefore subjective. In the context of research, when we use the word ‘knowledge’, we refer to **scientific knowledge**. Scientific knowledge is well tried out, examined and tested (i.e. validated) knowledge. It is scientific knowledge, which is considered and accepted by experts to be true. Knowledge, in this sense, represents the entire content of our intellectual heritage; it is this knowledge which education tries to pass on to succeeding generations.

In spite of what has been said above, we should remember that the concept of knowledge expresses our standards, ideals, and tastes about the rightful exercise of cognitive skills because collectively they express our conceptions of truth and evidence. Knowledge is, therefore, concerned with how we come to know, what are our approved standards of competence - in performance, in inquiry and in criticism.

The concept of knowledge has been associated with what are called philosophical traditions; these are primarily three: the rationalistic, the empirical, and the pragmatic. According to the **rationalistic tradition**, knowledge is derived through deductive reasoning based on self-evident basic truths. Knowledge, according to rationalists, does not strictly depend upon experience; it depends instead on reasoning. Rationalists consider mathematics to be the ideal science. Mathematicians do not conduct experiments and surveys. Yet through reasoning, they arrive at truth that does not depend on experience for its confirmation.

Empirical Tradition

According to the empirical tradition, all natural phenomena can be known only through experience and not through deductive reasoning or intuition. Empiricists assume that

our mind has the power to compare, combine, analyse and generalize upon whatever is provided to it by experience. They also believe that the mind possesses the ability to perform logical operations upon concepts. The empirical tradition emphasizes learning from experience, through accurate observation, reason-based generalization, and willingness to revise laws that are not supported by events related to a particular phenomenon.

Pragmatic Tradition

The pragmatic tradition emphasizes the experimental character of the process of acquiring knowledge. The pragmatic tradition stresses that merely carrying out logical operations on basic truths is not enough; one needs to go beyond the generalizations about observed phenomena. Pragmatists are in favour of experimentation based on controlled observation of environment and events. The process of generating and testing knowledge is, according to Dewey, the process of “trying and undergoing” - trying an idea in practice and learning from observation of the consequences of the trial. Pragmatists are of the view that the mind has the capacity for active generation of ideas so that the problem faced by the individual can be resolved. Pragmatists are in favour of active and imaginative theorizing provided it leads to experimentation. The outcomes of the experimentation should give direction to imaginative theorizing.

1.3.2 Types of Knowledge

Declarative knowledge

According to Biggs (1999), knowledge is of many kinds. Chief among these is declarative or propositional knowledge. This knowledge refers to knowing about things or ‘knowing - what’. Declarative knowledge is generated by research; it is not solely based on one’s personal experience. Our knowledge about the solar system, about how different seasons are formed, how children learn, how humans process information - all these and much more are part of declarative knowledge. It is also known as public knowledge because it is tested through rules of evidence that make it verifiable, replicable, and logically consistent.

Functioning knowledge

Functioning knowledge is concerned with ‘how to do things’ and it involves performance based on understanding. Functioning knowledge is strongly rooted in declarative knowledge. Unless one is strong in declarative knowledge and understands what action(s) can be performed through it, it cannot become functioning knowledge. In other words, declarative knowledge when put to use for problem solving or for performing theory - based tasks, becomes functioning knowledge.

Procedural knowledge

Then comes procedural knowledge, which is essentially skill - based; it however does not have the high rigour of declarative knowledge. Procedural knowledge goes hand in hand with appropriate competencies in a particular area. Procedural knowledge is largely based on performance of right action in the correct sequence.

Conditional knowledge

There is yet another type of knowledge, viz., conditional knowledge, which is a combination of both procedural and higher level declarative knowledge. It informs us of what one should do under given circumstances, why and under what conditions one should do this and not that.

Check Your Progress

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

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

1. Describe the difference between 'personal knowledge' and 'scientific knowledge'.

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2. What is the basic assumption in the empirical tradition of knowledge?

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3. List any three types of knowledge.

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1.4 SOURCES OF KNOWLEDGE

It is natural for human beings to seek answers to the problems they face. They try to increase their knowledge throughout their lives. For this they rely upon the following sources of knowledge:

Experience

Almost everyday we learn from our experience. When we see the sun rise from the East every morning, we conclude that the sun rises everyday in the East. Similarly, we learn through our experience to distinguish between things that are sweet, sour or bitter, very hot or very cold. While our experience serves as a useful guide in everyday life, it is quite fallible in many situations.

Social customs and traditions

Social customs and traditions represent the wisdom of generations that have preceded us. When we don't know what to do in certain situations, we often rely upon our customs and traditions. However, most customs and traditions do not change according to new knowledge and therefore quite often they become undependable and out of tune with the spirit of the time. For example, the traditional treatment for typhoid and infertility are entirely unscientific and therefore ineffective. Thus customs and traditions may not have any scientific basis and may be rooted in make - belief or even superstition.

