

# ACTION RESEARCH

## ★ NATURE OF ACTION RESEARCH

★ Corey (1953), action research is "the process by which practitioners attempt to study their problems scientifically in order to guide, correct and evaluate their decisions and actions".

★ Hammersley (1993) viewed action researches as small scale and narrowly focused researches undertaken by teachers in a given context. It is referred to as research into practice by practitioners, for practitioners who will make and live with decision.

## ★ BACKGROUND OF ACTION RESEARCH IN EDUCATION

### ★ PROMOTING DEMOCRATIC PRINCIPLES OF MANAGEMENT OF EDUCATION

Democratic principle of management ensures participation of stakeholders in decision making and execution of the system. In school system the teachers, principals, other management personnel like supervisors play a major role in execution of educational programmes and activities. Action research is used as a tool in the hands of such personnel in making improvements in educational practices at grass root level and making it a regular feature for development of school system.

### ★ OPPORTUNITIES FOR DEVELOPMENT OF SCIENTIFIC THINKING AMONG PRACTITIONERS

The modern age insists on encountering with complex problems scientifically.

### ★ GAP BETWEEN RESEARCHES IN EDUCATION AND EDUCATIONAL PRACTICES

It has been noticed that researches conducted at Doctoral degree or Masters degree level may lead towards generalisation oriented studies. The findings of such studies may be relevant to school system.

### ★ MOTIVATION OF PRACTITIONERS IN PROBLEM SOLUTION

Psychologically it has been proved that self initiative and self participation in dealing with problematic situations can bring fruitful results.

Ready made solutions to problems directed from one end to the other does not encourage practitioners to adopt them efficiently.

## ★ MAIN FEATURES OF ACTION RESEARCH

The features of action research as highlighted by Best and Kahn (1986) read as follows:

"Action research is focused on the immediate application, not on the development of theory, nor upon general application.

### ★ DIFFERENCES BETWEEN AND OTHER KINDS OF RESEARCH IN EDUCATION

Nature of problem, Goals of research, Research design, Nature of population and sample, Generalisations formulated on the basis of research

## ★ USES OF RESEARCH

### ★ SCOPE OF ACTION RESEARCH

Sl. No.	Area of Action Research	Specifications
1.	Learner	Motivation of learners, learning style, attention span, concentration, Learner participation in teaching learning, process etc. Group dynamics.
2.	Teacher	Level of competencies, Commitment, Teaching style, Motivation, Attitude towards weak students, Dealing with physically challenge learners, Social profile, Teachers communication. Value
3.	Methods of teaching	Activity based teaching, play way approach, child-centred learning, project approach, use of media in class room teaching, positive reinforcement etc.
4.	Curriculum	Mechanism of curriculum design, mechanism of curriculum construction, mechanism of curriculum revision, curriculum structure, subject upgradation, intended, transacted and hidden curriculum, teachers role in curriculum design and transaction in context specific situations.
5.	Evaluation	Criterion reference testing, diagnostic testing, formative testing, illuminative testing, achievement testing, objective type testing, objective based testing,
6.	School management	Institutional planning, learners and teachers participation in decision making, leadership style, class room management, institutional evaluation, accountability of headmasters and teachers, teacher morale, human resource development.
7.	School community interaction	Parental co-operation, PTA, community participation in school activities, community development projects undertaken by school, etc.

### ★ PROCEDURAL DETAILS OF ACTION RESEARCH

- Identification of problem
- Defining and delimiting the problem
- Analysing probable reasons behind the problem
- Formulating action hypotheses
- Developing suitable design for testing of action hypotheses
- Making intervention
- Collecting data with the help of suitable tools
- Evaluation of the project
- Reporting

## EX-POST FACTO RESEARCH

- ★ INTRODUCTION.
- ★ EX POST FACTO RESEARCH - ITS MEANING.
- ★ DIFFERENCE BETWEEN EXPERIMENTAL RESEARCH AND EX-POST FACTO RESEARCH.
- ★ BASIC FEATURES OF EX POST FACTO STUDIES.
  1. PROBLEMS OF INVESTIGATION.
  2. HYPOTHESEATION.
  3. POPULATION AND SAMPLE.
  4. SELF SELECTION IN EX POST FACTO RESEARCH.
  5. STATISTICAL DESIGN
  6. EXAMPLES OF EX POST FACTO STUDIES.
  7. SMALL SCALE EX POST FACTO STUDY.
  8. EXAMPLES OF LARGE SCALE EX POST FACTO RESEARCH.
- ★ STEPS IN CONDUCTING EX POST FACTO RESEARCH.
  1. SELECTION OF PROBLEM
  2. FORMULATING HYPOTHESIS
  3. POPULATION AND SAMPLE OF THE STUDY
  4. TOOLS
  5. DATA COLLECTION
  6. ANALYSIS AND INTERPRETATION OF DATA
- ★ CONCLUSION

**MEANING AND IMPORTANCE OF SURVEY AND REVIEW OF RELATED LITERATURE**

The first and an important step in the research process is the choice of a suitable problem for investigation. In each field or area of education, several problems exist which may have reference to past or present and implications for the future. The identification of a research problem is a difficult but an important phase of the entire research process. In the beginning the researcher may be unfamiliar with the areas in which the research is needed and also the procedures he/she is to follow for selecting the problem. Thus, it is important for him/her to familiarize himself/herself with and have a thorough conceptual or theoretical understanding of his/her field of study, to know what studies have already been conducted in it, and also to find out about the problems which have remained unsolved.

A research problem arises from a theoretical and empirical framework. Thus, both conceptual and research literature are to be reviewed for this purpose. The review helps in identifying the latest research trends pertinent to a problem. It clarifies what is already known and also what is unknown and unexplored. An analysis of the related literature eliminates the possibility of

duplication of what has already been done.

The first step in reviewing the literature is the identification of the material that is to be read and scanned. The identification can be made through the use of primary and secondary sources available in the library. In the primary sources, the author reports his/her own work directly in the form of research articles, books, monographs, dissertations or theses. These sources provide the researcher a basis for making judgement about the problem to be investigated. Though survey of such sources is a time consuming process for a researcher, it provides a good source of information about research methods, tools or samples used. In the secondary sources (bibliographies, abstracts, indexes, encyclopedias, etc.), the author compiles and summarizes the results of the research studies undertaken by others and provides interpretations of these results. **They** acquaint a researcher to major theoretical issues in the field and to the work that has been done in the area under study. In some situations, secondary sources suggest possible solutions of the problem and working hypotheses, and also introduce the researcher to important primary sources. Working with secondary sources is not time-consuming since it requires acquisition and reading/review. The disadvantage of the secondary sources, however, is that the researcher is depending upon some one else's judgments about the important and significant aspects of the study.

The nature of the study to be undertaken by the researcher helps him/her in deciding about the use of primary or secondary sources. However, secondary sources are excellent starting point to look for relevant literature, and as a researcher, you should make use of both primary and secondary sources. As far as possible, you should read primary sources and develop your own research problems/solutions for testing. Library is an important source for locating the information of primary or secondary nature.

The importance of review of related literature is evident from the following points.

- ★ The review of the related literature acquaints a researcher with the current knowledge in the field in which he/she is interested to conduct research. It provides him/her the theoretical and empirical framework from which the problem has arisen. The review eliminates the risk of duplication of what has been done. It is no use to replicate a study when the stability and validity of its results have been clearly established. It convinces the researcher that the problem selected by him/her has roots in the existing literature and it needs further exploration.
- ★ The review helps you as a researcher to define the scope and limits of the field. It enables you to delimit and define the problem with respect to nature of variables and area of operation, A thorough study of the related literature brings the researcher up-to-date on the results of the work which other researchers have already done. This background information is helpful in stating and formulating the objectives and hypotheses of the study being undertaken by the researcher.
- ★ Through the survey of the related literature and its review, you can identify the priority research areas and significant problems by avoiding unfruitful and useless problems. The findings of the significant problems are likely to add to the knowledge in a meaningful way.
- ★ The comprehensive review of the related literature provides rich background knowledge which enables you to perceive relationships among the variables and also to determine what findings other researchers have reported on the problems related to the problem under study. Thus, it provides a theoretical rationale for formulating hypothesis(es).
- ★ The careful and thorough review of related literature gives you an understanding of the research methodology which is helpful in the selection of sample groups, selection and development of tools and techniques and application of data analysis techniques.
- ★ The most important purpose for reviewing the related literature is to know about the recommendations of previous researchers highlighted in their studies for further research.
- ★ When you have completed your study and the results are interpreted, it is important that you discuss these results in relation to the findings of other researchers in the field. This discussion is possible only when you have a thorough understanding of the related literature the findings and conclusions drawn by them.

**IDENTIFICATION, SELECTION, AND UTILISATION OF SOURCES OF INFORMATION**

A library provides sources of primary and secondary information. As a researcher, you should be familiar with the library, its facilities and services. You should also be acquainted with the rules and regulations governing the use and circulation of books, journals, and other materials. Many libraries provide printed guide containing information about various aspects of library, viz., location of the stacks, the periodical section, reference section, reading rooms, microfilm or micro card equipment, manuscripts, or pamphlets. The guide also provide lists of the periodicals and journals to which library subscribes. The rules and regulations concerning the use of stacks, the use of reference and reserve books held by the library and procedures for securing reference materials that may be borrowed from another library are also included in the guide.

**HOW TO USE THE LIBRARY?**

Members of the library are usually issued a 'library card' which gives them access to the stacks. They can go through the stacks for an independent searching of books and other reference materials.

Members may also take the help of library staff in their search for such materials. After using the books or any other reference materials, it is desirable for the readers to leave them on the study tables so that library staff will return them to their proper place on the shelves. Sometimes a reference is not available in the library. In such a situation the reader must consult the 'union catalogues' which lists references found in other libraries. Such references can be obtained by: (i) inter-library loan system; (ii) requesting an abstract or translation of the portion of a desired reference and (iii) requesting materials in different formats (micro-film/microfiche; CD-ROM and online soft copy).

**CARD CATALOGUE**

The card catalogue is an index to the entire library collection. It contains the details of publications found in a library. The author, title, and alphabetically arranged subject cards are contained in card catalogue. Important information about a book can be found on the cards. It may include the date of birth of the author, the edition, the publication date, the number of pages, and the name and location of the publisher. Other items listed on the cards are bibliographies, maps, portraits, illustrations, tables, series (if any) in which a book appears, a brief description of the book.

The systematic placement and location of books makes use of library classification systems'. The principal systems are:

1. Dewey Decimal System,
2. Library of Congress System
3. Colon Classification System.

Each system is based upon a methodology that is logical and orderly to the smallest detail. In a library, all books have a call accession number or letter that appears in the upper left-hand corner of the author, subject, or title card, and on the spine of the book. These call accession numbers or letters are used to arrange the books serially on the library shelves. You should get acquainted with the particular system of classification used in a library before making use of it.

**LIBRARY SEARCHING GUIDELINES**

As a researcher, the following 'library searching guidelines' suggested by Van Dalen (1973, p. 88), may be of great use to you in identifying the best available resources pertaining to your problem.

1. Before using a library, familiarize yourself with its layout, facilities, services, and regulations.
2. Learn how to use the microform readers, photocopiers, and mechanical aids.
3. In the stacks and in the periodical, reference, reserved book, and rare book rooms, note where materials that you will use frequently are placed.
4. Schedule your work session in a library when you will encounter the least competition for resources and services.
5. Make out call slips for all or most of the books needed in one work session.
6. Copy all information that the librarian needs to obtain each reference for you, and before closing the periodical index or card catalog, recheck and rectify any errors or omissions.
7. Arrange to spend a block of time in the library that is sufficient to accomplish a specific task.
8. When little time is available, clear up questions that can be answered quickly through the help of reference books that are readily available.
9. Before initiating search for materials in a library, write down questions that cover precisely the information you wish to locate and group the questions in accordance with the areas in the library where the answers may be found.
10. Compile a list of the present and any previous names of periodicals, organizations, government agencies, collectors of statistics, libraries and museums with special collections, and outstanding authorities in your field.
11. Keep a list of the best reference books, indexes, hand books, historical studies and legal references in your area of specialization.
12. Obtain copies of the best bibliographies and reprints of significant research studies for your files.
13. Note which periodicals regularly or occasionally print bibliographies, reviews of literature, or such other reference material and the issues in which they appear.

**DIFFERENT SOURCES OF INFORMATION FOR REVIEW OF LITERATURE**

As a researcher you can make use of:

- (i) reference material;
- (ii) research periodicals;
- (iii) abstracts;
- (iv) theses and dissertations;
- (v) newspapers and pamphlets;
- (vi) government documents;
- (vii) monographs; and
- (viii) computer-generated reference materials for the identification, selection and utilization of related literature.

International Guide to Educational Documentation, UNESCO, 1963 is a one volume guide to educational books, pamphlets, periodicals, occasional papers, film and sound recordings.

