MES-049
PROJECT WORK

HANDBOOK FOR PROJECT WORK

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1.   INTRODUCTION

You are already aware about the general format of the five courses of Post Granduate Diploma in Educational Management and Administration (PGDEMA) programme. The first four compulsorycourses are theory courses which you have already studied. In the course MES- 041 Growth and Development of Educational Management, you must have understood the growth of Education in its socio- historical and development perspective. The dynamics and dimensions of educational management in a system were explained to you in the course MES-042 Dimensions of Educational Management. The course MES-043 Organisational Behaviour– dealt with the instructional nature of the educational, psychological, environmental and organismic components educational institutions. The planning and management of with focus on its structural and organizational characteristics were explained to you in the course MES-044 Institutional Management. Apart from these compulsory courses, you have also choosen one optional course of your interest.

While studying the contents of these five courses, you might have come across various issues related to educational management in the context of school education. These areas might be of some importance to you and you may like to undertake and execute a research project in one of these areas for the purpose of the fifth course namely **MESP-049**, **Project Work.**

In this handbook, we will discuss how to select a topic or a theme for the research project and conduct the study. For this you are required to develop and formulate a research proposal. We will discuss certain guidelines for developing the research proposal and executing the project successfully.

For successfully completing the research project, you are obligated to give a completely detailed account of your experiences and thinking involved in the conduct of the research on the theme or problem right from identification and statement of the problem, formulation of hypothesis (es), collection, analysis and interpretation of data, to testing of hypothesis (es) and drawing out of conclusions. Such a complete and detailed account of research project is called **research report.** In this handbook, we will discuss the procedure followed in the preparation of the research report which would also include the details about its general format, style and format of writing the report and the procedure which is followed in typing the research report.

2.   OBJECTIVES

After going this handbook. you should be able to:

● understand various types of research project;

● describe the important sources for problem identification and its selection;

● understand the criteria which are to be kept in view in formulating a research problem;

● describe various stages of a research proposal;

● understand the format of a research proposal;

● prepare a research proposal;

● execute a research project;

● understand the procedure or writing a research report.

3.   CLASSIFICATION OF RESEARCH PROJECTS

There are various types of research projects that can be classified into three groups. This classification is based mainly on the type of the research study to be under taken and its purpose.

a) The most common project is that which is prepared by those who wish to undertake research for completing their diploma master's or doctoral degree. Submission of a research proposal is a general requirement in most of the universities which is evaluated by a committee of experts to determine its feasibility. For example, being a student of PGDEMA, you are required to select a theme or a problem in an area of your choice within the framework of the contents from either compulsory courses or from an elective course which you have already studied. However, it may be noted that you should choose a topic for which all the needed resources are easily available to you. The main purpose of this project work is to sensitise you to the realities and practices used in educational management in various systems, their unique problems, the demands on them and the possibilities inherent in them.

b) The second type of research project is one, which is to a private or governmental agency for financial assistance.

c) Finally, in the third category is for the research project that is submitted by a university by teacher to some research organization such as Distance Education Council (DEC) of Indira Gandhi National Open University (IGNOU), the Indian Council of Social Sciences Research (ICSSR), the National Council of Educational Research and Training (NCERT), National Institute of Open Schooling (NIOS), the University Grants Commission (UGC). or any other organization. Funds are marked by such organizations for research, hence more teachers are taking interest to investigate problems in the areas of concern at the school, college or university levels. After successfully completing your PGDEMA, you may also be interested in undertaking a research project of this nature.

Generally, research which is conducted in any of the above mentioned types of research projects, can be classified based on the following three perspectives:

● the application of the research study;

● the objectives in undertaking the research; and

● the type of information sought.

These classifications are not mutually exclusive and may overlap and are given as follows:-
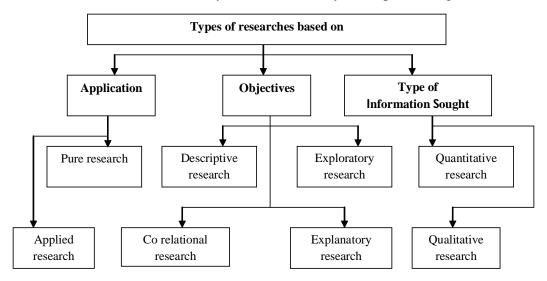

Figure 1: Types of Research

4.   SELECTING A RESEARCH PROBLEM

Before undertaking this course, it is expected that you have studied thoroughly the contents of all the courses which have pinpointed at the broad areas of educational management. Some of these areas may have been of more interest to you as compared to other areas. For undertaking a research project, it is first necessary to choose a specific area within which you will conduct the study. The area selected should be one in which you are capable of demonstrating necessary initiative, originality, and good judgement. a thorough understanding of the known facts and developments in the area in which you are interested constituted the first and most important step in selecting a specific problem for study. If you are familiar with your field and are aware of the studies that have already been conducted in it, you will be able to identify the problems which have, so far, remained unsolved. A survey of suggestions for further research given at the end of research reports, and review of research will be helpful to you in getting an idea about the gaps which exist in knowledge in a particular field or area. Periodicals and annual bibliographies are also useful in highlighting the research going in the area in which you may be interested.

It is not possible to list all the problems that need to be researched. The choice of a suitable problem is always difficult. It is a time consuming process.