Reasoning

Reasoning is a more dependable means of reaching and establishing truth. Reasoning is of two types viz., deductive reasoning and inductive reasoning. **Deductive reasoning**

is associated with Socrates; it is syllogistic. In a syllogism, we have a major premise, a minor premise and an inference, which is warranted by the major premise. For example,

Man is mortal. (Major premise)

Ram is a man. (Minor premise)

Ram is mortal. (Inference / Deduction)

In deductive reasoning, we start with a generalization and apply it to a specific case and deduce an inference.

In **inductive reasoning**, we start with a specific event and make many more observations and on the basis of the commonality in a given set of observations, we formulate a generalization. Thus while in deductive reasoning we start with a generalization and apply it to a specific instance. In inductive reasoning, we proceed in the reverse order; we start with a particular event / instance and conclude with a generalization. Fig.1 brings it out clearly.

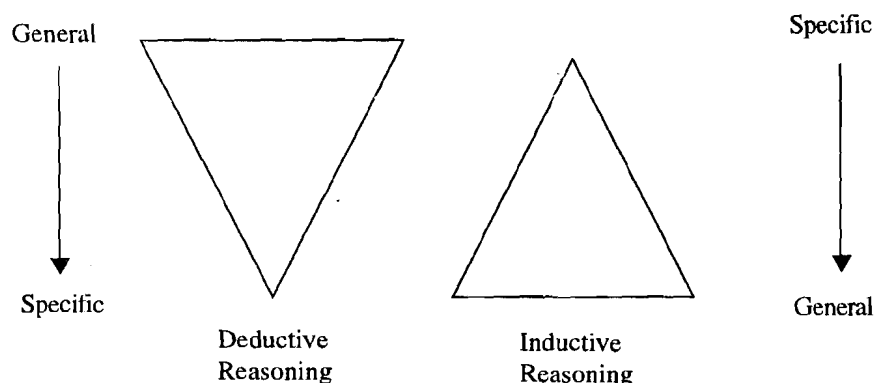


Fig. 1.1: Comparison of Deductive and Inductive Reasoning

Scientific Method

The scientific method was formulated in order to avoid the defects of deductive reasoning as well as inductive reasoning. The scientific method is the method of research. In spite of the variety, research has a typical set of procedures based on the scientific method, which is also known as the **hypothico-deductive paradigm**. According to researchers, the scientific method consists of the following sequence of steps (See Fig. 1.2):

- Step 1: A theory exists about the phenomenon.
- Step 2: The researcher identifies and researches questions in the context of the problem.
- Step 3: The researcher formulates a research hypothesis based on the theory. The research hypothesis is a statement of the possible relationship between two or more variables and it is testable.
- Step 4: The researcher describes the specific procedures i.e. operations by which the variables are defined and actions performed on them. The researcher formulates a null hypothesis on the research hypothesis, which can be tested statistically. He develops an appropriate research design i.e. a plan of action for testing the null hypothesis.
- Step 5: The researcher conducts the study according to the research design and collects the data.

- Step 6: The null hypothesis is tested by the researcher using the data collected through the study.
- Step 7: The null hypothesis may be rejected or accepted on the basis of statistical testing. If the null hypothesis is accepted, the theory is confirmed. If the null hypothesis is rejected, then the research hypothesis may have to be reformulated and tested again in order to solve the research problem. For this, steps 2-7 are repeated.