The Standard Periodicals Directory, New York: Oxbridge Publishing Co (1964 - date) provide, a list of over 30,000 entries and covers every type of periodical with the exception of local news papers. It is published every year and covers about two rounded classifications which are arranged by subject.

**ENCYCLOPEDIAS**

They serve as a store house of information. These usually contain comprehensive discussions and select bibliographies prepared by specialists. Encyclopedias are arranged alphabetically by subject, and for each field of research a critical evaluation and summary of the work that has been done is presented. In addition, these suggest the research needed in the field and provide a 'selective bibliography', in the field of education, the researchers might find The Encyclopedia of Education, (ed.) Lee C. Deighton (New York: The Macmillan Co & The Free Press, 1971), Encyclopedia of Educational Research, (ed.) Walter Scott Monroe (New York: Macmillan, 1950), Encyclopedia of Educational Research, (ed.) Chester Harris (New York: Macmillan, 1960), Encyclopedia of Educational Research, (ed.) Robert, L. Ebel (New York: Macmillan, 1969), Encyclopedia of Educational Research, (ed.) Harold E. Mitzel (New York: The Free Press: A Division of Macmillan Publishing Co., Inc., 1982), The International Encyclopedia of Education, (eds.) Torsten Husen and T. Neville Postethwaite, (New York: Pergamm Press, 1985), The Encyclopedia of Comparative Education and National Systems of Education (ed.) T. Neville Postethwaite (New York: Oxford Press, 1988), Encyclopedia of Indian Education (New Delhi: NCERT, 2004) etc, useful for identifying literature relating to various problems of education. Dictionaries, Yearbooks, Almanacs and Handbooks, namely, Dictionary of Education (New York: Me Graw Hill Book Co., 1971); Comprehensive Dictionary of Psychological and Psycho-Analytical Terms (New York: David McKay Company); The Handbook of Research on Teaching (ed.) Gage, N.L. (Chicago: Rand McNally & Co. 1963), Educational Year Book (New York: Macmillan Co., 1972-date), Mental Measurement Year Book (New Jersey: Grayphon Press, 1938-date); The Standard Education Almanac; etc. also provide a large amount of current information on educational problems, thought and practices; comprehensive summary on psychological measurement, standardized tests and inventories and meanings of technical terms of education.

**RESEARCH PERIODICALS AND JOURNALS**

They are other important sources, which provide information about new ideas and developments in education. These are the best sources for reports on recent research studies. They also publish articles of temporary, local or limited interest that never appear in book form. As a researcher it is necessary for you to become acquainted with certain educational periodicals and research journals. It is also important for you to get knowledge about the editor of a periodical or a journal, the names of its contributors, and the associations or institutions publishing it for getting clues in judging the merit of the periodical or journal. In India, many periodicals are published by some associations or institutions, They provide a medium for dissemination of educational research and exchange of experience among research workers, teachers, schools and others interested in educational research and related field, and professions.

**ABSTRACTS**

They which provide brief summaries of the contents of the research studies or articles serve as one of the most useful reference guides to the researcher and keep him abreast of the work being done in his own field and also in the related fields. Psychological Abstracts, Educational Abstracts, Research in Education (R1E), Dissertation Abstracts International (1952-date) etc. provide excellent documentation of the works that has been done in the field of education and its related areas.

**ORGANISATION OF RELATED LITERATURE**

After surveying and reviewing the related literature, it is necessary for a researcher to organize the pertinent information in a systematic manner. The related literature should be presented in such a way as to lay a sound foundation for the study. It should justify carrying out the study by showing what is known and what remains to be investigated. If the study has several dimensions, the related literature need to be organized separately for each aspect of the study.

The organization of the related literature involves recording the essential reference material and then arranging it according to the proposed outline of the research study. The research should use a 3 x 5 inch. Index card for recording essential information. This card will serve as *bibliographic card*. To make writing of the final report simpler, it is advisable that the information recorded in the bibliographic card should appear, in content and style, exactly as it will appear in the final research report. The essential information in the bibliographic card should include: (i) name of the author with last name first along with date of publication in parentheses; (ii) title of the book or article; (iii) name of the publication; (iv) name of the publisher; (v) volume number; (vi) page numbers; and (vii) library call number (for books). If some of this information is not available, the specified space should be left blank so that the missing information can be included at a later stage after locating it. More precisely the bibliographic card can be illustrated as follows:

**REFERENCING STYLE ADDRESS**

Abdul Kalam, A. P. J. (2005). How to add value to distance education'. Address of the President of India at the 16<sup>th</sup> Convocation of Indira Gandhi National Open University (March 5). New Delhi, (<http://www.presidentofindia.nic.in/sripts/eventslatestl.jsp?id=836>; retrieved on March 5, 2005)

**BOOK CHAPTER**

Kulandai Swamy, V.C. (2002a). Open and distance learning, and concerns of access and equity. In H.P. Dikshit et al (Eds.), *Access and equity: Challenges for open and distance learning*. New Delhi: Kogan Page India.

**JOURNAL ARTICLE**

Chaudhary, S. V. S., & Bansal, K. (2000). Interactive radio counselling in Indira Gandhi National Open University: A study. *Journal of Distance Education*, 15(2), 37-51.

**CONFERENCE PAPER**

Joshi, M. M. (1998). 'Higher education in India: Vision and action'. Country paper presented at UNESCO World Conference on Higher Education at the Twenty-First Century, Paris, October 5-9.

**RESEARCH REPORT**

Panda, S., Raza, R., Khan, A.R., Garg, S., & Gaba, A. (2004). *Study on programme completion, and learner persistence and dropout in distance education*. Unpublished research project report. Indira Gandhi National Open University, New Delhi & International Research Foundation for Open Learning, Cambridge.

## **SELECTION OF A RESEARCH PROBLEM**

After selecting the broad area or field, the next step is to identify a specific research problem for investigation. There are numerous problems which exist in a particular field of education and these need to be researched. But each researcher selects a specific problem keeping in view its uniqueness, need, and significance. There are some important sources which are helpful to select a research problem. These include

- (i) professional literature;
- (ii) theories;
- (iii) professional experience;
- (iv) social, economic, political and technological changes.

### **PROFESSIONAL LITERATURE**

A thorough acquaintance with and understanding of the related professional literature in the selected field of interest exposes a researcher to pressing problems which need solution. It also suggests approaches and methodologies which may be adopted to conduct the research. Research reports, bibliographies of books and articles, periodicals, research abstracts, yearbooks, dictionaries and research guides suggest problems that need to be investigated. Some specialised sources as the *Encyclopedia of Educational Research*, *Dissertation Abstracts International*, *Handbook of Research on Teaching*, *Psychological Abstracts* and other professional publications provide rich sources of research problem. The publications, namely, *Research Needs in the Study of Education (1968)*, the *Third Indian Year Book of Education: Educational Research (1968)*; *Survey of Research in Education (1973, 1979, 1987, 1991)* have been exclusively devoted to identifying various research problems in different areas and aspects of Indian education. All dissertations, theses and projects reports generally conclude by making suggestions about further research needs. Such suggestions and recommendations are helpful to consider how the methodology used could be adapted to solving other related problems, and how a similar research study could be undertaken in a different field or with different sample groups/units. Sometimes research studies are criticised for certain limitations in design, sampling, tools, analysis of data, contradictions, and inconsistencies in the findings, etc. It is worthwhile to repeat such studies by making necessary modifications in the methodology, designs and procedures so as to modify the results for their inconsistencies. Repeating research studies at different times on different groups or in different contexts increases the extent to which research findings can be extended or generalised.

### **THEORIES**

A second important source of research problem lies in the inferences that can be drawn from various theories: educational, psychological, philosophical or sociological. The application of important theories in educational situations provides important clues for selecting research problems. Such researches are helpful in determining whether a particular finding can be translated into actual practice. Various theories of learning, personality, intelligence, motivation and many others provide rich sources of problems for research not only in formal classroom settings but also for distance and open learning contexts.

### **PROFESSIONAL EXPERIENCE**

The professional experience of a researcher, especially for a beginner in research, is the most important source of problems. In the context of distance and open learning system, the interaction between distance learner and counsellor/tutor, and between distance learner and self-instructional material provides a rich source of problems which need solution through research. Lectures by tutors in personal contact programmes and subsequent discussions between distance learners and tutors also suggest many stimulating problems for research. As a distance learner you may be confronted with a number of academic, administrative, and personal/domestic problems during his enrolment in a course of distance education. Such issues also provide clues for undertaking research on some specific problem. A researcher may be interested in the study of behaviour of distance learners in terms of their profiles, interests, attitudes, motivation, and other personality characteristics. The organisers and administrators in the field of distance education may find problems for research in the areas concerning decision-making, scheduling, preparation and development of instructional materials, use and application of media, organisation of PCPs and other student support services, conduct of examination, use of evaluation techniques, and several other matters with which they are concerned.

### **SOCIAL, ECONOMIC, POLITICAL AND TECHNOLOGICAL CHANGES**

Social, economic, political and technological changes give rise to various demands in the educational system of the country. These changes and developments bring forth new problems for research in curriculum framework at various levels of education. The use and application of various technologies in terms of software and hardware are being advocated by educationists in formal and non-formal educational set ups. The use of all such innovations in educating the masses need to be carefully evaluated through research. For example, the-use and impact of tele-conference in taking education to the unreached in the country give rise to many issues and problems for research in the context of formal and non-formal educational settings.

## DEFINITION OF THE RESEARCH PROBLEM

The next important step after selecting a research problem is to define it in a form, which is amenable to research. Defining a problem means to specify it in detail and stating it with precision. Each question and its subordinate questions to be answered are to be stated specifically so that limits and scope of the study are narrowed down to workable size. For this, you should describe the background of the study, its theoretical rationale and underlying assumptions, and state the problem in the form of concrete, specific, and workable questions. All questions raised by you should be related to the problem and arranged logically.

Definition/statement of the problem means explaining the title of the problem. It must clarify exactly what is to be found out or solved. A good statement of the problem must restrict the scope of the study to specific, concise, and workable questions. It involves specification of variables involved in the questions and defining them in operational terms. The statement of the problem should be clear so as to give indications of the direction the study is likely to take, but, it should not be so narrow as to become insignificant and trivial.

Let us illustrate the concept with the help of an example. Suppose as a researcher, you are interested in undertaking research in the field distance education and state the problem as: 'A study of the effectiveness of student support services in solving the academic problems of distance learners enrolled with IGNOU'. The statement is broad and it communicates in a general way what you as a researcher want to do. Hence, it is needed to specify the problem with much greater clarity if you are to find a method to arrive at the right type of conclusions.

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', 'student support services', 'academic problems', 'distance learners'. The variables are not given dictionary meanings. For example, the dictionary meaning of 'effectiveness' is 'producing the desired effect'. This meaning is inadequate for research purposes. It is important for you as a researcher to specify exactly what indicator of effectiveness you will use or you will do to measure the presence or absence of the phenomenon denoted by the term 'effectiveness'. Similarly, you will have to define other variables also in terms of the operations or processes that will be used to measure them. To define operationally, it is always essential to specify some kind of overt behaviour that is directly observable and measurable by you and others to represent those concepts involved in the variables.

In this study, you may choose to define 'effectiveness' as the improvement made by the learners in clarifying the doubts and removing difficulties in the understanding of concepts etc. involved in a particular course of study. The 'student support services' can be broadly grouped under three categories: cognitive, affective and systemic. Cognitive support includes supporting and developing learning through the mediation of course material and learning resources for learners. It mainly comprises study materials, audio-video materials, personal contact programmes (PCPs), etc.

Affective functions provide an environment which support learners and creates commitment and enhances confidence among the learners. It includes audio-video support available at study centre and telecast through All India Radio, FM Channel, and Doordarshan, study guides, tele-conferencing etc. Systemic support helps in establishing administrative processes and information management system which need to be effective, transparent and learner friendly. It broadly includes enquiry, admission services, transfer of credits, management of study centres etc. It may not be possible for you to include all these services in the study; thus, you may restrict your study to study materials, audio-materials support and other ICT programmes, personal contact programmes .



## EVALUATION OF THE PROBLEM

Before undertaking a research study, it is necessary for a researcher to evaluate the selected research problem with respect to its significance, novelty, researchability and researcher's feasibility. For this a researcher is required to prepare a list of questions and try to seek their answers in affirmation. If answer to any of such questions is doubtful, you may not proceed ahead with the actual conduct of research study. A brief discussion of these questions is presented below for further clarification.

### **Is the research problem significant**

The significance of a research problem relates to its social and practical utility. It usually specifies what a researcher hopes to accomplish in a particular study. What purpose the study serves in the context of social or educational needs? What new knowledge the researcher hopes to add to the already existing body of knowledge? What value is this new knowledge likely to have? How the results of the study can influence educational theory or practice?