Generally, a researcher is unaware of the sources to find a suitable research problem. Given below are some important sources which can be helpful to you while **selecting a research problem.**

(a)   Professional Experience

Some of you may be teachers in Universities, Colleges or other institutions. There may also be some of you who are fresh graduates or post-graduate in any discipline. In such cases, one of the most fruitful source of problems are your **own experiences as a professional educator** or as a curious **learner**.

(b)   Inferences from Theory

A second important source of research problems lies in the inferences that can be drawn from various educational and psychological theories studied by you. The application of general principles involved in various theories in specific classroom settings makes an excellent starting point for research. It will help to determine whether a particular theory can be translated into actual practice. Use and application of theories of motivation, principles and techniques of managing institutions and innovative evaluation techniques provide rich source of topics for research.

(c) Professional Literature

The study of professional literature will not only expose you to pressing research problems but also suggest the ways in which research is conducted. Research reports, bibliographies of books and articles, periodicals, research abstracts, year books, dictionaries, newspapers and research guides suggest important themes which can be selected for undertaking project work. Some sources could be, the Encyclopedia of Educational Research, Dissertation Abstracts International. For all such documents it would be advisable for you to contact your counsellors in the study centres or the nearby libraries.

(d) Technological and Social Changes

Technological and social changes demand development of new courses and curriculum for students in both formal and open systems. These developments constantly bring forth new problems for research. The use of hardware and software in management give rise to various types of problems for research.

Another interesting way to classify sources of research problem is according to **the four 'Ps'**, which are as follows:

- People;
- Problems;
- Programmes; and
- Phenomena

The following table is illustrative of the above:

Aspects of a Study	About	Study of
Study population	People	Individuals, organizations, groups, communities
Subject area	Problem	Issues, situations, associations, needs population, composition, profiles, etc.
	Programme	Contents, structure, outcomes, attributes satisfaction
	Phenomenon	Cause and effect relationships, the study of a phenomenon itself, etc.

Table 1: Showing the four 'Ps'

Source: Kumar, Ranjit,1999 Research Methodology A step-by step Guide for beginners, Sage: New Delhi

In the context of the four 'Ps', let us examine issues in educational management that could be of research interest. In education there are several such issues: student's satisfaction with a teacher, attributes of a good teacher as a good manager, and supervisory needs of students in education, etc.

5. EVALUATING THE RESEARCH PROBLEM

Before selecting a problem for undertaking a research project, you should ask yourself a series of questions about its feasibility and significance. These questions are helpful in the evaluating the problem in terms of your personal suitability and social value of the problem. You must ask the following questions, before the project work is undertaken:

(a) Whether appealing and important for me?

The research problem selected by you, first must appeal you as a researcher. This will provide motivation and then only you will be interested in continuing it. Also, you must feel the importance of the problem before finalising it.

(b) Is the problem researchable?

There are certain problems that may not be effectively solved through the process of research. There are certain problems which can be answered only on the basis of value judgement. The relevant data may not be available to find answers to questions involving ethical issues. The

research problem must be such that can be stated in workable research questions to be answered empirically.

(c) Is the problem a new one?

There is no purpose in studying a problem which has already been adequately investigated by others. In ignorance you might select a problem for your project work which is neither new nor original. You will spend time needlessly on a problem already investigated by some other researcher. To avoid such duplication, it is essential to examine very carefully the record of previous research projects completed in the area. However, this does not mean that a problem which has been investigated in the past is no longer worthy of study. You might want to repeat a study when you want to verify its conclusions or to extend the validity of its findings in a situation entirely different from the previous one.

(c) Is the problem significant?

The question of significance of the problem usually relates to what you a researcher hope to accomplish in a particular study. What is the purpose in solving the particular problem that have been chosen? What new knowledge do you hope to add to the sum total of what is known? All these questions need to be addressed and unless thse are answered clearly, the problem should not be selected for project work. Your project should indicate that it is likely to fill the gaps in the existing knowledge, to help in resolving some of the inconsistencies in the earlier studies, or to help in the interpretation of the known facts.

(d) Is the problem feasible?

A problem selected for the project work may be a good one from the point of view of the three criteria mentioned above, yet it may not be feasible in view of some of the aspects discussed below:

- *Research Competence:* The problem should be in an area in which you are qualified and competent. You must be familiar with concepts involved in the are and also possess necessary skills and competencies that may be needed in the conduct of study. Beside, this you must have a skill to develop, administer and interpret necessary data, choose appropriate research design.

- *Locate Pertinent Data:* You must find out whether pertinent data is accessible and are the valid data collection devices are present ?

- *Interest and Enthusiasm*: The problem should be one in which you re genuinely interested and about which you are truly enthusiastic. It should be meaningful and arouse your curiosity. You must also be determined to pursue the study despite the difficulties and social hazards that may be involved. It is always advisable that controversial problems may not be taken up for the beginning research project, like that of yours.

- *Financial Consideration*: The problem should be one which is financially feasible. You must ascertain whether you have the necessary financial resources to complete the project work on the selected theme. You must have an estimate of the expenditure involved in development of tools and data collection, printing, travel, typing etc.

- *Time Requirement*: Project work is one of the requirements of PGDEMA. You are required to compete it within a stipulated time. Thus, the project selected by you should be one which can be completed in the allotted time along with other courses of the PGDEMA. It is worthwhile to plan for the time that will be needed for the development and administration of tools, processing and analysis of data, and writing of the project report.