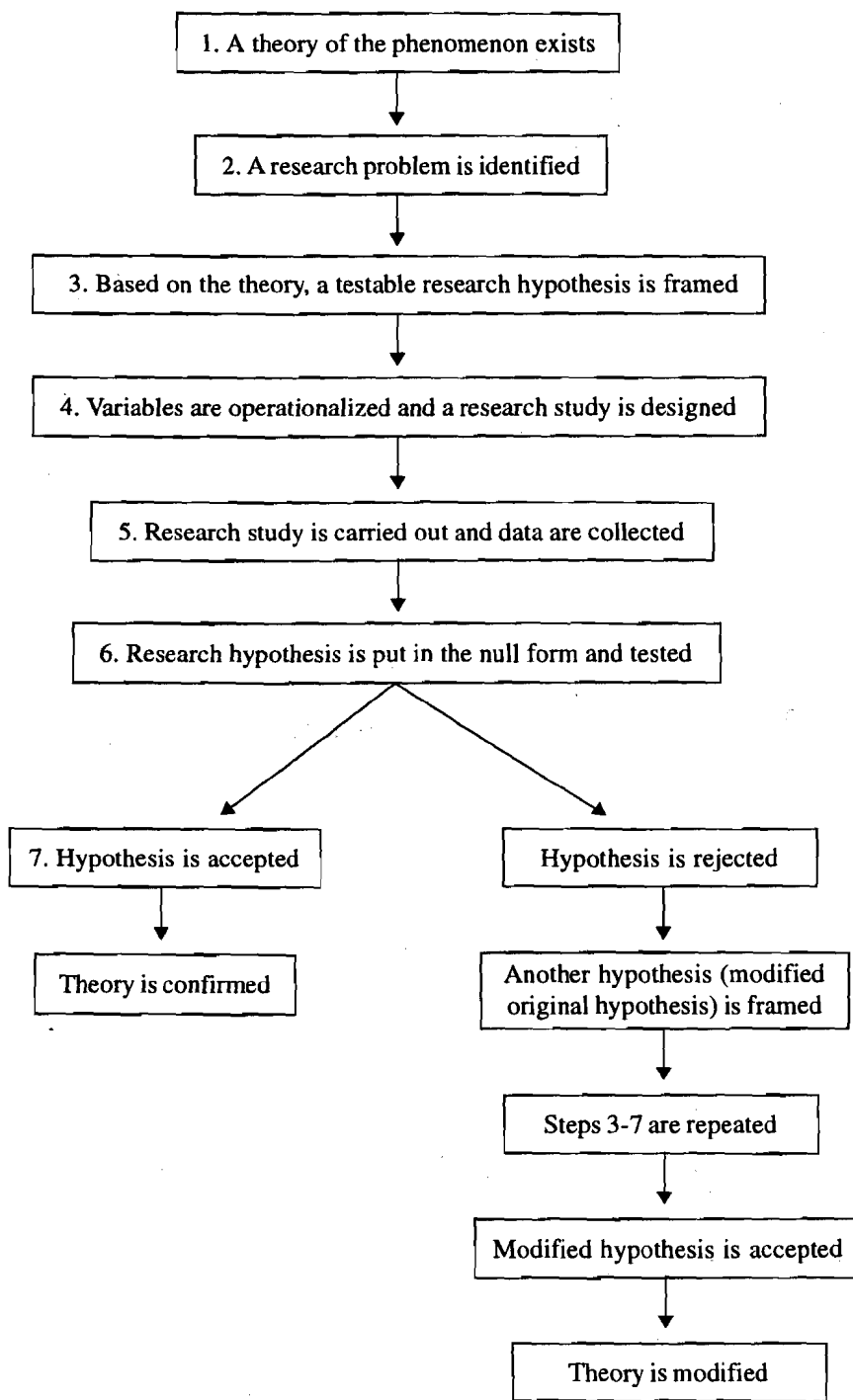


Fig. 1.2: Flow Chart on using Scientific Method

Since research is based on the scientific method, very often these expressions are used interchangeably and research too is considered a source of knowledge.

Check Your Progress

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

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

4. Briefly list the steps in the Scientific Method.

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5. Name the three parts of a syllogism.

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1.5 NATURE AND CONCEPTIONS OF SOCIAL REALITY

From the earliest times, human beings have been trying to understand the world in which they are born, grow up, and live their lives. This world can be divided into two parts: (a) the physical environment which consists of the natural environment (i.e. various objects and life forms) and objects created by human beings as they become more civilized (these are also known as 'artifacts'); and (b) the social environment which is the chief characteristic of human society. Social reality is the name given to the social environment. Growing up in a particular social environment shapes our life styles, attitudes, beliefs, value systems and worldview. These beliefs and values differ from one society to another, and change over time within the same society. For example, the beliefs of an Eskimo and an Indian would be very different from that of one another'. And each would feel that his view and attitude is correct.

The manner in which we look upon the social reality around us determines our conception of social reality. For centuries, human beings believed that our social reality is no different from our physical reality. It was also believed that social reality, like our physical reality, exists whether we are a part of it or not. The study of our social reality has given birth to the social sciences just as the study of the physical reality has given birth to the natural sciences. Those who believe that the essential nature of social reality and social sciences is the same as that of physical reality and physical sciences, try to discover and formulate universal laws in social sciences, just as a physical scientist would try to discover and formulate universal laws about the physical world. This conception of social reality would be called "the objectivists' conception".

Opposed to the objectivists' view of social reality is "the subjectivists' conception". According to this view, even though as animate objects, human beings may appear alike, as humans, as individuals, they differ from each other. The human beings, according to the subjectivists' view, live in two worlds at the same time: the physical world and the social world. Their behaviour in the social world is neither determined nor explained by the laws of the physical world. The social reality is not static; it changes over time and is in a state of flux. Let us, now examine "How the objectivists' conception and the subjectivists' conception of social reality differ from one another?" In fact, these two views of social reality are based on a number of different assumptions. These assumptions are essentially related to the following four questions:

- a) What is the essential nature of the social phenomena?
- b) What is the nature of knowledge? How is it acquired?
- c) What is human nature? Is it pre-determined or is it characterised by free will?
- d) What methods should we use in order to study social phenomena and human nature?