The need and significance for undertaking a study can be shown in four ways:

- (i) the time lapse between the earlier study and the present one should indicate a need to replicate the study because of the new techniques or conditions;
- (ii) there are gaps in the knowledge provided by previous researches, and therefore, a need to fill these gaps;
- (iii) to show the lack of information about a problem by presenting the supporting statements of other research studies;
- (iv) to relate the present problem to the existing social issues and to priority areas in the context of national and international educational developments.

### **Is the problem new?**

There is no justification in undertaking research on a problem, which had already been adequately investigated by other researchers. In the ignorance of facts a researcher selects a problem for research which is neither new nor original and therefore, spends, time needlessly on a research already conducted by some other researchers. To avoid such duplication, it is necessary for you to very carefully scrutinise and review the previous studies in the related area and hence, a thorough literature review is needed. But this does not mean that a research problem which has been studied in the past is not worthy of further investigation. You may replicate a study when the findings of the previous study need re-interpretation in view of the new social, political, economic or technological developments.

### **Is the problem researchable?**

The researcher should not select a problem for research for which the data are not available because of certain technical, political or security reasons. There are certain documents which are of very confidential nature. Moreover, there are some places in the country which cannot be visited by researchers because of security, climatic, and other reasons.

### **Is the problem feasible for the particular researcher?**

A research problem may be good one from the point of view of the three criteria listed and-discussed above, yet it may not be feasible for you in view of

- (i) research competence;
- (ii) interest and enthusiasm;
- (iii) financial constraints;
- (iv) time requirements;
- (v) administrative considerations.

The problem selected for research should be in an area in which you have expertise, competence, and necessary skills. You should also be aware of the research methodology and have necessary knowledge of research design, quantitative and qualitative analysis techniques that may be required to carry out the research.

You should be genuinely interested in and truly enthusiastic about the selected problem. The problem should be one for which you have the necessary financial resources and which can be completed within the allotted time. In addition to personal, financial and time requirements, you must ascertain access to the sample groups to administer necessary tools.

**MEANING AND IMPORTANCE OF HYPOTHESIS**

Hypothesis (plural, hypotheses) comprises two words, "hypo" (less than) and "thesis", which means less than a thesis. It is the presumptive statement of a proposition or a intelligent guess, based upon the available evidence, which a researcher seeks to prove through a study or investigation. The hypothesis is precisely defined as a tentative or working proposition, suggested as a solution to a problem.

Hypothesis is formulated only as a suggested solution to the problem, with the objective that the ensuing study may lead either to its rejection or to its retention. It helps you to locate and identify the variables involved in the study and suggest methodological procedures that are to be employed in the conduct of study.

The importance of hypothesis is generally recognized more in the studies, which aim at making predictions about some outcome. For example, in experimental research one may be interested in making predictions about the outcome of the experiment or what the results are expected to show, and therefore, the role of hypothesis is considered to be of utmost importance. On the other hand, in historical or descriptive research one is studying the history of a fact, life of an individual, happening of an event, or is seeking the status of some phenomena, and thus may not have a basis for making a prediction of results.

A hypothesis, therefore, may not be needed in such fact-finding studies. Hypothesis provides direction to the research. It helps you in realizing the objectives of study and also in determining the type of data needed in the conduct of research. It helps in the selection of relevant facts and variables that you need in the study. Hypothesis provides a basis for selecting the research design, tools, sampling units and data analysis techniques. It also helps you to delimit the study with respect to number of variables and area of operation.

Hypothesis provides rational statements, which glides you in the tentative explanations of facts and phenomena. Such explanations lead to generalisations if held valid after testing.

Hypothesis is helpful in providing basis for reporting the conclusions of the study. For this the researcher tests each hypothesis separately and comes out with conclusions that are relevant to each. These conclusions make the research report interesting and informative to the reader.

## TYPES OF HYPOTHESES

Research hypotheses are classified under two categories: directional and non-directional. The hypothesis which stipulated the direction of the expected differences or relationships is termed as directional hypothesis. For example, the research hypothesis: "There is a positive relationship between academic achievement of distance learners and their high attendance in **PCPs**" is a directional hypothesis. This hypothesis stipulates that distance learners with high attendance in PCPs will have better academic performance in their test/examinations. Similarly, the hypothesis "Distance learners with high test anxiety will have low academic achievement in tests than distance learners with low test anxiety" is a directional research hypothesis because it stipulates the direction of the difference between the groups of distance learners.

A research hypothesis which does not specify the direction of expected differences or relationships is a non-directional research hypothesis. For example, the hypothesis: "there will be difference in the effectiveness of student support services provided by IGNOU and Directorate of Distance Education, Panjab University" is a non-directional research hypothesis. This hypothesis stipulates that there will be a difference, but it does not specify the direction of the difference. Similarly, the hypothesis: "there is a relationship between academic performance of distance learners and their regularity in the submission of assignments" is a non-directional hypothesis because the direction of the relationship is not specified.

A research hypothesis

1. 'declarative' form,
2. 'null' form,
3. 'question' form.

When the researcher makes a positive statement about the outcome of the study, the hypothesis takes the 'declarative' form. For example, the hypothesis: "the academic achievement of B.Ed, distance learners enrolled with IGNOU is significantly higher than that of B.Ed, distance learners enrolled with Directorate of Distance Education, University of Jammu" is stated in the declarative form. In such a statement of hypothesis, the researcher makes a prediction based either on his/her theoretical formulations or his/her professional experience of what should happen if the explanations of the behaviour are correct.

In the 'null' form of hypothesis, the researcher makes a statement that no relationship exists. The hypothesis, "there is no significant difference between the academic achievement of male M.Ed, distance learners and female M.Ed, distance learners enrolled with IGNOU" is an example of null hypothesis. This type of hypothesis is tested statistically and is often termed as 'statistical' hypothesis. It is also called 'testing' hypothesis when declarative hypothesis is tested statistically by converting it into null form. A null hypothesis challenges the assertion of a declarative hypothesis and denies it altogether. It states that even where it seems to hold good it is due to mere chance.

In the 'question'<sup>1</sup> form hypothesis, a question is asked as to what the outcome will be, instead of stating what outcome is expected. For example, "will instruction through TV increases interest in studies among distance learners at the primary stage?" is a question form hypothesis. It is relatively easy to state a hypothesis in question form. But it may be noted that the question form hypothesis is less powerful than the declarative or null form as a means for obtaining valid information.

# CHARACTERISTICS OF A GOOD HYPOTHESIS

Hypotheses are intelligent guesses or tentative generalisations, but these guesses are not merely accidents. These are the products of considerable speculation and imaginative guess work based on available literature, experience, and research evidence. They are based partly on known facts and explanations, and partly conceptual. There are no precise rules for formulating hypotheses. However, there are some characteristics to which the hypotheses should conform:

## **Hypothesis should be stated as far as possible in simple terms**

A good hypothesis should not make use of vague terms or constructs. Its statement in simple terms not only makes its meaning clear to others, but also helps in its testability. You should use such terms that are generally accepted for naming a condition or phenomena.

## **Hypothesis should be amenable to testing within a reasonable time**

You should not select/prepare a research hypothesis which is not amenable to testing within a reasonable and specified time. It is of no use to select a hypothesis of immense difficulty that cannot be reasonably studied because of the lack of essential techniques.

## **Hypothesis should be in conformity with most known facts**

A good hypothesis is based on well established theories and laws. It should not be inconsistent with a substantial body of established facts. For example, the hypothesis: "There is no relationship between the self concept of female adolescent students and their rate of physical growth" is not in conformity with known fact because the preponderance of evidence supports the relationship between self concept and rate of physical growth.

## **Hypothesis should be limited in scope**

A good hypothesis is stated in specific terms. It is simple for testing and drawing conclusions. A beginner researcher is overly ambitious and formulates hypotheses which are generally of global significance. It is partly because of his/her earnestness and partly because of his/her immaturity to realise how little can be achieved in specified limited time.

## **Hypothesis should be clearly and precisely stated**

A good hypothesis is clearly and precisely stated and it usually avoids the use of general terms such as intelligence, personality, motivation, etc. in their statements. The researcher should use "personality as measured by the sixteen personality factor questionnaire", "intelligence as measured by "Raven's Progressive Matrix" etc. A carefully formulated hypothesis generally involves concise technical language and definition of terms that are specifically and concisely defined in simple common language.

## TESTING OF HYPOTHESES

Hypothesis should be formulated in a way that it can be tested or verified. Such a hypothesis enables a researcher to determine whether those consequences that are derived deductively, actually occur or not. If the hypothesis is not testable, it would be impossible either to confirm or contradict it and hence it does not help a researcher to draw conclusions.

Hypotheses are tested by subjecting them to empirical as well as logical testing.

1. Some hypotheses are simple and can be tested directly whereas complex hypotheses cannot be so tested. They have to be tested in terms of their direct deduced consequences. Once all the deduced consequences, after testing, come out to be true, the hypothesis is confirmed. If some of the consequences come out to be true and some others not, the hypothesis is examined afresh.
2. The absence of conflict with other satisfactorily proved generalisations lends support to the correctness of a hypothesis.
3. A hypothesis is also confirmed to be correct if the predictions made on its basis prove to be successful.

The null hypothesis is a testing hypothesis. It challenges the assertion of a declarative hypothesis (directional or non-directional) and denies it altogether. It states that even when it seems to hold good it is due to mere chance. It is for you as the researcher to reject the null hypothesis by showing that the outcome mentioned in the declarative hypothesis does occur and the quantum of it is such that cannot be easily dismissed as having occurred by chance. The criteria for rejecting the null hypothesis may differ. Sometimes the null hypothesis is rejected only when the quantum of outcome is so large that the probability of its having occurred by mere chance is 1 time out of 100 or .01 time out of 1. We consider the probability of its having occurred by chance to be too little and we reject the chance theory of the null hypothesis and take the occurrence to be due to a genuine tendency. On other occasions, we may be more bold and reject the 'null hypothesis even when the quantity of the reported outcome is likely to occur by chance 5 times out of 100 or .05 time out of 1. Statistically the former is known as the rejection of the null hypothesis at .01 level of significance and the latter as the rejection at .05 level. We will have more discussion about these concepts in Block 4. It may be pointed out that if the researcher is able to reject the null hypothesis, he/she cannot directly uphold the declarative hypothesis. If an outcome is not held to be due to chance, it does not mean that it is due to the very cause and effect relationship asserted in the particular declarative statement. It may be due to something else which the researcher may have failed to control. But inferentially the case of declarative hypothesis becomes quite strong.

# PREPARATION OF THE RESEARCH PROPOSAL

## MEANING OF RESEARCH PROPOSAL AND ITS TYPES

A research proposal is a systematic plan which aims at preliminary planning of a researcher which he/she needs to follow in conducting the proposed study. It acts like a blue print which an architect prepares before the construction of a building starts.

There are three types of research proposals. The categorisation is generally made keeping in view the type and purpose of the study.

The most common research proposal is of the type that is prepared by those who undertake research for their degree or diploma in education. In most of the institutions/universities, submission of a well planned research proposal is a general requirement for researchers while pursuing a degree or diploma course. These proposals are prepared by the researchers either under the guidance of their approved supervisors or a committee of experts.

The second category of research proposal is one that is submitted by a researcher to NGO or governmental organisation for financial support which is provided by the concerned agency after the scrutiny and evaluation of the proposal by a committee of experts.

The third category of research proposal is submitted by school, college or university academicsto research organisations, such as university, the Indian Council of Social Sciences Research, the National Council of Educational Research and Training, National Institute of OpenSchooling, Distance Education Council (DEC-IGNOU), or any other autonomous research organisation.

### Format of a research proposal

The format of a research proposal generally follows a structure.

- (i) introduction which includes the details about the title, theoretical background, statement of the problem, review of related literature and formulation of hypotheses, significance and need of the study, operational definitions of terms and concepts used in the study, and delimitations of the study
- ii) procedures for collecting data highlighting information about sampling and tools;
- (iii) procedures for treating data, results and their analyses;
- (iv) bibliography,
- (v) time schedule for completing various phases of the study;
- (vi) budget schedule pertaining to financial requirements.

### Introduction

The introductory part of the research proposal should highlight the following information:

***The title, Statement of the problem and objectives of the study, Review of related literature/studies***

***The hypotheses, Significance of the study, Delimitations of the study, Operational definitions of variables, terms and concepts, Methods***

This section of the research proposal deals with the details about sampling techniques and data collecting tools to be used to carry out the study. The nature of the study should be kept in view while deciding about the sampling techniques and the types of data collection tools and techniques. For example, in historical and philosophical researches the nature of the data and their treatment differ from descriptive or experimental studies.

### ***Sampling and tools***

In the execution of a research study a researcher need to use different sampling methods: probability and non-probability, as it is not possible to deal with large populations.