6.   PREPARING A RESEARCH PROPOSAL

After evaluating the problem, you have to prepare a research proposal or a plan for undertaking the project work. This provides a basis for the evaluation of the project you will undertake for the completion of the PGDEMA programme and also will provide you assistance during the completion of the project. Hence, this is a very important step for the completion of the programme.

A research proposal is a systematic plan, which brings to focus the preliminary planning that will be needed to achieve the objectives of the proposed project. It is just like blue print which an architect prepares before the construction of a building. The initial draft of the proposal is subject to modifications in the light of the constructive criticism, comments and suggestions of experts in the field. The research proposal always goes through the developmental phases, and therefore, deficiencies, if any, may be corrected by discussing the same with experts which includes your supervisor, counsellors, colleagues or research specialists in the concerned field. You may note that an acceptable and worthwhile research project is the result of well designed proposal; therefore it must be prepared with all care and caution.

The research proposal is a detailed document containing various aspects the research which you will be undertaking including a statement of the problem and its significance, formulation of hypothesis(es) (if any), the methods indicating the selection of sample(s) too(s), technique to be used in the collection and analysis of data and a detailed bibliography.

There are certain specifications that are essential to good research project which must appear in each proposal. A worthwhile research study is likely to result only from a carefully planned and well designed plan. Let us go through the categories of information, which should appear in the proposal. **A research proposal must have information about the following**:

● What you are proposing to do?;

● How you plan to do it?;

● Why you selected the proposal strategyThe following categories of information should be carried in he proposal?;

● Definitions' problems and limitations;

● A statement of the objectives of the study;

● A list of hypotheses(if you are testing any);

● The research instrument(s) you are planning to use;

● The information on sample size and sampling design;

● Information on data processing procedures;

● An outline of the proposal chapters for report;(if possible)

● A proposed time frame.

Let us go through the components of the research proposal, which you have to put while developing your proposal.

(a) The Title

The title of the research proposal actually means to give words to the problem and must suggest the theme of the study. In selecting a title, you are advised to consider two things:

(i) The title should not be burdened by pompous words and should not include terms of unscientific, rhetorical, emotional, or biased nature.

(ii) The title should not be too lengthy or too involved. It should be specific to the area of study. An adequate title for a project is one which represents a reasonable restriction and implies an objective approach. It may be noted by you that the proposed study for project work cannot be presented in the title; but it should be so worded that it would give sufficient information about the nature of the study.

For example, the following title is simply worded and conveys specific information about the nature of the study.

A Study of the Effect of a Remedial Instructional Material on the achievement of Slow Learners Mathematics at the primary level

(b) Introduction (Context and Justification)

In this section, the researcher introduces the problem briefly. Further, the researcher will spell out as to how the problem emerged, its social and educational context and its importance to the field? Some researchers name this caption as "Background of the Study." In short, here the entire topic of the study is introduced in brief. In some proposals, there is a separate caption 'Rationale', while in others the same is included in the Introduction. Here, the researcher specifically deals with justification for conducting the proposed study. In short, one tries to answer 'WHY' of the study, suppose one selects "problems of managing distance learners in India" as a problem of his/her study, the researcher will discuss about distance education in India, its status etc. in introduction along with various problems related to it and the justification for conducting this study.

While writing this section, you must include the following:

- The content must be written form known areas to the specific problem undertaken for the research

- It must also briefly present the current status of the problem.

(c) The Significance of the Problem

A good research proposal should specify the worth and urgency of the project. It should indicate clearly how the results of the project can influence educational processes and practices. The significance of the project undertaken for research study can be shown in several ways.

It can be established by showing the time lapse between the earlier research study and the present one; therefore the new interpretation, new knowledge, modified techniques, or conditions indicate a need to replicate the study.

A second way of justify the for a study is to show that there are gaps in the knowledge provided by the previous studies and to show how the present study will help to fill in these gaps and add to the quantum of existing knowledge.

A third way to justify the need for a study is to show the lack of information about a problem by presenting the supporting statements of other research studies.

(d) The Statement of the Problem

The statement of the problem is not exactly the same as the title of the project but an expansion of that and has a definite place in the introductory part of the proposal. It is often a declarative statement but may also be given in question form. It provides an explanation of the stated goal and gives direction to research process. The major statement of the problem can be broken down into minor statements. To state a problem means to specify it in detail and with precision.

In the formal statement of the problem, you are required to describe the background of the study, its theoretical basis and stating the problem in concrete, specific and workable questions. All questions or issues raised must be related the problem. Each major issue should be separated into its subsidiary or secondary elements which need to be arranged into a logical order. These elements must clarify exactly what is to be determined or studied so as to restrict the scope of the project.

(e) Research Questions

Any research study aims at providing answering certain questions raised as a result of the research gaps. These research questions usually lead to framing of objectives of the study and hypotheses to be tested on the basis of evidences.

(f) Research Objectives

If the objectives are clearly defined, then the researcher is likely to wander aimlessly in the field to achieve any worthwhile goal. Objectives provide the basic foundation to the research study, as this guide the entire process of research. It must be noted that the list of objectives should not be too lengthy and ambiguous rather should be stated clearly in achievable terms. These objectives generally flow from the research questions the researcher has in his/her mind.