The objectivists believe that reality exists independent of human beings; the world does not need an observer who may observe it and say that it exists. The subjectivists believe that the world is the result of human thought and consciousness. In other words, it is created by the human mind. About knowledge and how it is acquired, the objectivists believe that knowledge is comparable to a tangible object; it can be passed from one person to another just like an object, therefore it can be acquired from others if one does not possess. The subjectivists believe that knowledge has to be experienced and one constructs it for oneself. Hence, knowledge, according to this view, is subjective, personal and unique. The objectivists believe that human nature is predetermined; human beings are no different from other forms of life and they respond to various objects and events in a mechanical manner. The subjectivists, on the other hand, are of the view that human nature is characterized by consciousness and freedom of choice. So far as the question of methodology for study of social phenomena and human behaviour is concerned, the objectivists emphasise that discovering universal laws that explain human behaviour should be the task of research; the differences among human beings are not as important as their similarities. The subjectivists are of the view that research methods used for social phenomena and human behaviour should emphasise what is unique about them; the focus should be on understanding and explaining the particular and not the universal.

It is hardly surprising that these two views of social reality recommend the use of methods of research, which are very different from one another. The objectivists recommend the use of experimental method in which human behaviour is observed in carefully controlled situations. The subjectivists, on the other hand, recommend the use of ethnographic methods wherein human behaviour is observed in its natural, uncontrolled environment.

Check Your Progress

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

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

6. Briefly describe the subjectivists' view of social reality. (in one sentence)

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1.6 PURPOSES OF RESEARCH

Research is an activity that helps us generate knowledge; it helps us in testing the existing knowledge and it also helps us in creating new knowledge. One may ask 'But why do we need more and more knowledge?' This can be best answered by stating that research and the knowledge generated through it help us satisfy our curiosity and solve the problems we face. Human beings are born curious and throughout our lives we keep on seeking answers to questions that arise in our minds. Research is essentially the process of conducting disciplined inquiry. Research serves the following purposes:

Generation of Knowledge

Research helps us verify existing knowledge and, if necessary, generate new knowledge. For example, various theories of learning explain how human beings learn. Behaviourist theory of learning explains how habits can be formed, and fears can be got rid of but it does not fully explain how we learn language. Similarly, information - processing theory explains how we process various types of sensation, how we make meaning of them and what role our memory plays, how we store information and how memory is organized. Research that leads to generation of knowledge is therefore very carefully planned and conducted in controlled situations. Such research is concerned with theory - building and is known as basic research, also called fundamental research. This type of research is very rigorous and based on carefully selected samples and techniques.

Problem-Solving

In education, we confront a variety of problems e.g. what is the best method of teaching a language? How can children learn skills more efficiently? How can scientific creativity be fostered among children? How can students learn to think mathematically? How can children develop morally and develop concern for others? etc; all these problems involve relatively more effective ways of promoting learning and development. Such problems can surely be attempted through trial and error but we may not succeed at all through trial and error or may take more time than is necessary. Research is essentially systematic inquiry and it can help us discover more effective ways of teaching and facilitating learning. Research concerned with problem solving is also known as applied research. Most educational research is applied research because it is concerned with formulation of procedures and sequences of action to achieve our purpose i.e. solving problems that we encounter as teachers.

Action in Specific Situations

Very often classroom teachers encounter problems that do not allow them to perform as effectively as they would like to. For example, a particular teacher may notice increasing truancy in his class or a teacher of English may find that students' attitude to the English language is far from positive and as a result they do not take interest in their English class. 'How to reduce truancy in my class'? would be the problem faced by Teacher A and 'How to make learners' attitude towards English more positive'? would be the problem confronted by Teacher B. You must have noted that both these problems are not general educational problems; on the other hand, these problems are faced by specific teachers in a specific class in a particular school of a particular town or city. These problems are therefore localized problems. The concerned teachers may take appropriate steps to study the problem in detail and examine its causes and finally may be able to solve their problems by themselves. Sometimes two or more teachers from the same school or neighbouring schools may exchange their experiences and help each other solve a particular problem. Such action in specific situations is quite systematic and the result of careful observation and analysis. Research that serves this purpose is known as "action research" and it is now being increasingly used. Results of action research usually are not extended to other situations.