### ***Techniques for treating data***

This section of the research proposal is confined to the details about the procedures which you may use for organising, analysing and interpreting the gathered data.

### **Bibliography**

Bibliography will include the list of books, journals and other documents which you have used and consulted in the selection of the research problem and all other resources that you may use while conducting the proposed research study. You should use a standardized format in the preparation of the bibliography.

### **Time schedule**

A realistic time schedule for completing the study within available time should be given in the research proposal. Dividing the study into phases and assigning time framework for completion of each phase would help you to use time systematically and judiciously in the completion of the study.

### **Budget schedule**

If a research proposal is submitted to a government, private or autonomous organisation or NGO for financial assistance, it should include a budget proposal estimating the funds for certain aspects, viz., travel, printing, typing, purchasing of equipments, books etc.

## TOOLS OF RESEARCH - I

# CLASSIFICATION OF TESTS

The classification of the tests may be made in term of their purpose, that is, the types of psychological traits that they describe and claim to measure, for example, tests of general intelligence, tests of aptitudes, tests of achievement etc. The tests may be non-standardized, teacher made or standardized. Another classification is made on the basis of types of responses which an item requires e.g., paper-pencil tests and performance tests. Let us discuss these classifications in detail.

### Standardized test versus teacher made test

Standardized tests are those tests, which are validated over a large sample. This sample acts as a norm group for various kinds of variables you include in our study. The validity and reliability of these tests are established with the help of various statistical measures. Such tests also standardize content, procedure of test administration, procedure of scoring and interpretation for the users.

### Power tests versus speed tests

Power tests do not have time limits. The test taker is given ample time to complete all the test items. It is he who decides when to hand over the answer sheet to the examiner. On the other hand, speed tests specify time limits. The test taker has to complete tasks within the prescribed time limit.

### Group tests versus individual tests

The distinction between group tests and individual tests is made on the basis of the way they are administered on the students. When a test can be administered to a large number of subjects, it is called a group test. Group tests are economical, easy to administer and score.

### Paper-pencil tests versus performance tests

Paper-pencil tests require respondents to write the answers to the questions by pulling a tick mark, encircling or underlining one of alternative answers given to a test item. Sometimes, the respondents are also asked to provide the answers by writing a word, a phrase or a sentence. The common achievement tests developed and used by teachers in schools and colleges are examples of the paper-pencil tests.

### Verbal tests versus non-verbal tests

When the emphasis of a test is on reading, writing or speaking, it is called a verbal test. In education, we find many verbal tests. The common example is achievement test used by a teacher. Non-verbal tests comprise numerals or drawings. Respondents need to provide their answers by analyzing the drawings. Non-verbal tests are used in many entrance tests as part of the non-verbal reasoning. Many intelligence tests like Raven's Progressive Matrices, use nonverbal methods to test the intelligence of the respondents.

### Objective tests versus subjective tests

In the objective tests there is agreement among two or more evaluators on the correctness of the answer. But when there is no agreement between two evaluators on whether an item is correct or incorrect, the test is a subjective one. Essay tests are subjective tests but multiple-choice tests; true-false tests, etc. are objective tests.

Tests also can be classified into different categories based on the psychological traits they measure. Tests of mental ability measure intelligence, tests of special abilities are developed to measure attitude, aptitude. Similarly, there are tests of creativity, tests of achievement and tests of personality. Let us look at some of the examples of these tests.

### Norm-referenced tests and criterion-reference tests

#### *Achievement*

Tests can be classified into norm-referenced tests and criterion-referenced tests based on the method of interpreting test results. In norm-referenced tests the results of the students are described in forms of certain norms decided for a known group. Thus the performance of a student is described in terms of the relative position he/she holds in a participant group. For example, student 'X' has secured first position in the class or student 'Y' has stood first in the Central Board of Secondary Education (CBSE) Examination.

#### *Diagnostic tests*

Some students have consistent or recurring learning difficulties in spite of the usual feedback provided by the teachers during the course of instruction through formative tests.

### Projective versus Non-projective test of personality

Students' personality characteristics and adjustment problems can be measured with the help of projective and non-projective tests. Projective tests are used to assess students' personal-social adjustment. Through these tests, students are provided a series of ambiguous forms or pictures and asked to describe what they see in the forms of pictures. From their description, we analyse what they have projected onto the forms or the pictures. Roschach Inkblot Test and Thematic Apperception Test are examples of projective tests.

Non-projective tests include problem checklists and personality inventories. Problem checklists consist of a list of problems which students face in these lines and they are asked to choose the problems which concern them the most. The problems may be related to their study, family, health, friends, school, etc. For example, 'I do not pronounce certain words correctly', 'I cannot get along well with my classmates'. Personality inventories are similar to problem checklists but they contain a series of questions to which students are expected to answer by circling 'yes' or 'no' or '?' for uncertain. The questions are asked in the areas of health, socio-emotional adjustment, self-confidence, socio-ability, etc.

# TOOLS OF RESEARCH - I

## SELECTION OF TESTS

### VALIDITY

Validity of a test is concerned with the specific purpose for which it is developed. It refers to the extent to which the results of an evaluation procedure serve the particular uses for which they are intended (Gronlund, 1981). For example, a test of intelligence ought to evaluate the mental ability of children, and not their personality. Cronbach (1964) holds that a test which helps in making ones' decision in a particular research situation may have no value at all for another". Validity is always concerned with the results of a test and may range from low validity to high validity. All tests do not possess the same kind of validity. The validity of a test depends upon the nature of a test. Hence, there are different types of validity. We shall three main types of validity in this unit. They are:

- ★ Content validity
- ★ Criterion-related validity
- ★ Construct validity

### RELIABILITY

The second important characteristic of a test is its reliability. Reliability is commonly known as consistency. In a testing situation, reliability refers to consistency of test results when the test is administered to the same individuals with the same conditions. Cohen et. al. (2000) defines reliability as a synonym for consistency and reliability over time, over instruments and over groups of respondents. According to Freeman (1965), reliability has two connotations:

- First it refers to the extent to which a test is internally consistent, that is, consistency of results obtained throughout the test when administered once. In other words, how accurately is the test measuring the traits at a particular time?
- Second, reliability refers to the extent to which a measuring device yields consistent results upon testing and retesting. That is, how dependent is it for predictive purposes?

Reliability, therefore, refers to consistency of measurement from one testing situation to another. Suppose a test of achievement is administered to students of eighth standard. The same achievement test is again administered to them after six months. Do the results obtained .from both the administration match with each other. The answer to such questions basically refer to the concept of 'reality'. In order to find out the reliability of a test,

we generally make use of the four methods:

1. test-retest method;
2. alternate or parallel forms method;
3. split-half method; and
4. rational-equivalence method. Let us discuss each method.

### USABILITY

While selecting any research tool, we need to looks into different practical considerations. These practical considerations would decide whether a test to be used is usable or not. Some of these considerations are: ease of administration, time required for administration, ease of scoring, ease of interpretation and application, availability of equivalent or comparable forms and cost of testing (Gronlund, 1981).

The test results ought not to be difficult, tedious and troublesome to score. The scoring process needs to be simple, easy and clear. The test must be supplied with a scoring key, which is not cumbersome but contains clear directions for scoring. Another way of ensuring ease of scoring is to supply separate answer sheet alongwith the test. When test results are obtained, you need to know how they can be interpreted to arrive at conclusion. Hence, a test ought to provide the information with regard to interpretation of test results. It should indicate as to how raw scores can be converted into meaningful derived scores and also as to how test results can be interpreted with the help of statistical analysis. The cost of a test is another consideration for selection of a test. Although it does not have anything to do with the effectiveness of the tool, but is a consideration for all of us from the viewpoint of our capacity which we have to bear/ spend using the test.

### OBJECTIVITY

The fourth characteristic of a test is that we are supposed to look for its objectivity. Objectivity of a test means that test results must be consistent when scored by different evaluators. Suppose, you have scored the responses of subjects on a test and again their responses to the items are evaluated by another evaluator. If scores awarded by both the evaluators match, then we can say that there is objectivity in scoring between the two evaluators: In this case personal biases of the scorers do not influence the process of assigning marks to the answers. Objectivity is also called inter-scorer reliability.



# TOOLS OF RESEARCH - I

## TEST DEVELOPMENT

Test development involves certain steps, which we follow. These are:

- i) Planning
- ii) Preparation of preliminary draft
- iii) Tryout of the test
- iv) Item analysis
- v) Final draft

### PLANNING

Like any activity, planning of a test involves a detailed description of the tasks to be accomplished in the development of a test. These include the purpose, type, objectives, content and format of the test. Apart from these, it also includes the construction of the test including item-analysis, procedure of tryout, validity and reliability of the test, procedures of test administration, method of scoring, cost involved, etc. The purposes of the test could be many, such as, diagnosing students' strengths and weaknesses, measuring their achievement, measuring their aptitude for certain courses, etc. The purpose of the test decides the objectives of the test in specific terms. Specification of objectives, content areas, relative weightings to objectives and content areas, total number of test items, and the format of items, namely, essay type, short answer type, objective type, etc. are to be decided.

### PREPARATION OF PRELIMINARY DRAFT

After having obtained a fair idea of the different aspects of the test, we prepare a preliminary draft. We write test items as per the test specifications. Although we are required to create new test items for the test, yet it is advisable that we consult the existing tests in the concerned area. This helps us to create similar kind of items. We must develop double the number of items as are required for the final draft. While developing test items, we should try out a few items on a small group of subjects to have a rough idea about the difficulty of items. When all the items are prepared, the test items may be edited by a language expert for ascertaining adequacy of language used in the construction of test items. Apart from test items, the test should also include other necessary details like basic information about the respondent, directions for responding to the items, etc.

### TRYOUT OF THE TEST

The preliminary draft is administered to a large random sample of the population for which test is developed. The size of the sample for try out is usually taken as 30 because it helps the test-maker to get indices of difficulty and discrimination quickly for selecting good items for the final test with the help of the table developed by J.C. Flanagan (Koul. 1984). The test takers need to be given sufficient time to answer the items. Of course, time depends upon the nature of the test.

### ITEM ANALYSIS

The test results obtained from the tryout are subjected to item analysis. The main purpose of the item analysis is to find out the effectiveness of each item. Moreover, it helps in finding out total score reliability and total score validity. Item analysis provides information regarding the following aspects:

#### ***Difficulty level***

The difficulty level of an item indicates the percentage of students who answer it correctly. The formula to find out the difficulty level is as follows:

$$\text{Difficulty level} = R/T \times 100$$

In which: R = The number of students who have answered the item correctly.

T = The total number of students who have attempted the item.

#### ***Index of discrimination***

The second item analysis parameter is index of discrimination of the item. It means how well an item discriminates between the high and low achievers. For computing the index of discrimination, the following formula can be used

$$\text{Index of Discrimination} = \frac{A - B}{\frac{1}{2} N}$$

In which, A = the number of correct scores from the high scoring group;

B = the number of correct scores from the low scoring group;

N = the total number of students in the two groups.

### DEVELOPMENT OF FINAL DRAFT

Based on the item analysis values i.e. difficulty level and index of discrimination, **items** are selected for inclusion in the final draft of the test. The final draft is administered to a large sample of the population under consideration for estimation of validity, reliability and norms. Validity and reliability are computed as per the nature and purposes of the test. Norms are developed for interpreting the test results of an individual or a group. There are different kinds of norms which are reported in a test. These are *age norms*, *grade norms*, *percentile norms* and *standard score norms*. In age and grade norms, meanings are attached to an individual's test score by determining the age or grade group in which he would be just average. In percentile and standard score norms, the scores of an individual are converted to percentile and standard scores respectively.

## TOOLS OF RESEARCH -II

### TYPES OF RESEARCH TOOLS AND TECHNIQUES.

1. Inquiry forms
2. questionnaires,
3. Check lists,
4. Rating scales,
5. Observation
6. Interview.

#### ★ INQUIRY FORMS

Inquiry forms are data-gathering research tools which attempt to inquire into and obtain evidences about the phenomenon/problem under investigation. Such tools are checklist, rating scale, attitude scale, and questionnaires. We shall discuss these tools in detail.

#### 1. QUESTIONNAIRE

Questionnaire is the widely used tool of research to collect data. It is used to collect information regarding any events, phenomenon, practices, or attitudes of an individual or a group of individuals. A questionnaire is either administered personally to a group of individuals or sent by mail to the respondents staying at distant places.

##### **TYPES OF QUESTIONNAIRE**

- (i) closed-ended questions; (ii) open-ended questions.

##### **CLOSED-ENDED QUESTIONS:**

Closed-ended questions are the ones in which the respondents are to choose from the restricted or fixed responses. They cannot exercise their own options. There are different forms of closed questions, like replying with yes/no, putting a tick (") on the possible answer from a list, ranking the alternate answers, putting a circle around the alternative in a scale, etc.