The research objectives facilitate the execution of activities of the project in a planned manner. The objectives have to be enumerated in such a sequential manner that achievement of one objective is logically connected to another activity and so on. A research may have both major and minor objectives also. A major objective will be to achieve the global target of the research project, whereas the minor objectives focus specifically on the secondary purposes of the project. In other words, the major objective indicated an overall statement of the thrust of your study and also the main associations and relationships that you seek to discover an establish. The minor objectives are the specific aspects of the topic that you want to investigate within the main framework of your study.

Following are the criteria for writing the objectives:

- must be clearly worded and unambiguous.

- make sure that each objective contains only on aspect of the study.

- must be written by using action- oriented words or verbs such as 'to determine', 'find out',' to ascertain'. 'to measure', 'to explore'.

The following illustration gives an idea of objectives:

Descriptive study	→	1. to describe the organizational structure of ……….. 2. to find out the opinion of students about the………..
Correlational study	→	1. to ascertain the impact of the use of education tehnology. 2. to ascertain the impact of different teaching methods on …..

(g) The Hypothesis

Any research is directed to answer to the questions raised by the researcher. Hypothesis is thus a guess or a tentative generalization which is formulated by the implications of related literature and deductive logic drawn from the empirical support of the problem under investigation. At the time of making the proposal, it is in the form of a formal affirmative statement which predicts a single research outcome, a tentative explanation about the relationship between two or more variables.

Following are the characteristics of the good research hypothesis:

- reasonable;

- consistent will known facts or theories;

- formulated in such a way that it can be tested and found to be probably true or probably false; and

- must be stated in the simplest possible terms.

It is important to have hypothesis for your research project because of the following reasons:

- provides the investigator with a relational statement that is directly testable in a research study.

- provides direction to the research.

- provides a framework for reporting conclusions of the study.

- could be tested and shown to be probably supported or not supported, apart from our own values and opinions.

For example, in experimental research, a researcher is interested in making predictions about the outcome of the experiment. In the problem which we stated earlier, our interest is to study

the effect of remedial instructional material on the achievement of slow learners in mathematics, here the expected outcome may be in terms measured as the gain in the achievement in mathematics by the group of slow learners.

On the other hand, in the historical or some descriptive research, you may be interested in investigating the history of an educational institution, the life of a man or the happening of an event and thus may not have a basis for making a prediction of results. A hypothesis, therefore, may not be required in such fact-finding studies. It may be noted that when fact-finding alone is the aim of a research project, a hypothesis may not be required.

A hypothesis can be stated in *directional or non-directional type*. The hypothesis which stipulates the direction of the expected differences or relationships is termed as directional hypothesis. For example, in the problem stated earlier, you may frame the directional hypothesis as:

There will be a significant positive gain the achievement of mathematics of slow learners at the primary level after studying the remedial instructional material.

This statement of hypothesis stipulates the direction in terms of significant positive gain in the achievement of mathematics of slow learners at the primary level as a result of studying the remedial instructional programme.

A research hypothesis which does not specify the direction of expected differences or relationships is a non-directional hypothesis. For example, in the above problem we may formulate the non-directional hypothesis as:

There will be a change in the achievement of mathematics of slow learners at the primary level after studying the remedial instructional materials.

In this statement, the direction of change in achievement of mathematics of slow learners at the primary level has not been specified and hence, the hypothesis is in the non-directional form.

At the beginning of your research, you state the hypothesis in affirmative form as the prediction of the outcome that you propose to test. Later, at the stage of statistical analysis of the observed data, you have to restate the hypothesis in negative or null form. Thus, Null hypothesis is a hypothesis which negates the relationship between the two variables under the study.

(h) Operational Definition of Terms

In behavioural research, many variables of the interest are abstraction and cannot be observed directly therefore, it is necessary to define them in terms of observable acts. Thus, an operational definition ascribes meaning to a concept by specifying the operations that must be performed in order to measure the concept. For example, the term 'achievement' has many meanings but operationally it can be defined as: "The scores obtained by the students in an achievement test constructed by the researcher". It must be noted that like the objectives these terms must also be written in behavioral or action verbs, so that its existence or absence may be ensured through observation.

Apart from defining operational terms, you must also provide description about some terms which have been used in your study. These may include terms like 'Eklavya' 'Lok Jumbish' etc. (these are terms associated with elementary education projects undertaken by NGOs).

(i) Research Design

A research design is not just a work plan but a detail of what has to be done in order complete the project. You can say that research design deals with a logical problem and not a logistical problem. In this section, you must include brief description about the following:

- Type of study

- Population and the sample for the study

- Tools to be used

- Analysis Plan

- Delimitation of the study

Let us now go through each component in detail in the following section.

(i) Types of Research

You may be aware of different types of educational research such as descriptive research, experimental research, qualitative research, historical research and philosophical research. In this section, you will specify the method of research to be adopted by you for the proposed study. The method or type of research will specify the nature of the data and its treatment. For example, in historical and philosophical researches, the nature of data and their treatment are different from experimental and descriptive types of researches.

Also, selection of sampling design and data gathering tools (s) mostly depends upon the nature of the study which a researcher has chosen for research.