Training of Future Researchers

Research also serves the purpose of preparing future researchers by providing them planned research experiences, which may be initially quite simple but later on become more and more complex. Surely, if research is to continue during the coming years, a new generation of researchers must be trained in time. As a student of this programme, you will be working on a dissertation (i.e. small scale research) on a specific educational problem. This will provide you with first hand experience of what activities are involved in research and what doing research feels like. M.Phil. Scholars and Ph.D. scholars in education also conduct research, which may be considered intermediate level and advanced level training for preparing researchers.

Check Your Progress

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

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

7. Briefly describe 'generation of knowledge' as a purpose of research.

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1.7 WHAT IS EDUCATIONAL RESEARCH?

We now know that research is a systematic inquiry based on the scientific method and concerned with understanding, prediction and control of phenomena. Educational research applies the scientific method for systematic study of educational situations. It seeks to help us solve educational problems.

Like research in other disciplines, educational research is characterized by the following features:

- 1) It is based on inductive - deductive reasoning in which the researcher observes the phenomenon, formulates a logically sound hypothesis (or a set of hypotheses) and tests its (their) validity empirically. The validated hypotheses are again checked against new data through further observation.
- 2) It is empirical in nature. In other words, educational research proceeds through systematic study of reality that can be observed, measured and recorded.
- 3) It is self - correcting. Results of research that appeal to our reason today may be disproved by new data. This is so in spite of the fact that the researcher takes all precautions to avoid error. Further research in the same area would remove the error, if any. Thus educational research like research in other disciplines is self - corrective.

We have already examined two conceptions of social reality. Since education is one of the social sciences, we find that educational research uses both conceptions of social reality and the methods that are considered appropriate for exploring it. This explains why educational research makes use of the approaches used in scientific research as well as those used in social science research. The objectivists' approach to research is known as the **positivist** paradigm while the subjectivists' approach to research is known as **non - positivist** or **humanistic** paradigm. A paradigm can be defined as a way of looking at a phenomenon or a broad perspective of it. A paradigm determines research approach and methods. Educational research uses methods derived from or based on positivist as well as non - positivist paradigms depending upon the nature of the problem being investigated. We will study various major types of studies in educational research a little later (see 1.8). We may conclude by saying that educational research is concerned with issues that engage the attention of teachers and educationists. To quote Travers, "The scientific goal of educational research is to discover laws or generalizations about behaviour which can be used to discover, to make predictions and control events within educational situations" (Travers, 1964, 5). Advocates of the humanistic paradigm would take the stand that educational research should help us understand how humans learn and behave in educational settings for learning/performing educational tasks.

Check Your Progress

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

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

8. Briefly explain why educational research uses both positivist and non - positivist approaches for solving educational problems.

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1.8 SCOPE OF EDUCATIONAL RESEARCH

Educational research covers a vast territory and it can be looked upon and classified in many ways, chief among which are the following:

Classification by Levels of Education

This classification would result in research in pre-school education, research in primary, secondary and tertiary (i.e. higher) levels of education. Under research on secondary level and tertiary level education, we have research studies on face - to face education and on open and distance learning.

Classification by Curriculum Areas

This classification results in research studies in various areas of school curriculum e.g. language education, science education, math education, social sciences (including Environmental Science) education, art education, business studies education etc; Under each of these, there exist many sub - areas. For example, language education research could deal with teaching of the first language, or second language or foreign languages. In the context of Hindi, a first language for many students, research studies could be conducted on teaching grammar, teaching poetry, teaching reading comprehension and teaching writing skills, to name some of the major aspects. In teacher education, we have curriculum areas like philosophy of education, sociology of education, history of education, educational psychology, educational technology, peace education, value education, human rights education, etc; Research studies can be conducted in all these areas as also in pre - service teacher education and in - service teacher education.

Classification by Research Methods Used

Educational research may be classified according to the research method used in a particular research study. Such classification will yield types like experimental research, historical research, survey research, ethnographic research, developmental research, case study research etc;

However even these three schemes of classification do not completely account for the entire variety of studies in educational research. With the passage of time, new priorities in educational research lead to new areas of research. When the First Survey of Research in Education in India was published in 1974, the entire research conducted till 1970 was classified under 17 headings, but 23 years later when the Fifth Survey was published in 1997, the variety in research studies generated 38 headings! (see Table 1.1)

It is hardly surprising that during the intervening 23 years about 25 new areas in educational research had emerged and substantial quantity of research had been carried out in each area.

Table 1.1: The Changing Map of Educational Research in India.