##### **OPEN-ENDED QUESTIONS:**

Unlike the closed-ended questions, the open-ended questions call for a free response from the respondents. The questions are not structured. The respondents are given freedom to express their opinions and feelings. The responses obtained from such questions are difficult to analyse and interpret.

##### **Examples of open ended questions**

- i) Should teachers' performance be evaluated by their students? Substantiate your answer.
- ii) Suggest how distance education can provide increasing access to educational opportunities.

##### **CONSTRUCTION OF A QUESTIONNAIRE**

- i) Properly define terms that otherwise could easily be misinterpreted.
- ii) Be careful in using adjectives and adverbs that have no agreed upon meaning.
- iii) Beware of double negative.
- iv) Avoid the double-barreled questions. Break it into two questions.
- v) Be careful of inadequate alternatives.
- vi) Underline a word if you wish to indicate special emphasis.

#### 2. CHECKLIST

A checklist is a device through which we assess the knowledge of the respondents regarding the presence or absence of certain defined characteristics in an object, a phenomenon or a process. It is also used to evaluate the performance, which can be divided into a series of clearly defined actions. We prepare a list of items pertaining to the problem being studied and provide a space for the user to indicate the presence or absence of the characteristics or action mentioned in the item by circling 'Yes' or 'No' or by writing the appropriate word or number. Checklists are very useful in survey researches.

#### 3. RATING SCALE

Rating scale is a tool of research which is used to judge or form opinion about particular characteristics or qualities, which describe varying degrees of the aspects of behaviour of an individual or characteristic of an object being observed.

##### *Types of rating scales*

There are five broad categories of rating scales (Guilford, 1954). These are:

- Numerical scales • Graphic scales • Standard scale • Rating by cumulative points • Forced choice ratings

#### 4. OBSERVATION

Observation is a useful technique of collecting authentic evidence in descriptive educational research. We observe the real-life situation, and collect and analyse evidence pertaining to the phenomenon according to a planned scheme. It is natural way of collecting data.

##### **Types of observation**

Observation technique can be classified in two ways. These are:

1. PARTICIPANT AND NON-PARTICIPANT OBSERVATION
2. STRUCTURED AND NON-STRUCTURED OBSERVATION

#### 5. INTERVIEW.

, "interviews may encourage respondents to develop their own ideas, feelings, insights, expectations or attitudes and in so doing 'always the respondents to say what they think and to do so with greater richness and spontaneity" (Oppenheim, 1992). Interview can be used as a technique in both quantitative and qualitative research.

##### **Types of interview**

Interviews can be classified into different categories on the basis of their purposes, design or structure.

# RATING SCALE

Rating scale is a tool of research which is used to judge or form opinion about particular characteristics or qualities, which describe varying degrees of the aspects of behaviour of an individual or characteristic of an object being observed. According to Barr, Davis, and Johnon (1953), "Rating is a term applied to expression of opinion or judgment regarding some situation, object or character. Opinions are usually expressed on a scale of values". It measures the degree to which each attribute being observed is present. The degree of presence of the attribute is described along a line from high to low. It is like a continuum and this continuum is called a 'scale'. Rating scales are used to describe the behaviour of teachers, students, and educational administrators, the activities performed by a group of people, the classroom instructional processes, students' performance in lab work, seminar, debate, field work, project work, etc. There are two principles, which we should keep in mind while constructing a rating scale. First, we must be clear about the attributes to be observed. Second, we should get sufficient opportunity to make observations.

## TYPES OF RATING SCALES

There are five broad categories of rating scales (Guilford, 1954). These are:

- ★ Numerical scales
- ★ Graphic scales
- ★ Standard scale
- ★ Rating by cumulative points
- ★ Forced choice ratings

## CONSTRUCTION OF A RATING SCALE

The following considerations may be taken in view while constructing a rating scale.

- ★ The trait to be rated must be clearly defined and described in objective and unequivocal terms.
- ★ The number of steps in the scale should neither be too many nor too less. Generally, 5 on 7 point scales are preferred.
- ★ The directions to the rater must be clear and comprehensive.
- ★ The items in the rating scale may be arranged in ascending or descending order.
- ★ The number of characteristics to be rated need to be limited.
- ★ The rater needs to be well informed of the characteristics to be rated.
- ★ The rater should be instructed to skip the rating of characteristic of which he/she has no knowledge.
- ★ Some space may be provided for the rater to write additional material in the form of comments.

## ADVANTAGES OF RATING SCALE

- ★ evaluation of teacher performance
- ★ selection of teachers and prediction of teaching success
- ★ school appraisal
- ★ course and programme evaluation
- ★ writing student reports
- ★ recommendation to employers
- ★ sociological surveys

## LIMITATIONS OF RATING SCALE

Since ratings are based on human judgement, they are subject to personal biases or subjectivity. Major limitations are as follows:

- *Generosity error.* Raters generally rate high if they find that the ratee is known to them. As a result, high ratings are given in almost all cases. This is also called the '*error of leniency*'.
- *The error of central tendency:* Quite often, raters tend to rate the individuals on the middle of the scale and avoid rating on the extremes of the scale.
- " *The halo-effect:* Sometimes the rater forms a general opinion about the individual's merit. As a result, his ratings on specific traits are influenced by this general impression. It is difficult to get rid of this influence which causes him to carry qualitative judgment from one trait to another.
- <sup>B</sup> *The logical error:* Very often the raters find logical connections between certain traits and accordingly give similar ratings for these traits. This apparent logical coherence of the traits increases inter-correlation among them.
- *The constant error:* When a rater has the tendency to rate others in the opposite direction from himself in a trait, the constant error occurs. For example, if a person is very sincere in his activities, he would rate others as not sincere constantly.
- *The proximity error:* Adjacent traits are rated similarly by the raters. This gives rise to high inter-correlation among them than the remoter ones, because of their closeness or proximity.

# OBSERVATION

Observation is a useful technique of collecting authentic evidence in descriptive educational research. We observe the real-life situation, and collect and analyse evidence pertaining to the phenomenon according to a planned scheme. It is natural way of collecting data.

## Types of observation

Observation technique can be classified in two ways. These are:

1. PARTICIPANT AND NON-PARTICIPANT OBSERVATION
2. STRUCTURED AND NON-STRUCTURED OBSERVATION

### *Participant and non-participant observation*

In participant observation, we, as researchers or observers become participants of the group being observed. We may play a particular role assigned by the group. While taking active part in the group, we shall observe behaviour of the individual members of the group or the group behaviour as a whole. On the other hand, in non-participant observation, we are not a part of the group. We keep our observation as inconspicuous as possible. We, while studying the behaviour of infants, children, or abnormal people uses non-participant observation.

### *Structured and non-structured observation*

In structured observation, we observe the phenomenon according to a pre-planned scheme. But, in non-structured observation, we observe the phenomenon as it unfolds during the process of observation.

## STAGES IN A PROCESS OF OBSERVATION

There are three stages of observation. These are:

- i) Planning for observation.
- ii) Execution of observation.
- iii) Recording and interpreting the observation.

### I) PLANNING FOR OBSERVATION

Observation is a research technique which involves systematic planning. Planning includes the statement of the purpose of observation, the nature of the group or the individual to be observed, the kind of behaviour to be observed, the place and the environment of observation, the duration of observation, tools of observation, etc. According to Good (1966), the following points need to be taken into consideration for observation:

- An appropriate group of subjects to be observed.
- Selection and arrangement of any special condition for the group.
- Length of each observation period, interval between periods, and number of periods.
- Physical position of the observer and possible effect on the subject(s).
- Definition of specific activities or units of behaviour to be observed.
- Scope of observation, whether for an individual or a group.
- Form of recording, including consideration of mechanical techniques and quantitative factors such as number, time, distance, and spatial relationships.
- Training of the observer in terms of expertness.
- Interpretation of data collected through observations.

### II) EXECUTION OF OBSERVATION

The following five aspects (Koul, 1984) need to be taken into account while executing observation.

- Proper arranging of specific conditions for the subjects to be observed.
- Assuring the proper role or physical position for observation.
- Focusing attention on the specific activities, or units of behaviour under observation.
- Proper handling the recording instruments to be used.

### III) RECORDING AND INTERPRETING OBSERVATION

Recording of observation may take place during the time of observation or after the observation is over. In the former case, we record the data as we observe the occurrence of the phenomenon, but in the latter case, we perform this function immediately after the observation. Apart from these two procedures, we can make use of electronic and other devices for accurate recording of events. The use of tape-recording, video recording, cameras, stopwatch, binoculars, etc., are effective devices to record observation data. In the case of using electronic devices, we need not have to record the data simultaneously; rather we can record the data afterwards. Moreover, it helps in classifying and recording the relevant data. The recorded data need to be processed analysed, and interpreted very carefully for the purpose of research. We should not be guided by our biases, attitudes and values while analyzing and interpreting the data, instead, ought to be guided by the very purpose of observation and specific behaviours to be observed.

## LIMITATIONS OF OBSERVATION

Observation as a technique of research suffers from certain limitations. They are:

- Subjectivity of the researcher which influences the process of observation and recording of data.
- The phenomenon may be distorted through the very act of observation.
- The observer may like to record the information, which he is interested in.
- The samples of behaviour being observed may not provide the sufficient basis for drawing conclusions,
- The validity and reliability of observation depends upon the competency of the observer.
- Sometimes, the people being observed become conscious and do not behave naturally.

# INTERVIEW

Unlike the questionnaire, the interview technique is meant for eliciting the required information from the respondents in a face-to-face situation. Very often, many respondents do not express their free and frank views, feelings or thoughts through a questionnaire, but they may express their views, feeling, etc. freely while interacting with a interviewer in the face-to-face situation. Moreover, "interviews may encourage respondents to develop their own ideas, feelings, insights, expectations or attitudes and in so doing 'always the respondents to say what they think and to do so with greater richness and spontaneity'" (Oppenheim, 1992). Interview can be used as a technique in both quantitative and qualitative research. In quantitative research, this technique can be used to find out facts and in qualitative research in-depth inquiry can be done to develop ideas and understanding.

## Types of interview

Interviews can be classified into different categories on the basis of their purposes, design or structure.

### RESEARCH AND CLINICAL INTERVIEW

In experiments, historical, and survey research, interview is used as a technique to collect evidences to prove hypotheses or to find out solutions to research questions. Such type of interview is called 'research interview'. On the other hand, in a clinical situation, psychiatrist or social worker uses interview to obtain information about the interviewee's personal problems, for the purpose of diagnosis and treatment. Such interview is called 'clinical interview'.

### INDIVIDUAL AND GROUP INTERVIEWS

When we interview one individual at a time, it is called 'individual interview'. On the other hand, the interview which is carried out for a group of individuals is called 'group interview'. The size of the group should not be too large or too small. The optimum size is approximately 10 to 12 persons (Good, 1966).

The types of interview structures

#### STRUCTURED INTERVIEW

- Controlled by the interviewer
- Less flexible
- Guided by researcher's predetermined agenda
- May provide easier framework for analysis

#### SEMI-STRUCTURED INTERVIEW

- Less control by interviewer than in structured interviews
- More flexible
- Not completely pre-determined
- Mind framework for analysis

#### UNSTRUCTURED INTERVIEW

- Control more evenly distributed between researcher and respondent
- Very flexible
- Direction unpredictable
- Likely to be more difficult to analyze
- May throw up unexpected findings

## Stages to be followed in interviews

There are three stages, which need to be followed in interview. There are:

1. Preparing for the interview
2. Conducting the interview
3. Recording of the interview

### Preparation for the interview

A good planning is necessary for all kinds of interviews. Planning for the interview includes, research questions to be answered, the nature of data to be generated, the format of the interview, whether structured, semi-structured or unstructured, framing of interview questions based on research questions, sequencing of questions, the procedure of collecting information and the place of interview, the analysis procedure, etc. When the interview schedule is prepared, the same can be tried out on a pilot basis to eliminate any ambiguous, confusing or insensitive questions. The 'try out' will also enable you to know as to how much time interviewees take and accordingly inform them to take the time you intend to take up. Questions can also be rephrased based on feedback collected through the try out.

### Conduct of the interview

While conducting the interview, we must identify a place of interview where privacy can be maintained. We should first establish a rapport by greeting the interviewee. We should make our feel at ease during the course of the interview. To start with, we should ask simple factual question and gradually put analytical and thought provoking questions. At a time one question should be asked. We should listen to the answers carefully. The interviewer should give time to the interviewee to answer the question. We should not bias the interviewee by asking favourable questions and should not humiliate him/her if he/she does not get the expected answers. Please remember we should not ask ambiguous questions. We should always value the feelings and sentiments of the interviewee during the interview.

### Recording the interview

Recording of the interview can be done by several means. We can make use of structured format, rating scale, tape recorder, etc. It is always easy to transcribe data from audio or video tape recorder. If these are not available we can develop some sort of format to record the interview. Validity of the interview data can be established by comparing them with the data obtained from other sources or instruments.