Following are the major types of the research studies:

- Historical Study

It aims to discover, describe and interpret what existed in the past. Suppose you have selected a problem in which your objective is to "study enrolment trends among various categories of students in a particular programme offered by IGNOU from 1995 – 2000." In this type of study, your focus is on the enrolment of various categories of students during the past years for which you would identify the documents and records for scrutiny and analysis. For collecting various data, you would use primary and secondary sources. After the data have been identified, the data pertaining to past goes through rigorous evaluation, which is known as **criticism of the data**. It involves the dual processes of establishing the authenticity of the source **(external criticism)** and of establishing the validity of its content **(internal criticism).**

- Descriptive Study

These types of the study aims to obtain pertinent and precise information concerning the current status of phenomena and, whenever possible, to draw general conclusions from the facts discovered. It is restricted not only to fact finding but may often result in the formulation of important principles of knowledge and solution of significant problems concerning local, state, national and international issues. Descriptive studies are more than interpretation. These studies collect and provide three types of information:

✓   of what exists with respect to variables or conditions in a situation;

✓ of what we want by identifying standards or norms with which to compare the present conditions or what experts consider to be desirable; and

✓ of how to achieve goals by exploring possible ways and means on the basis of the experience of others or the opinion of experts.

Descriptive studies are classified in various types. Some are classified on the purposes they achieve; some on the basis of geographical area they cover; and some on the basis of the techniques they employ. There are various types of descriptive research , the principle types are as follows:

● *Comparative*

Aims to measure the behavior of acriterion variable at a single point in timein order to draw conclusions about similarities or differences between the classification variables (i.e., between thepopulations).

● *Correlational*

Aims to measure the degree to which a predictor and predicted variable areassociated/related, i.e., the degree towhich changes in the predictorcorrespond to changes in the predicted.

● *Developmental*

Aims to measure changes over time(trends) in the criterion variable (e.g., due to ageing, maturation, recovery, learning, etc.).It is of two types:

✓ Longitudinal: Studies one group of subjects over a prolonged period of time.

✓ Cross-sectional: Studies two or more groups of subjects, each of which is at a different, progressive level (i.e., age, stage of recovery or learning, etc.).

Survey: This type of study is intended to find out the present status, it can be further divided into: descriptive Normative, evaluative and comparative survey.

Qualitative: It includes Case study and ethnography.

Surveys are studies of a generalized statistical nature rather than in depth studies of individuals on their characteristics about their present status. It involves the clear definition of the problem, systematic collection of data, careful analysis and interpretation and reporting of the findings. Surveys include topics such as a teacher opinions/ attitudes on various educational matters, pupil drop- out rates, etc. Data is collected through the use of questionnaires, interviews, standardized tests and other techniques and this method has been widely used in educational research for many years.

It may be noted that case study method of research also falls in the category of descriptive research studies. A typical case study is an intensive investigation of a social unit. The case study is essentially a research in depth rather than breath. It is not applicable to a very large sample. However it can be employed in studying a small group of individual or a unit. The social unit may be an individual, a family, an educational institution, a group of delinquent slow learners, a gifted student, or any teenage group.

Development studies are not only concerned with the description of the current state of affairs and the phenomena/ situation in a given point but in this type of study, recorded data are utilized with a view to determining what has happened in the past, what the present situation

reveals, and what will be likely to happen in the future. However, as PGDEMA students you are leas likely to make use of this type of research since this is mostly longitudinal in nature involving longer spans of time.
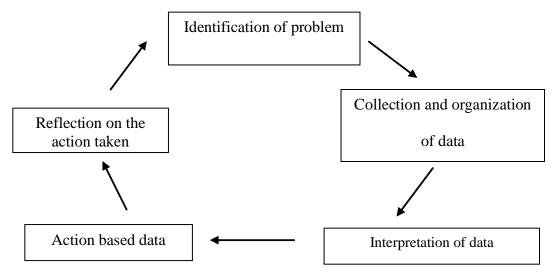
Ethnographic studies have defined as 'an in- depth analytical description of an intact cultural scene' Korg and Gall (1983). The main aim of ethnographic research is to discover and describe the culture in an education in the natural setting without manipulating the variables. It involves participant observation, description concerns with process and meaning and inductive analysis. Apart from its limitations, like demands on time and lack of generalizations, this approach has some unique benefits.

In case, you are interested in a topic related to curriculum evaluation, you could, problematize it thus, 'The effectiveness of teaching materials in achieving the desired outcomes'. The two types of evaluation studies are **formative** and **summative.** Formative studies gather information about programme whilst they are in progress, summative evaluation is designed to measure the effectiveness of a programme on its completion by analyzing data collected using a variety of instruments including standardized tests.

● Action Research

is aimed to help learners, teachers, and others to 'provide' a way of working which takes theory and practices into one whole: **ideas – in – action.** In its approach, action research shares with other approaches the need for careful systematic planning and the selection of methods, appropriate to the nature of the information required. In the field of education, action research has been employed in curriculum, professional and policy development, as well institutional improvement. It has certain essential features: testing ideas in practise as a means of increasing knowledge about curriculum, teaching and learning. The desired outcome is an improvement in the teaching/learning situation.

Action research is *not* a library project where we learn more about a topic that interests us. It is *not* problem solving in the sense of trying to find out what is wrong, but rather a quest for knowledge about how to improve. Action research is *not* about doing research on or about people, or finding all available information on a topic looking for the correct answers. It involves people working to improve their skills, techniques, and strategies. Action research is *not* about learning why we do certain things, but rather how we can do things better. It is about how we can change our instruction to impact students.