The First Survey (1974)	The Fifth Survey (1997)
<ol style="list-style-type: none"> 1. Educational research in India 2. Philosophy of Education 3. History of Education 4. Sociology of Education 5. Personality, learning and motivation 6. Guidance and counselling 7. Tests and measurement 8. Curriculum, methods and textbook 9. Programmed learning 10. Correlates of achievement 11. Educational evaluation and examinations 12. Teaching and teacher behaviour 13. Teacher education 14. Educational Administration 15. Economics of Education 16. Social and adult education 17. Educational surveys 	<ol style="list-style-type: none"> 1. Educational research in India 2. Philosophy of Education 3. Sociology of Education 4. History of Education 5. Economics of Education 6. Psychology of Education 7. Mental health * 8. Cognitive processes * 9. Social Processes * 10. Motivation 11. Creativity and innovations * 12. Guidance and counselling 13. Curriculum development 14. Pre - primary education* 15. Primary education* 16. Secondary education * 17. Higher education * 18. Social science education * 19. Science education * 20. Mathematics education * 21. Physical and health education * 22. Moral, arts and aesthetics education * 23. Educational technology * 24. Teaching strategies * 25. Teacher education: Pre - service and In-service* 26. Vocational and technical education * 27. Special education * 28. Open and distance education * 29. Adult, continuing and non-formal education * 30. Education of S/Cs, S/Ts and minorities * 31. Education of girls and women * 32. Demographic studies in education and population education * 33. Ecological and environmental studies in education * 34. Comparative education * 35. Educational assessment and evaluation * 36. Educational planning and policy research * 37. Organization, administration and management of education * 38. Correlates of achievement <p>(* denotes a new area of educational research not listed in the First Survey).</p>

'Teaching' constitutes a macro - area in educational research. Let us examine the changes that took place in 'research in teaching' during the period 1963 - 1986. The year 1963 marks a watershed in research on teaching because it was during this year that N.L. Gage's Handbook of Research on Teaching (also known as 'the First Handbook') was published. The year 1986 witnessed the arrival of M.C. Wittrock's Third Handbook of Research on Teaching. It should be interesting to examine the new areas that appeared in research on teaching during these 23 years. Gages' Handbook lists 23 areas whereas Wittrock's Handbook covers 35 areas. It is not the difference in the number of areas that impresses us; far more interesting should be the changes in areas in terms of new trends and changing priorities, because changes in research in teaching called for an entire new scheme of classification of research studies. (See Table 1.2)

Table 1.2: Changing Emphasis on Research in Teaching

Gage's Handbook (1963)	Wittrock's Handbook (1986)
<p>Part I: Theoretical Orientations</p>	<p>Part I: Theory and Method of Research on Teaching</p>
<p>1. Historic exemplars of teaching method 2. Logic and scientific method in research on teaching 3. Paradigms for research on teaching</p>	<p>1. Paradigms and Research programs in the study of teaching : A contemporary perspective 2. Philosophy of research on teaching : Three aspects 3. Measurement of teaching</p>
<p>Part II: Methodologies in Research on Teaching</p>	<p>4. Quantitative methods in research on teaching</p>
<p>4. Statistics as an aspect of Scientific method in research on teaching 5. Experimental and quasi - experimental designs for research on teaching 6. Measuring classroom behavior by systematic observation 7. Rating methods in research On teaching 8. Testing cognitive ability and achievement 9. Measuring non-cognitive Variables in research on teaching</p>	<p>5. Qualitative methods in research on teaching 6. Observation as inquiry and method 7. Synthesis of research on teaching 8. Theory, methods, knowledge, and research on teaching</p>
<p>Part III: Major Variables and Areas of Research on Teaching</p>	<p>Part II: Research on Teaching and Teachers</p>
<p>10. Analysis and investigation of teaching methods 11. The teachers' personality and characteristics 12. Instruments and media of instruction 13. Social interaction in the classroom 14. The social background of teaching</p>	<p>9. Teachers' thought processes 10. Students' thought processes 11. The teaching of learning strategies 12. Teacher behavior and student achievement 13. Teaching functions 14. Classroom organization and management 15. Classroom discourse 16. Media in teaching 17. Philosophy and teaching</p>
<p>Part IV: Research on Teaching Various Grade Levels and Subject Matters</p>	<p>Part III: The Social Institutional Context of Teaching</p>
<p>15. Research on teaching in the nursery school 16. Research on teaching reading 17. Research on teaching the social studies 18. Research on teaching composition and literature 19. Research on teaching secondary school mathematics 20. Research on teaching science 21. Research on teaching foreign languages 22. Research on teaching the visual arts 23. Research on teaching at the college and university level</p>	<p>18. The culture of teaching 19. Research on teacher education 20. School effects</p>
	<p>Part IV: Adapting Teaching to Differences Among Learners</p>
	<p>21. Adapting teaching to individual differences among learners 22. Teaching creative and gifted learners 23. Teaching bilingual learners 24. Special educational research on mildly handicapped learners</p>
	<p>Part V: Research on Teaching of Subjects and Grade Levels</p>
	<p>25. Research on early childhood and elementary School Teaching Programs 26. Research on teaching in higher education 27. Research on written composition 28. Research on teaching reading 29. Research on teaching and learning mathematics : Two disciplines of scientific inquiry 30. Research on natural sciences 31. Research on teaching arts and aesthetics 32. Moral education and value education 33. Research on teaching social studies 34. Research on professional education 35. Research on teaching in the armed forces</p>

Check Your Progress

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

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

9. Give three examples of different curriculum areas in educational research.

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10. Write names of three new areas in research on teaching.