# SAMPLING ERRORS

We always intend to select a sample in such a way so that the estimates obtained from the sample are error-free. However, this may not always happen. Some sorts of errors creep into the sampling process. Thus, sampling error refers to the difference between the estimates obtained from the sample and the value actually existing with the population. In this context, two important concepts: statistics, and parameters, need to be explained.

- **Statistics:** The measures estimated from the sample are called statistics.
- **Parameters:** The measures, which describe a population, are called parameters.

Sampling error is the difference between statistics and parameter.

Sampling errors arise due to both sampling process and non-sampling process. Errors in the sampling process occur due to certain unavoidable factors and bias on our part as the researchers. Suppose, we want to study the computer skills of eighth grade students and have decided to choose a sample of 30 children out of 150 children. While we follow the perfect randomization procedure in selecting 29 students, the 30<sup>th</sup> student we select is very bright in computer skills. In this case, since we cannot avoid this student, the statistical estimate from the sample will certainly be affected. Similarly, if you are very much biased in selecting the population, the estimates may not be perfect and there would be errors leaning towards one or the other direction of population value.

Non-sampling errors refer to our biases in selecting research tools, defects in data collection procedure, etc. Another type of non-sampling errors arise due to faulty measurement process. For example, you have administered an achievement test to the sampled students. Although the time for completing the test is fixed, you allow extra 5 minutes to them. As a result, the samn<sup>1</sup>" statistic goes up due to these errors. When finding out the total error of the sampling process, the following formulae can be used (Kou). 1984)

Sampling errors can be minimized by giving due considerations to the following suggestions (Koul, 1984):

- i) Selecting more sampling units.
- ii) Taking large sample.
- iii) Taking more observations per individual.
- iv) Improving the precision of the methods of observation.
- v) Improving the questionnaire or, the coding and processing of data.

## EXPERIMENTAL RESEARCH

Experimental method is applied to test the hypothesis: "if x then y". Such 'if and 'then' relationship is studied following certain rules. Let us focus on one of the major rules of experimentation. John Stuart Mill had stated the rule of Method of difference as the basic tenet of experimentation.

### CAUSE AND EFFECT RELATIONSHIP

As stated above you may notice that the basic nature of experimental research is to explain cause and effect relationship between variables. Good (1966) states that "in experimentation the investigator controls (manipulates or changes) certain independent variables and observes the changes which take place in the dependent variables."

### NATURE OF VARIABLES

#### **INDEPENDENT VARIABLES**

Independent variable means the conditions or characteristics which can be manipulated or controlled to produce certain effects. For instance in classroom setting methods of teaching can be manipulated or controlled to study their effects on learners' achievement.

#### **DEPENDENT VARIABLES**

Dependent variable means the conditions or characteristics that undergo change as a result of manipulation or control of independent variables in an experiment. For instance reward or punishment given by teachers may affect learners achievement in positive or negative direction. Here, achievement is treated as dependent variable. Regular viewing of television programmes may cause change in learners attitude. Here learners attitude is taken as dependent variable.

#### **EXTRANEOUS VARIABLES**

In experimental research extraneous variables play crucial role. Extraneous variables are those factors which may have significant effect on dependent variables. In some experimental situation, we may manipulate or control some extraneous variables to minimise their effect on dependent variables.

#### **INTERVENING VARIABLES**

The fourth category of variable taken into consideration is intervening variable. Intervening variables are those variables which influence the experiment but uncontrollable. Moreover, they cannot be measured. In educational setting many such variables intervene between the cause and effect. They may be accidental.

### **EXPERIMENTAL RESEARCH DESIGN**

According to Kerlinger (1974) research design is used to (1) provide answers to research questions and (2) to control variance. The major thrust of experimental research design is to test hypotheses in controlled situations. How to proceed with a study by controlling the effect of extraneous independent variables is a major challenge before a researcher. A good research design is needed to answer this question scientifically.

#### **CRITERIA OF RESEARCH DESIGN**

- (i) Whether the design is suitable to answer research questions? or does the design help us to test the hypotheses?
- (ii) Does the design help us to control extraneous variables which may affect the dependent variable?
- (iii) Can we generalise the results of the experiment to other conditions or subjects? Let us understand such criteria one by one.

#### **CONTROL OF EXTRANEOUS VARIABLE:**

- Controlling the subjects
- Matching the subjects
- Randomisation:

#### **GENERALISATION OF FINDINGS**

The third criterion of research design is concerned with generalisability of results of the experiment.

#### **VALIDITY OF EXPERIMENTAL RESEARCH DESIGN**

Campbell and Stanley (1963) insisted on two major criteria of experimental design -(i) whether the research design is fit to answer the research question (Internal validity) and (ii) to what extent the findings of the study are generalisable (External Validity).

#### **Types of experimental designs**

There are various types of experimental designs. They vary in complexity and appropriateness. The research design deals with the major question of how well the study can be conducted to test the hypotheses. Keeping in view the research questions, nature of variables, the context of the study, resources available and scope of the study we go for different kinds of experimental designs, such as:

- True Experimental Design; and " Quasi Experimental Design

#### **TRUE EXPERIMENTAL DESIGN**

- control of extraneous variables with the help of random assignment of subjects in experimental group and control group.
- manipulation of experimental variables.
- observation of events with the help of administration of tests and quantification of data; and
- Replication of the study in a number of cases within the framework of experimental design.

#### **SYMBOLS USED IN EXPERIMENTAL DESIGNS**

- R - Random selection of subjects or random assignments of treatments to experimental groups.
- X -Manipulation of experimental variable or treatment.
- C -Control variable or no treatment or receiving the treatment in different forms.
- O -Observation or test.

## QUASI EXPERIMENTAL DESIGNS

As stated in the foregoing section true experimental design requires at least two groups, one receiving an experimental treatment i.e., experimental group and one not receiving the treatment or receiving it in different form i.e., control group. It requires the random assignment of subjects to groups as one of the essential conditions. However, because of several constraints on the part of researcher or administrative difficulties it is not always feasible to equate experimental and control groups randomly. For instance in educational setting it is extremely difficult to go for randomised assignment of subjects to groups. Moreover, matching of subjects is not possible because of human factors existing in the system. Hence, the researcher takes alternative measure to establish equivalence among experimental and control groups by other means. The extent to which he is successful in doing so, the design is valid to that extent. This kind of research design is known as *Quasi experimental design*.

Usually in the case of *Quasi experimental design* the structure of experimental group - control group true experimental design remains same. However, the condition of random assignment of subjects and matching of subjects as done in the case of true experimental design is missed in the case of quasi experimental design. Some examples of quasi experimental design are stated as follows:

### THE PRE-TEST-POSTTEST NON EQUIVALENT-GROUPS DESIGN :

O1	X	O2
O3	C	O4

The experimental group and control group subjects are chosen on the basis of existing bifurcations like two sections of a class or two groups of players of same age group etc. The pretest treatment and posttest conditions remain same as that of a true experimental study. The major drawback of quasi experimental design is lack of randomisation in selection of subjects in experimental and control groups. The absence of this condition affects the internal validity of experiment considerably.

### COUNTER BALANCED/ROTATION GROUP DESIGN :

As discussed above, in certain situations it is not feasible to assign subjects to experimental and control group randomly. To overcome the weakness of non-randomisation of subjects in different groups it is advised to assign experimental treatments to the groups on rotation basis at periodic intervals during the experiment. In other words each group of subjects is exposed to each experimental treatment at different times during the experiment. This design is known as counter balanced design or rotation group design.

Replication	X	C
(Experimental treatment)		(No treatment or Treatment with difference)
Unit 1	Group 1	Group 2
Unit 2	Group 2	Group 1

The unit tests were administered **on** both the groups. The mean scores of **experimental** treatment groups (Group one and Group two) were compared with that of control groups (**Group two** and **Group one**). The difference between mean scores of two methods shall be attributed to the experimental treatment. This design takes care of controlling the effect of group characteristics on experiment.

### TIME SERIES DESIGN

**Unlike true** experimental design where experimental and control groups are included in the study, *time series* design takes into account one group for periodic observations. The observation is applied to a unit consisting of one or more than one subjects. An experimental variable (X) is introduced and its effect is observed by the change or gain in the measurement done at the end of the treatment (X). The following graph indicates the study of experimental **input X** in course of eight observations spreading over a period of time.

### SOME EXAMPLES OF EXPERIMENTAL STUDIES IN EDUCATION INVOLVING TRUE EXPERIMENTAL DESIGN AND QUASI EXPERIMENTAL DESIGNS

- ★ Effect of mastery learning strategies on concept attainment in Geometry, test anxiety and self-confidence among high school students
- ★ Effectiveness of VanHiele model of thinking at theoretical level for secondary school Geometry
- ★ Effectiveness of countrywide classroom ETVprogrammes in social sciences with and without talk-back and through simulated interactive mode
- ★ The effects of cooperative learning strategy on achievement, cognitive development, science process-skills, and attitude towards science



## EXPERIMENTAL RESEARCH DESIGN

Experimental studies must have sound research design. Here research design means the plan, structure, and strategy to conduct investigation so that the hypotheses are tested and valid conclusions are drawn. According to Kerlinger (1974) research design is used to (1) provide answers to research questions and (2) to control variance. The major thrust of experimental research design is to test hypotheses in controlled situations. How to proceed with a study by controlling the effect of extraneous independent variables is a major challenge before a researcher. A good research design is needed to answer this question scientifically.

### CRITERIA OF RESEARCH DESIGN

- (i) Whether the design is suitable to answer research questions? or does the design help us to test the hypotheses?
- (ii) Does the design help us to control extraneous variables which may affect the dependent variable?
- (iii) Can we generalise the results of the experiment to other conditions or subjects? Let us understand such criteria one by one.

### CONTROL OF EXTRANEOUS VARIABLE:

- **CONTROLLING THE SUBJECTS:** It is mostly feasible in laboratory studies where physical control is applied to eliminate the presence of one factor in the experiment. In educational research we must be careful about this type of control. For instance, we may restrict our experiment in rural setting and select only rural subjects to remove residential background (rural urban) as a variable. However, there is caution that all the rural subjects may not have uniform residential background or there cannot be any restriction that some subjects may not have urban exposure at all.
- **MATCHING THE SUBJECTS:** In actual sense it means selecting pairs with identical characteristics. While selecting subjects for experimental group and control group we match the groups on the basis of an extraneous variable which may affect the experiment. For instance we know that intelligence affects learner achievement. In case we wish to conduct an experiment on the effect of methods of teaching on achievement we would like to match the experimental group and the control group on their intelligence scores.
- **RANDOMISATION:** This approach is most suitable for experiments concerning social science research. It is suggested that the best satisfactory answer to control extraneous variable is;

*Randomise whenever possible: Select subjects at random; assign subjects to groups at random; and assign experimental treatments to groups at random.* Once we select the sample of the study randomly we go for identifying the subjects to be incorporated in experimental group and control group. Randomisation is one of the best approaches for dividing the sample in two groups randomly. This equalises the group in statistical sense. There is also another approach where randomization of the groups of subject is done. For instance, three different groups were included in an experiment to study the effect of three different methods of teaching viz., 'A', 'B' and 'C'. Randomisation of the different groups is done to assign each method of teaching to each group of subjects i.e., Groups A, B, and C. *Analysis of co-variance:* As you know Analysis of Co-variance (ANCOVA) is a statistical technique that helps us to control the effect of covariates on dependent variables. On the basis of result of ANCOVA, whatever changes witnessed in the dependent variables are attributed to the experimental variable. Through this technique the measures of extraneous variables are incorporated for analysis so that the initial differences on several variables between experimental group and control group are eliminated. (You will learn in detail about ANCOVA in the section devoted to statistical analysis of data).

### GENERALISATION OF FINDINGS

The third criterion of research design is concerned with generalisability of results of the experiment. Often we raise questions: to what extent can the results of the study be generalized? or To whom and what can we generalise the results of the study? Such questions are associated with whether the research situation truly represents the conditions for valid generalizations. For example, the sample chosen must truly represent the population.

## VALIDITY OF EXPERIMENTAL RESEARCH DESIGN

Campbell and Stanley (1963) insisted on two major criteria of experimental design -(i) whether the research design is fit to answer the research question (Internal validity) and (ii) to what extent the findings of the study are generalisable (External Validity). *Internal validity* applies to study whether changes occurred in dependent variable are attributed to experimental manipulation in real sense or not. In other words what measures have been adopted to eliminate or minimize the effects of extraneous variables towards increasing internal validity of a research design. The discussions made above with regard to control of independent variables deal with internal validity of a study.

## TYPES OF EXPERIMENTAL DESIGNS

There are various types of experimental designs. They vary in complexity and appropriateness. The research design deals with the major question of how well the study can be conducted to test the hypotheses. In other words, how to deal with different kinds of variables and to study their relationships in controlled situations.