Action Research Cycle

- **Experimental Study**

The aim of the experimental research is to investigate the possible cause- and-effect relationship by manipulating one independent variable to influence the other variable(s) in the experimental group, and by controlling the other relevant variables, and measuring the effects of the manipulation by some statistical means. By manipulating the independent variable, the researcher can see if the treatment makes a difference on the subjects.

In educational research, the most frequently studied dependent variables are achievement, motivation, attention, interest in learning, participation and attitudes. The common independent variables that are manipulated are teaching methods, types of assignments, types of teaching materials such as text books and visual aids, types of rewards, types of questions used by the teacher, and evaluation techniques.

These are four essential characteristics of experimental research which are as follows:

- **Control Group:** It is a group on which no treatment is given.

- **Experimental Group:** It is group on which the treatment is given.

- **Randomisation**: The subjects are allotted to the control and the experimental groups randomly.

- **Manipulation:** It involves deliberate operation of the conditions by the researcher. In the process of manipulation, a predetermined set of varied conditions are imposed on the **independent variable**, the **experimental variable**, or the **treatment variable**.

Despite the objectivity and caution of the researcher in controlling the extraneous variables through the method of randomization or other methods, some discrepancies invariably remain and influence the results of the experiment. The researcher can take care of such discrepancies through the replication of the study.

There are three basic experimental designs, each containing subsets with specific strengths and weaknesses. These three basic designs include: pre-experimental design; quasi-experimental design; and true experimental design.

If random assignment is used, we call the design a **randomized experiment** or **true experiment**. If random assignment is not used, then we have to ask a second question: Does the design use *either* multiple groups or multiple waves of measurement? If the answer is yes, we would label it a **quasi-experimental design**. If no, we would call it a **pre-experimental design**.

We will discuss the Quasi-Experimental Design in details as they are used more in the education research:

- **Pretest Post-test Non-equivalent Group**: With this design, both a control group and an experimental group is compared, however, the groups are chosen and assigned out of convenience rather than through randomization. This might be the method of choice for our study on work experience as it would be difficult to choose students in a college setting at random and place them in specific groups and classes. We might ask students to participate in a one-semester work experience program. We would then measure all of the students' grades prior to the start of the program and then again after the program. Those students who participated would be our treatment group; those who did not would be our control group.

- **Time Series Designs**: Time series designs refer to the pretesting and posttesting of one group of subjects at different intervals. The purpose might be to determine long term effect of treatment and therefore the number of pre- and posttests can vary from one each to many. Sometimes there is an interruption between tests in order to assess the strength of treatment over an extended time period. When such a design is employed, the posttest is referred to as follow-up.

- **Non-equivalent Before-After Design**: This design is used when we want to compare two groups that are likely to be different even before the study begins. In other words, if we want to see how a new treatment affects people with different psychological disorders, the disorders themselves would create two or more nonequivalent groups. Once again, the number of pretests and posttests can vary from one each to many.

The obvious concern with all of the quasi-experimental designs results from the method of choosing subjects to participate in the experiment. While we could compare grades and determine if there was a difference between the two groups before and after the study, we could not state that this difference is related to the work experience itself or some other confounding variable. It is certainly possible that those who volunteered for the study were inherently different in terms of motivation from those who did not participate. Whenever subjects are chosen for groups based on convenience rather than randomization, the reason for inclusion in the study itself confounds our results.

Pretest Posttest Nonequivalent Groups
$$O_1 \quad X \quad O_2$$
$$O_1 \quad X \quad O_2$$

Time Series Designs
$$O_1 \quad O_1 \quad X \quad O_2 \quad O_2$$

Nonequivalent Before-After Design
$$O_1 \quad O_1 \quad X \quad O_2 \quad O_2$$
$$O_1 \quad O_1 \quad X \quad O_2 \quad O_2$$

Key:
X = Treatment
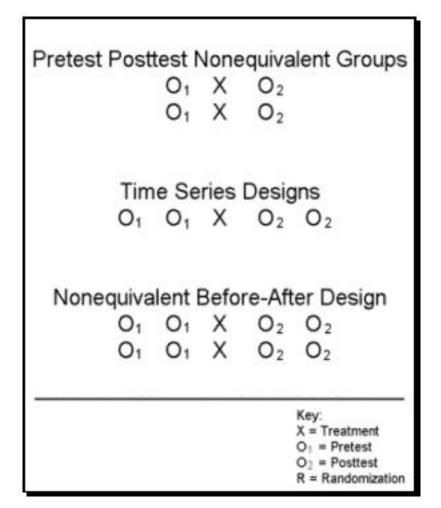O_1 = Pretest
O_2 = Posttest
R = Randomization

Table 2: Diagram of Quasi Experimental Designs

In conclusion, the selection of a method and the specific research design with in that method appropriate in investigating a research problem will depend upon the kind of data that the problem will require. However, the method and procedure selected should be in harmony with the scientific principle and adequate enough to lead to dependable generalisations.

(ii) Population and Sample of the Study

From the statistical point of view, universe refers to the total number of items/units in the field of inquiry whereas population means the total number of items from where the information is needed.