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11. Write names of two new areas in recent educational research in India.

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1.9 TYPES OF STUDIES IN EDUCATIONAL RESEARCH

Studies in educational research are catergorised under two broad heads: (a) quantitative studies, and (b) qualitative or non-quantitative studies. Qualitative studies are also called 'descriptive' studies by some researchers. Various types of research studies under these broad heads are shown in Table 1.3.

Table 1.3: Types of Research Studies

Educational Research	
<i>Quantitative (Based on positivist paradigm)</i>	<i>Qualitative (Based on Humanistic paradigm)</i>
1. Experimental 2. Quasi experimental 3. Correlational	1. Survey 2. Case Studies 3. Documentary analysis 4. Developmental 5. Ethnographic 6. Historical 7. Philosophical

A brief description of these types of research studies is given below. You will study about these types of research later on in detail. In Unit 5, you will study about descriptive research, which includes survey research, case study research, documentary analysis studies and developmental studies. Units 6 and 7 provide detailed treatment of experimental and correlational studies. Unit 8 is based on ethnographic research of various types while Unit 9 gives a comprehensive description of historical and philosophical research.

Experimental Research

Experimental research in education is concerned with the investigation of cause-effect relationships in educational events. Variable(s) related to cause must precede those

related to the effects. Since in terms of time, the cause variables occur first, they are also known as 'antecedents' while effect variables are called 'consequents'. In experimental studies, the researcher observes 'what happens' if an antecedent is varied under control; the effect is examined on another variable or a set of variables. The variable, which is varied, is also known as the '**independent variable**' (IV) while the variable(s) on whom the effect is measured are dependent variables (DV). Issues like 'which method of teaching is more effective in promoting students' learning in a particular subject?' are settled through well-designed experimental studies.

Quasi-experimental Studies

The literal meaning of 'quasi' is "seemingly, but not really". Thus research studies that do not use a truly experimental design are called quasi - experimental studies. Since educational research is carried out on human beings who are, unlike objects, quite changeable, and controls cannot be exercised absolutely, therefore much of experimental research in education is quasi - experimental in nature. This type of research investigates the same issues that experimental research does, the difference is only in terms of the manner in which an experiment is designed and conducted.

Correlational Research

Correlation means 'going togetherness'; in other words, correlation between two variables tells us about the relationship between them. For example, if we know how achievement in mathematics (x) is related with achievement in science (y), then on the basis of marks, in 'x' we can predict marks in 'y' and vice versa. Variables may be positively related with one another (e.g. High achievement in mathematics is associated with high achievement in science); or the correlation may be negative (e.g. High achievement in maths is associated with low achievement in art); or the correlation may be zero (e.g. high achievement in maths is sometimes associated with low achievement in art, sometimes high achievement in art and sometimes even with average achievement in art). Correlation can vary between '0' and '1' and is expressed in terms of direction as well as magnitude (e.g. + 0.91, - 0.23, + 0.53 etc.). Unlike experimental research, which aims at discovering cause-effect relationship among variables, correlational studies are concerned with problems like 'What is the relationship between educational achievement and levels of anxiety'? However, the correlation must not be interpreted to mean that one variable is the cause of high or low measure of the other variable. Frequently there are other factors that influence both of the variables under consideration. Correlation is always relative to the situation under which it is obtained, and its size does not represent any absolute natural fact. It is relative to the circumstances under which it is obtained and should be interpreted in the light of those circumstances. Correlational studies enable us to predict one variable from another (or many others). Correlational research helps us explore and understand the phenomena and thus it can prove helpful in theory building.

Descriptive Research

Descriptive research investigates 'what exists'. If it is conducted on large samples through surveys, it is called survey study. It may also be based on detailed and comprehensive study of just one unit of population, i.e. just one case, thus resulting in a case study. Descriptive research may examine how various aspects of human development (e.g. intelligence, attitudes, social development, moral development) or skills (cognitive skills, social interaction skills etc.) develop in groups of persons of the same characteristics. Such studies are called 'developmental studies'. Similarly analysis of documents related to a particular aspect / area of education (e.g. religious and moral instruction, value education etc.) is collectively known as documentary analysis studies. All these are part of descriptive research.