True Experimental Design; and " Quasi Experimental Design

### TRUE EXPERIMENTAL DESIGN

- ★ control of extraneous variables with the help of random assignment of subjects in experimental group and control group.
- ★ manipulation of experimental variables.
- ★ observation of events with the help of administration of tests and quantification of data; and
- ★ Replication of the study in a number of cases within the framework of experimental design. *Symbols used in*

### EXPERIMENTAL DESIGNS

- R - Random selection of subjects or random assignments of treatments to experimental groups.
- X -Manipulation of experimental variable or treatment.
- C -Control variable or no treatment or receiving the treatment in different forms.
- O -Observation or test.

## MAIN CHARACTERISTICS OF HISTORICAL RESEARCH

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

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

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

Third, as stated earlier, historical research is conducted on the basis of the analysis of all the known information related to the research problem. It is a fact that the total amount of information which originally existed at the time of the actual occurrence of events does not survive till the date of investigation. Hence, only those data which have survived till today become the focus of the study. However, the researcher may not have full access to all the data existing at the present moment. Consequently, he depends on the total information available to him through all possible efforts. Because of inaccessibility to all kinds of relevant information concerning past events, the interpretation made about causal relationships of certain events suffers from serious limitations.

Fourth, data concerning the past events are available through different sources. Conventionally the historical sources are categorised as: (i) primary sources, and (ii) secondary sources.

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

- " physical artifacts like collections in museums or evidences of historical spots in the form of 'remains' or relics, and institutions of various types;
- mechanical artifacts like films, video films, audio cassettes, and photographs; and
- verbal testimony or records written by actual participants or observers in the form of constitutions, charters, court decisions, official minutes or records, autobiographies, letters, genealogies, contracts, deeds, wills, permits, licenses, certificates, bills, receipts, magazines or newspaper accounts, maps, pictures, painting, books etc.

Usually, primary sources of data are given first priority in historical studies with a view to authenticating the presented facts. They are found in archives. The researcher locates relevant data from archives located at different significant places of a state or a country.

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

Besides primary and secondary sources of historical data the social historians can trace data from two more sources viz., Running Records and Recollections.

**Running records:** Running records consist of files or statistical documents maintained by organisations. The annual reports of an educational institution maintain detailed events taken place in the institution. The calendar of events which have taken place at university level maintained continuously can form a major source of past data. The records like enrolment, registration, deposit of fees, attendance, etc., which have a continuity till date form the sources of historical data.

**Recollections:** The speeches or writings of individuals about their past lives or experiences based on memory are known as recollections. These can be traced in the form of memoirs, autobiographies, or interviews. Recollections are sometimes imperfect hence they do not fit into primary sources.

You can notice that the historians conduct unstructured interviews with people about their lives and events in the past. This technique is called gathering oral history which may focus on historical events associated with social and educational developments.

Fifth, the main feature of historical research is the **evaluation** of historical **data**. The backbone of historiography is the authenticity of data collected through different sources. Even though the data are collected through different sources, doubts can be raised about their validity, reliability and relevance. The process of judging validity, reliability and relevance of data is carried out through: (i) external criticism, and (ii) internal criticism.

# SCOPE OF EDUCATIONAL RESEARCH

By scope of educational research, we mean the range of areas in education in which educational research can be conducted. Education as a field of knowledge has two major dimensions. First, education as an academic discipline and second, education as an area of practice. As a discipline, it has its own concepts and propositions. But these concepts and propositions can be understood and explained with the help of knowledge drawn from cognate disciplines like psychology, sociology, philosophy, economics, etc. Hence, one finds content areas in education such as psychology of education, sociology of education, philosophy of education, economics of education etc. As an area of practice, education operates at both vertical and horizontal level as well as at macro and micro level. At macro level, educational operations take place at societal or national level. At micro level, education operates at the institutional and classroom level. Thus, scope of education can be classified into several ways. Let us discuss them.

## **Classification by major emphasis of cognate disciplines in education**

As we have already mentioned, .study of educational phenomena needs an understanding of the knowledge in cognate disciplines like psychology, sociology, philosophy, economics, management, etc.; hence, educational research can be conducted in these interdisciplinary areas such as psychology of education, philosophy of education, sociology of education, management of education, etc.

## **Classification by levels of education**

Formal education takes place at different levels such as pre-primary, primary, secondary, senior secondary, and tertiary or higher levels. Therefore, educational research can be conducted at these levels of education.

## **Classification by modes of providing education**

There are two major modes of providing education. These are face-to-face and distance education modes. Therefore, educational research can be conducted on the problems related to face-to-face and distance education modes.

## **Classification by curriculum areas - researches in subject matter, innovative techniques and ideas, and teaching methodologies**

Research studies can be conducted in various curriculum areas at school and higher education levels. In all these curriculum areas, educational research pertaining to various aspects of curriculum such as planning, design, development, and evaluation can be undertaken.

## **Classification by educational operation at macro and micro levels**

At macro level, research studies can be undertaken on the problems pertaining to educational planning, national policy formulation, implementation of policies, manpower planning, etc. At micro level, various processes involved in the functioning of educational institutions as well as classroom operations can be studied. For example, teaching-learning process, student assessment, examination, school budget, school processes, etc. can be studied.

## TYPES OF STUDIES IN EDUCATIONAL RESEARCH

As we have already mentioned that the nature of educational problems varies from one problem to another, a single procedure or method cannot be used to study all kinds of problems. Moreover, there are two major paradigms namely, positivist and non-positivist. Based on these paradigms, studies in educational research can broadly be categorized into two heads:

- Quantitative studies; and
- Qualitative studies

### **Quantitative studies**

Quantitative studies are based on positivist paradigm whereas and qualitative studies are based on non-positivist paradigm. We briefly present an overview of these studies. For further details about these you refer to unit 3 of Block 1. Quantitative studies include experimental, quasi-experimental and correlational studies.

#### **Experimental studies**

Experimental studies aim at investigating cause-effect relationships between variables in a given educational phenomena. The variable associated with the cause is independent variable and the variable associated with effect is dependent variable. For example, in the problem, 'the impact of computer-assisted learning on the academic achievement of high school students', computer-assisted learning is the independent variable and academic achievement is the dependent variable. The, educational problems like this are studied with the help of experimental studies.

#### **Quasi-experimental studies**

Quasi means 'seemingly, but not really'. Experimental studies follow true experimental design in which it is possible for the researcher to assign subjects randomly to groups or exercise full control over the scheduling of experimental conditions. On the contrary, such conditions are not present in quasi-experimental design. The same kinds of problems studied in experimental research can be investigated using quasi-experimental research, but the difference lies in the manner in which the research is designed and conducted. Example of such studies is required here.

#### **Correlational research**

Correlational research is a form of descriptive research concerned with determining the extent of relationship existing between variables. For example, there is a relationship between the performance on intelligence test and performance on science achievement test. Such kind of problem can be investigated by correlational studies.

#### **Qualitative research**

As indicated earlier the quantitative research may be of the descriptive, historical and philosophical types; the meaning of such types by research is given as under.

#### **Descriptive studies**

Unlike experimental research focusing on studying cause and effect relationship, descriptive research is concerned with studying 'what exists'. It interprets and explains the existence of educational phenomena. There are various forms of descriptive studies. For example, *case studies* investigate a particular case, i.e. an educational institution, a student, a teacher, a single system of education, etc. Surveys of different forms also come under descriptive studies. *Developmental studies* attempt to investigate the change in the characteristics of children with their growth and development. *Content analysis* is concerned with the classification, quantification and comparison of a given content, which may be from a document, or transcription of a speech or the communication between two or more people.

#### **Historical research**

Historical research attempts to examine past events in order to draw their relevance for the present and for the future. By studying the past events, the researcher can get a clear perspective of the present events, as well as predict and control the future events and actions. There are various types of historical research, namely, bibliographic research, legal research, studying the history of scientific and philosophical ideas, studying the history of educational institutions and organization. For example, one may study the history of the growth and development of Indira Gandhi National Open University or the history of the development of vocational education in India.

#### **Philosophical research**

The major emphasis of philosophical research is on analyzing meaning and nature of educational concepts, and propositions and their relevance to educational practice. These studies also make an analysis of epistemology (related to knowledge), metaphysics (related to reality) and axiology (related to values) of a particular educational process or educational thought. Unlike scientific research aiming at putting out empirical conclusions or generalizations, philosophical research attempts to develop deep understanding of various educational concepts, ideas, theories, principles, and practices under philosophical research. A researcher may want to study educational philosophy of a great thinker, say, Gandhiji, Rabindernath Tagore, Sri Aurobind and its relevance to the present day education system.

## MEANING OF THE TERM 'PARADIGM'

The meaning of the term 'paradigm' is intimately related to research in any field. This concept was introduced by Thomas Kuhn in his famous book "The Structure of Scientific Revolution, 1962". The concept has turned out to be useful in inspiring critical thinking about 'sciences' and the way shifts in basic scientific thinking occur. A paradigm determines the criteria according to which a researcher selects and defines problems for inquiry. It ascertains scientific approaches and procedures which stand out as exemplary to new generation of researchers (scientists) as long as they do not oppose it. Kuhn (1962) characterizes a paradigm as : "an integrated cluster of substantive concepts, variables and problems attached with corresponding methodological approaches and tools...a paradigm gathers into itself a community of investigators. By sharing information within itself, the community gives itself intellectual and social support. It tends not to communicate with investigators who follow different paradigms. Citation of other's work is frequent within a paradigm but much less frequent, perhaps non-existent across paradigms. Hence, the followers of a paradigm tend to have their own journals, scientific societies, and meetings, because the paradigm has won their allegiance to an integrated set of concepts, variables, problems and methods."

A 'revolution' in the field of scientific paradigms occurs when one or several researchers at a given time encounter anomalies, for instance, make observations, which, in a striking way, do not fit the prevailing paradigm. Such anomalies can give rise to a crisis after which the universe under study is perceived in an entirely new light. Previous theories and facts become subject to thorough rethinking and re-evaluation.

There are three normal aspects of scientific research:

- (i) Determination of the class of significant facts that the paradigm has shown to be particularly revealing of the nature of things in the field, and an attempt to increase the accuracy and reliability of facts.
- (ii) Matching of facts with theories, and
- (iii) Empirical work to articulate the paradigm theory, including a comparative study of various theories or generalizations with a view to deciding which one is better.

The normal scientific research is a puzzle solving activity which includes not only solutions of problems that have not been solved before but also of problems that have not been solved so well. The new paradigm determines the problems that need to be solved; others are set aside. Sharing a paradigm does not necessarily mean having "shared values". However, lack of shared interpretation does not hinder the progress of research in the paradigm.

In a field of research, during the pre-paradigm stage there are frequent debates on legitimate methods, problems, and their standard solutions. When a paradigm is established, there is a general consensus in the research community on these issues. However, in the course of regular research, new and unsuspected issues crop up for which there are no ready made solutions. The attempt to solve them enriches and refines the paradigm; it leads to new theories, not all such theories are paradigm theories. During the pre-paradigm stage and during the crisis that develops in the existing paradigm, many speculative unarticulated theories come up which can point the way to a new paradigm.

## MLA (MODERN LANGUAGE ASSOCIATION) FORMAT

The MLA format is a widely accepted style for writing footnotes, bibliography/reference in most disciplines in humanities. It requires citation within the text rather than endnotes or footnotes. Citation in the text provides information, usually the name of the author and page number(s) to lead the reader to the accompanying full bibliographical entry in the *works cited* list, which is placed at the end of the research paper/report.

### ***Parenthetical citations in the text of the research paper/report***

*Example:* At least one other educator has recently quarreled with the traditional division of curriculum into discrete subjects (Moffet 5-10).

*Works cited* - a section in alphabetical order at the end of the same research paper. *Example:* Moffet, James. *Teaching the Universe of Discourse*, Boston: Houghton, 1968

*Citation of books, journals, articles and internet resources*

*Books:* In citing books normally arrange the information in the following order:

- author's name
- *title of the book*
- name of the editor, translator or compiler
- edition used
- volume No. used
- name of the series
- place of publication, name of the publisher and year of publication
- page numbers

*Examples:*

By a single author

Henry, E. Garrett. *Statistics in Psychology and Education*, 10<sup>th</sup> Indian Reprint. Bombay: Vakila Feffer and Simons, 1981.

By two or three authors

Dagar, B. S. and Dull, Indira. *Perspectives in Moral Education*. New Delhi: Uppal Publishing House, 1995.

*By more than three authors*

Edens, Walter, et al. (eds.) *Teaching Shakespeare*, Princeton: Princeton UP, 1977. *By corporate author*

National Council of Educational Research and Training, Name of the Book, Place of publication.

*By anonymous author*

*Encyclopedia of Virginia*. New York: Somerset, 1993.