But for carrying out the research, you have to select a sample, which is a representative of the population by using the sampling techniques. There are two major types of sampling techniques i.e. probability and non- probability, we will discuss later about them in detail these are techniques. In this section, the researcher will describe the population from which he/she will draw the sample and the procedure followed in drawing the sample. Also, about the size and structure of the sample justification for choosing a sample.

(iii) Tool and Techniques of Data Collection

Research tools (also called instrument) are used for the collection of data or for measurement of variables. It can either be prepared by you or you can take standardised tools. In this section, the researcher will describe the various tools, which are to be used for collection of data. In case, when you are constructing the tool yourself, the procedure followed for development of tools should be also described in brief. You must also provide information regarding the validity, reliability and norms etc. of the tools to be used for the research. We will discuss in detail about the various types of tools in the later part of the handbook.

(iv) Method of Data Analysis

Here, the researcher should indicate in brief the procedure to the followed in analysis of the data. You can adopt any kind of analysis technique i.e. depending upon the nature of data. In your, research proposal you must describe the technique used. Also, must clarify the purpose a particular technique to be used. The selection of the technique and its use should be justified in terms of objectives of the study. In case of historical research, it is necessary to throw light on the methods of internal and external criticism that are to be addressed to in the analysis of historical data. In document studies, mode of content analysis should be explained in the research proposal.

(j) Delimitations

Due to the constraint of time, resources etc., you have to put the boundaries to your research in respect of:

● the scope of the study by specifying the areas to which the conclusions will be confined; and

● the procedural treatment including the sampling procedures, the techniques of data collection and analysis, the development of measuring tools and their use in the study.

(k) Bibliography

The research proposal should include a list of books, journals and other documents that have been used in identifying and selecting the problem and which may be used during the tenure of project work. You must use APA style of referencing while preparing the bibliography.

(l) Time Schedule

For completing the project work, you should also prepare a realistic time schedule keeping in view other requirements of the PGDEMA and your own personal commitments. Dividing the project work into phases and assigning dates for completion of each phase will help you to use your time systematically.

7. CARRYING OUT THE DISSERTATION WORK

After finalizing the research proposal, the next step is to undertake the research study and to write a research report in the form of a project report. This involves collection of evidences, analysis and interpretation of evidences, and validation of the objectives or verification of hypotheses, formulation of conclusions and generalizations. In order to collect the required data or evidences, you have to sample the population concerned. Since, it is not possible to take the entire population for the study, you have to select representative units from the population in the form of a sample, and we will briefly discuss them as below.

(a) Sampling

It has been earlier explained that a sample is a small group of unit to be selected from a population under study. After studying the characteristics of the sample, one can make certain inferences about the characteristics of the population from which it is drawn. A population is any group of individuals or units that have one or more characteristics in common which are of interest to the researcher, for a particular research. You can select a sample, with the help of sampling methods which are of two types i.e. probability and non-probability sampling methods.

(i) Probability Sampling Method

In this type of sampling, the units of the population are not selected at the discretion of the researcher, but by means of certain procedures which ensure that every unit of population has fixed probability of being included or rejected as the sample. It is also called random sampling method. Different types of probability sampling methods are as follows:

● *Simple Random Sampling*

In this sampling method, each unit of the population is given an equal chance of being selected or rejected. You may use lottery method to draw out a sample or take the help of random numbers table for selecting a sample. Simple random sampling is neither possible nor feasible if lists of units are not available or incomplete. You can also use computer to simple random sampling.

● *Stratified Random Sampling*

When the population is heterogeneous, you need to divide the population into different strata on the basis of some characteristics, and from each of the smaller homogenous strata or groups you may draw randomly a pre-determined number of units. Let us understand how stratified random sampling is carried out.

Suppose, if you intend to study management styles of different types of schools in a particular city. Then you may have categorize population of students in different types of schools as presented in following Table

Types	Total number of students	Number of students in sample (25%)
Government Schools	100	25
Government Aided Schools	100	25
Private Schools	100	25
	N =300	Ns = 75

Table 3: Distribution of Students according to different types of schools

It is evident from the above that there are three groups of different types of schools has a population of 300 (Np = Number of students in the population). Suppose, we may decide to select 25 per cent of each group (stratum) in the sample. As a result, from the stratum of government schools, we get 25, from government aided school 25 and from private schools 25. Thus, the total number of students in the sample comes to 75 which is Ns = Number of students in the sample.

While selecting a particular number of schools from each stratum, the method of simple random procedure needs to be adopted. If you have more than one variable, you may go for further stratification of the population.

It provides more accurate results than simple random sampling and is particularly useful when the lists of units or members in the population are available in various strata. It is also useful in survey-based research studies.

● *Systematic Sampling*

In systematic sampling method, the units of population in the sample are selected from a list made in alphabetic or some other order. In order to select the sample, you select a unit at random and this becomes number k. Thereafter, every k^{th} subsequent number is selected. In order to find the number k, you can use the following statistic in which the total of the wider population being represented is divided by the sample size required (Cohen, et. al. 2000).

f = N/Sn

Where f = the frequent interval

N = the total number of the wider population

Sn = the required number in the sample.

For example, you want to study the leadership style of 200 secondary School Principals and decide to have a sample of 40 Principals. You can get the k number by dividing 200/40, which comes to 5. Then you can choose every 5th number from the list of 200 principals for selecting the sample. This method is convenient, simple and less time consuming than simple random sampling.