Ethnographic Research

Ethnographic research is just the opposite of experimental research. In the latter, research is conducted through carefully controlled experiments but in ethnographic research, the emphasis is on naturalistic (i.e. totally without control) field studies. Ethnographic studies typically describe events that occur in the life of an educational group or a society with respect to social structures and behaviour and perceptions of the individual members. Thus ethnographic studies collect primary data (i.e. facts as they occur) and interpret its meaning. Ethnographic studies use both participant as well as non-participant observation for collecting and recording primary data.

Historical Research

Historical studies are concerned with the study of 'what was'; they try to determine, evaluate and understand past events primarily for the purpose of gaining a clearer understanding of the present and a better prediction of the future. Historical research thus seeks to provide a perspective on the past so that we may be able to understand the present and the direction the course of events would take in future. Historical research is obviously useful in understanding the trends and the problems associated with educational developments during a period of time. Historical research can also help us understand well - established educational systems like the one we have in India.

Philosophical Research

Philosophical research studies in education can be taken up under historical research. These studies usually deal with philosophical aspects of education (e.g. related to knowledge and acquiring knowledge), metaphysical (i.e. related to reality aspects) or axiological (i.e. concerned with values) aspects of the education process. Philosophical research is basically interpretive in its approach and it involves careful definition of the terms and processes.

Check Your Progress

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

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

12. Answer by completing the following:

- a) Experimental studies aim at discovering relationship among variables.
- b) Case studies are part of research.
- c) Correlational studies are concerned with discovering among variables.
- d) Historical research examines and helps us understand the
- e) Documentary analysis studies come under research.

1.10 LET US SUM UP

In this Unit we have learnt about knowledge, the two major philosophical traditions associated with it, types and sources of knowledge. We have also learnt how research is a major source of knowledge and knowledge - generation. Thereafter we examined the various steps in scientific method, also called the "hypothetico - deductive paradigm". Since social reality differs a good deal from the physical reality, we examined the two

conceptions of social reality viz., the objectivists' and the subjectivists' and the respects in which they differ from one another.

We also learnt that research is a disciplined inquiry for knowledge and serves four purposes:

- a) generation of knowledge,
- b) problem solving,
- c) action in specific situations, and
- d) training of future researchers.

We have learnt about what is educational research and have also examined its scope. We have learnt that educational research deals with almost all issues related to education and that educational research is classified according to levels, curriculum areas and research methods used. We also learnt how priorities change with time even within the same area of educational research.

Towards the end of this Unit we learnt about various types of research studies in education and what they aim at. In this section we learnt about experimental and quasi - experimental studies, correlational research, descriptive research, ethnographic research, historical and philosophical research.

1.11 UNIT-END ACTIVITIES

1. List different areas of educational research in the Indian context.
2. List different areas of educational research as documented in Dissertation Abstracts International (DAI).

1.12 POINTS FOR DISCUSSION

1. Is educational research carried out to generate new knowledge only? Discuss.
2. The scope of educational research is becoming wider with the emergence of new problems in education. Discuss.

1.13 SUGGESTED READINGS

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1.14 ANSWERS TO CHECK YOUR PROGRESS

1. Personal Knowledge is based on one's personal experience and it differs from person to person. Scientific knowledge is tested and validated; it is widely accepted by the experts.
2. Empirical tradition of knowledge assumes that knowledge can be known only through experience; it cannot be known through deductive reasoning or intuition.
3. Any three: declarative (or propositional) knowledge, procedural knowledge and conditional knowledge.
4.
 - a) A theory is available about the phenomenon.
 - b) A research problem is identified.
 - c) A research hypothesis is framed for testing
 - d) Operations are defined and a research design is prepared.
 - e) Research is conducted and data are collected.
 - f) The research hypothesis is tested.

The research hypothesis is accepted or rejected. If it is rejected, then the hypothesis is modified and steps 'c' to 'g' are repeated.
5. Three parts of a syllogism: Major premise, minor premise, and inference or deduction.
6. According to the subjectivists' view, social reality is not static; it is dynamic and ever evolving.
7. Generation of knowledge is a major purpose of research. It is concerned with theory - building by testing a current theory and modifying it if necessary in the light of new data.
8. Educational research employs both positivist as well as non-positivist paradigm because of the nature of research problems in education. Some of these problems can be solved better through the use of positivist paradigm while others can be resolved more satisfactorily through humanistic paradigm.
9. Languages, sciences, social studies, business studies, arts etc; (any three).
10. Teachers' thought processes, teaching of learning strategies, classroom discourse etc; (any three other than those listed in NL Gages' Handbook).
11. Educational planning and policy research, and Teaching strategies (Any two new areas from the 5th Survey).
12. (a) cause - effect (b) descriptive (c) patterns of relationships (d) what was; present (e) qualitative.