*An article in a reference book*

"Mandarin". *The Encyclopedia American*, 1994 ed.

*Conference proceedings*

Freed, Barbara F., ed. *Foreign Language Acquisition Research and the Classroom: Proc of Consortium for Language Teaching and Learning Conference*, Oct. 1989. University of Pennsylvania, Lexington: Henth, 1991.

*Journals and magazines articles:* In citing journal and magazine articles, normally the information is arranged in the following order:

- i) author's name
- ii) title of the article
- Hi) *name of the journal*
- iv) series number or name
- v) volume number
- vi) date of publication
- vii) page number(s)

*Examples*

*From a magazine*

Mehta, Pratap Bhanu. "Exploring Myths". *New Republic*, 6 June, 1988: 17-19.

## APA FORMAT

The APA style is extensively used in social sciences. It is standardized by the American Psychological Association (APA). In this system also the citation format requires parenthetical citations within the text rather than footnotes. The citation in the text provides information, the name of the author and the date of publication, to lead the reader to the accompanying bibliography entry. Complete information about what is cited in the text is supplied a "References" given at the end of the research paper. The APA style is used in the double space as was in the case of MLA format.

*Example:* (cited statement in the text)

*Once established, working models are said to be "core features of personality that are then carried into new relationship" (Collins and Read, 1994, p.56)*

Collins, N., and Read, S. (1994). "Cognitive representations of attachment: The structure and functions of working model". In K. Bartholomew and D. Perlman (eds.), *Personal Relationships* (Vol. 5, pp. 53-90). London:

*Examples of APA style reference citations*

*Periodicals:*

Author, A.A., Author B.B., & Author, C.C. (1999). Title of the article. *Title of the Periodical*, Vol., pp....

Paivi, A. (1975). Perceptual comparisons through the mind's eye. *Memory and Cognition*, 3, 635-647.

*Books, reports, brochures (non-periodical) General form*

Author, A.A. (1999). Title of the work. Location: Publisher

*By a corporate author (example)*

American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders (4<sup>th</sup> ed.)*. Washington, D.C.: Author

*Article in a book (example)*

Dagar, B.S. (1997). Evolution of Pedagogy as a Profession. In R.P. Singh (Ed.) *Teacher Education in India-Looking a Head*. (pp. 127-143) New Delhi: Federation of Management of Educational Institutions, Report & Government Printing Office

National Institute of Mental Health. (1990). Clinical Training in Serious Mental Illness (DHHH Publication No. ADM 90 - 1679). Washington, DC: W.S. Government Printing Press.

*Online Periodicals - General Form*

Author, A.A., Author, B.B., & Author, C.C. (1999), Title of the Article. *Title of the periodical*, XX, XXX-XXX Retrieved month, year from source.

*Example:*

Senior, B. (1957). Team roles and team performance: is there really a link? *Journal of Occupational and Organizational Psychology*, 70, 241-258. Retrieved June 6, 2001 from ABI/ INFORM Global (proquest)

## CHICAGO MANUAL OF STYLE

The Chicago style will show you how to create footnotes or endnotes and a bibliography from print and electronic formats. The endnotes/footnotes provide correct bibliographical citation for the sources noted by number in the text. Footnotes appear at the bottom of each page. Endnotes appear at the end of each chapter or at the end of entire paper. These notes whether footnote or endnote aim at giving an explanation or citation of other works related with the statement in the text which has been numbered as 1, 2 or 3, etc. It may also indicate some example.

*For example*

- i) A similar distinction is made by H. Richard Niebuhr in "The Responsible Self, New York (1963).
- ii) The term 'object' was first used by Freud in *Three Essays on the Theory of Sexuality* (1905) to distinguish objects from sexual aims.

*Book (Two authors)*

Colby, A. and Kohlberg, L. *Measurement of Moral Judgment: Manual and Results*, Cambridge: Cambridge University Press, 1987.

*Corporate author*

International Monetary Fund, *Survey of African Economies*, Vol. 7, Algeria, Mali, Morocco, and Tunisia (Washington, D.C.: International Monetary Fund, 1977), 27

*Articles in Periodicals (journals, magazines, newspapers, etc.)*

Robertson, Noel. "The Dorian Migration and Corinthian Rituals", *Classical Philosophy* 75 (1980): 1-22,

*Citation in the text*

Basic form consists of the author's last name and the year of publication of the work. No punctuation is used between author's name and the date. For example (Dewey 1916)

*Articles retrieved in electronic format*

*Footnotes and endnotes:* Author's name in normal order followed by document title, date of Internet publication, <URL> or other retrieval information, date of access.



## ETHICAL ISSUES IN REPORTING

While going through this course that the process of research, especially the collection of data whether via experimentation or survey essentially involves ethical issues. While conducting research you are advised to take cognizance of such issues. In the process of reporting and dissemination of research findings also such issues arise. So while reporting you must take care of such issues. Some of these issues are related to the language you use in printing the findings or recommendations of research.

### HONESTY VERSUS DIPLOMACY

Suppose for example, you conducted a study on organizational climate of an institution and you found that the staff morale is low. You also tried to find out the casual factors responsible for such situation; and you observed that the head of the institution has somewhat autocratic style of functioning. There may be two ways of presenting the same finding. If your findings are critical of some people or institution you have to exercise your judgment about how to present the findings. A point, which is negative in nature, if presented as such, may offend the person concerned and he/she may not like to implement the findings. But the same negative findings may be disseminated in a more positive way. Compare the two versions of the same point relating to the example cited above:

- Staff morale is low because the principal of the institution is autocratic, not easily approachable and unpredictable.
- The principal should use more consultative management style and take care of the needs of the staff and students and respecting their individuality.

In the second way of presentation without being dishonest with the research findings, you have tilted it in a positive direction. In such a presentation, there is much likelihood that the principal without being offended may implement the findings.

### FEEDBACK TO STAKEHOLDERS

While conducting experiment or collecting data in other ways, there are many people or subjects involved. Your findings are based on the reactions/observations etc. of these people. So it will be ethical if the draft report is shown to those involved. Do they consider it fair? Do they wish anything to be taken out or added in? In such situation you should be able to negotiate for an acceptable compromise. If you have fed back of your findings from those who helped you in collecting data at various stages of the research, you would already be aware of their reactions.

### ANONYMITY

In conducting research, in education, you always choose a sample of individuals called subjects, and obtain their views/reactions about themselves or about others by using "some appropriate tool/experiment. The identities of such people you observed/interviewed should be kept secret and should not be divulged to anybody else. The subjects have given the information with a confidence in you and, therefore, it is your ethical duty not to give any clue regarding who the subjects/institutions were. In case study research it may be possible to disguise the context but retain the key information including quotes. You may use pseudonyms

## GENERAL PRINCIPLES FOR WRITING A RESEARCH REPORT

Writing a research report is a scientific task requiring a special training or experience on the part of the researcher. Its basic purpose is to inform the interested audience of the nature of the problem investigated, the procedure followed in its execution, and the nature of findings and their implications. In this process, the researcher discharges the responsibility of communicating three kinds of information:

- (i) The nature of the study in sufficient details in order to facilitate the replication of the study by another person;
- (ii) The nature of findings of the study in sufficient details in order to enable the reader to judge for himself what the conclusions are;
- (iii) Processing data and interpretation of results and researcher's own conclusions and recommendations for further research and action.

In addition to a thorough understanding of research process, the report writer must possess good communication skills. A good communication is one which others can understand and if necessary, use it. The findings of research in education are useful not only for a professional or

a specialist in this field but also for practitioners, especially, teachers, administrators and policy planners. All these users of research should be able to understand and interpret the contents of a research report.

Writing a research report is a complex and creative endeavour. It takes weeks, and sometimes months in getting started. At times, researchers prefer to write less complex parts of the report first, and then, come to more complex chapters. Instead of beginning with the introduction, which may be conceptually complex and relatively unstructured, students begin with writing the chapter describing the procedure which is not conceptually complex (Fox, 1969), and is relatively structured. But, this is simply a way of getting started. The full report cannot be written effectively in bits and pieces which are then pasted together. A good research report is characterized by high degree of precision and consistency, which come into being only after a lot of writing, editing and re-writing. It is not generally possible to achieve that level of precision and consistency while preparing the first draft. The investigator must recognize that what he first writes is not the final product, but only the first of several drafts. In short, the best way to get started on writing the research report is to sit down with paper and pencil and write, without much attention, in the beginning, to the fluency and eloquence of what comes through. Fluency and eloquence can be added after the first draft is ready. It would be useful for a researcher to follow a few general principles while writing a research report:

- Probably, the foremost rule of research report writing is that the writer must be as objective as possible in reporting the study. Being a scientific document, a research report should not contain subjective statements. The write-up should not reflect overstating or emotional reactions, the statements of the kind given below should be avoided :
  - *Obviously*, method A is better than method B.
  - *Wonderfully* What a fantastic result!
  - Every year *many poor* and *helpless* children dropout of school.

Such statements reflect some kind of subjectivity and emotional involvement on the part of the author. Therefore, these should be avoided.

" A research report should contain an objective, and factual description of past research upon which the study is based. It should not be written in such a way as *to justify or prove* the researcher's position. The objective reporting demands that the use of personal pronouns, such as I, We and Us, etc., should be kept to the minimum. Instead, impersonal pronouns and the passive voice should be used. Instead of writing "I collected data from rural and urban schools", the researcher should write "the data were collected from rural and urban schools". As far as possible, impersonal *pronouns, passive voice, and indirect and reported* speech should be used in report writing. The entire report should be written in past tense.

- The contents should be presented in a clear, simple, concise and straightforward language. What is to be communicated should be stated in the fewest number of words and simplest possible language. Instead of saying "the population comprised all the students who graduated in Commerce at the University of Delhi", it would be worthwhile to say "the population was all Commerce graduates of Delhi University". The research report should reflect researcher's scholarship and literary competence in terms of correct spellings, grammatical construction, and punctuation. For this purpose, the researcher may use a reference book, dictionary or have a spelling and sentence construction programme on the computer. It is advisable to use the services of some expert who is competent in these areas to read the manuscript and correct errors.

**DECEMBER-2009****MES-054****METHODOLOGY OF EDUCATIONAL RESEARCH**

1. Discuss with examples how the knowledge gained through scientific method is more authentic and reliable than the knowledge gained through inductive or deductive method.

OR

Discuss why a researcher should be familiar with the field of education from which he/she intends to choose his/her problem for investigation.

2. Differentiate between probability and non - probability sampling methods. Explain the types of non-probability sampling with examples.

OR

Differentiate between comparative and evaluative survey. Also, explain the problems faced by Investigator while analyzing documentary studies.

3. a) Explain the need and importance of review of related literature.  
 b) Describe briefly characteristics of a good test.  
 c) What is an attitude scale ? Describe briefly any one type of attitude scale.  
 d) Discuss briefly the nature of qualitative data.  
 e) Explain the steps of conducting a case study.  
 f) What is the general format of the chapterisation of a doctoral thesis?
4. Compute Mean and Standard deviation of the following data and interpret it.

Class Interval	f
70 - 79	2
60 - 69	2
50 - 59	4
40 - 49	6
30 - 39	11
20 - 29	8
10 - 19	9

N = 42

**JUNE, 2010****MES-054 : METHODOLOGY OF EDUCATIONAL RESEARCH****1. ANSWER THE FOLLOWING QUESTIONS IN ABOUT 600 WORDS :**

Differentiate between positivist and non-positivist or anti-positivist approaches to educational research. Explain, 'with an example, how positivistic and non-positivistic approaches can be applied together for a research problem in education.

OR

Differentiate between experimental research and ex-post facto research. Describe, with an example, the steps of conducting an ex-post facto research in education.

**2. ANSWER THE FOLLOWING QUESTION IN ABOUT 600 WORDS.**

Explain the meaning and characteristics of a hypothesis. Discuss, with examples, various types of hypothesis.

OR

What is a 'test' ? Discuss the various characteristics which you need to look into while selecting a test as tool for educational research.

**3. ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS IN ABOUT 150 WORDS EACH :**

- What is qualitative research ? Mention the characteristics of qualitative research.
- What are sampling errors ? Mention different ways to minimizing sampling error.
- Differentiate between nominal scale and interval scale with examples.
- Differentiate between cross sectional study and longitudinal study with the help of examples.
- What are the characteristics of normal probability curve ? Discuss its applications briefly.
- Discuss ethical issues to be considered while reporting research findings.

**4. In the table below, data represent the number of boys and the number of girls who chose each of the three possible answers to an item on an environmental awareness questionnaire. Test whether the item differentiates significantly between boys and girls.**

	Yes	No	Undecided	Total
Boys	25	15	5	45
Girls	20	12	8	40
Total	45	27	13	85

The Chi-Square critical values for 2 df as given in the Table E are 5.991 and 9.210 respectively for 0.05 and 0.01 levels of significance.