● *Multi-Stage Sampling*

When the sample is collected from a large units of population spread across a large geographical area, you may opt for multi-stage sampling. In this method, sampling is done at different stages, which you define as per the objectives of the study. Each stage of sampling has some definite purpose. For example, you are interested to study the reactions of distance learners towards the management of student support from students enrolled in different academic

programmes of Indira Gandhi National Open University in your State. At the first stage, suppose you may select 10 study centres located in different parts of state on random basis so as to represent different parts of the State. In the second stage, you can select five academic programmes out of the programmes activated at the study centres. In the third stage, you may select randomly 20 students out of all the students enrolled in these programmes. In this way, the final sample of students can come to 10 study centres X 5 programmes X 20 students = 1,000 students. Thus, 1,000 students will be constitute the sample for the study.

We have been till now discussing probability sampling and its various types. Now, we shall discuss non-probability sampling, its types and various situations where non-probability sampling methods are employed.

(ii) Non – Probability Sampling

● *Incidental Sampling*

Incidental sampling is also called convenient sampling where select units of the population which are incidentally or conveniently available. Suppose, you want to study the reactions of students towards the introduction of a new subject in secondary schools. You may go on interviewing students in schools that are easily available to you to arrive at the required sample size. Since, the sample is not drawn from the population on a representative basis, generalization is not possible.

● *Quota Sampling*

Quota sampling method is somewhat more or less similar to the stratified random sampling method. But the difference is that the randomization process is not followed in quota sampling, as is in the case of stratified random sampling method. In quota sampling, you try to represent the strata (characteristics) in proportion to their presence in the population. For example, if the population of 1,000 comprises 60 per cent boys and 40 per cent girls, then in the sample there should be 60 per cent boys and 40 per cent girls. If the sample selected is 100, then there would 60 boys and 40 girls in the sample.

Since the selection of the sample is done according to a fixed quota for different characteristics of the population, the sample is known as quota sampling. Sometimes, if there are too many characteristics of population, it is difficult to fix up quota for each characteristic. Hence, it is advisable to choose a few characteristics and accordingly decide about the sampling.

● *Purposive Sampling*

Purposive sampling method is based on your discretion, judgement or rationality to choose the sample. However, you judgement is based on you experience or understanding of the population. The purpose here is very specific to the objectives of the research. Suppose, you want to select 100 B.Ed. teacher trainees of IGNOU to study as to how they learn from the self-learning material provided to them. In this case, you may visit a programme centre and take B.Ed. teacher trainees enrolled under that programme centre for the sample. The problem in this type of sampling is that it fails to represent the wider population. Hence, you need to take care to report the findings of the study carefully.

● *Snowball Sampling*

Sometimes, you may find it difficult to access the sample because of the very nature of the members of population. In this case, you first select a few members of the population whom

you access, then uses them to identify and select another group of members who identify the third group of members. The process goes on till you arrive at the required size of sample. Therefore, this sampling method is called snowball sampling. This sampling method, for example, can be used when you want to study behaviour of those students who are addicted to drugs. Similarly, when it is difficult to trace the members of population due to lack of proper communication networks, the researcher may use snow ball sampling method.

(b) Data Gathering Tools

From the sample selected, you have to get the desired data for the research, for which you need data gathering tools and techniques. Each tool or technique has to be appropriate for the collection of certain type of evidence or information. You can either select the standardised available tools or you may develop your own tool, where the existing research tools do not meet your purpose.

As a researcher, you should familiarize yourself with the nature, merits and limitations of the existing tools and should also develop skills in the construction of the research tools. The major data-gathering tools of research may be classified broadly as: (i) psychological tests, (ii) inquiry forms, (iii) observation, (iv) interview, and (v) sociometric techniques.

(i) Psychological tests

These are among the most useful tools of research. They have to be devised to evaluate or measure behaviour in a standardized way for the purpose of selection, classification, prediction and guidance as well as the evaluation of educational programmes. Tests are used to measure intelligence, aptitudes, creativity, achievement, personality traits, interests and values.

(ii) Observation

It is a technique in which one or more persons observe the real-life situation and then classifies and records pertinent happenings according to some planned scheme. It is used to evaluate the overt behaviour of individuals in controlled and uncontrolled situations. This technique has occupied an important place in descriptive studies of qualitative nature.

Observation may be either participant or non-participant. In participant observation, the observer (researcher) becomes more or less a member of the group under observation. He/she may play any one of several roles in observation, with varying degrees of participation, as a visiting stranger, an attentive listener, an eager learner, or a more complete role as participant observer. In the non-participant observation, the observer (researcher) takes a position where her/his presence is not disturbing to the group. She/he may follow in detail the behaviour of one individual or may describe one or two behaviour characteristics of a dozen or more individuals.

Observation may also be classified as structured or unstructured. The structured observations are much too formal and they are designed to provide systematic description for testing causal hypotheses under controlled conditions. Interaction analysis of the classroom verbal behaviour of a teacher is an example of structured observation. In unstructured observation, the observer does not categorize the behaviour in advance for observation i.e. there is no fixed time limit. In the following table 4, a checklist of what you as an observer in the research process is expected to do is presented.

Decide exactly what you need to know.	List all topics/aspects for which information is required.
Consider why you need this information.	Examine your list and remove any item that is not directly associated with the task.
Is observation the best way of obtaining the information you need?	Consider alternatives.
Decide which aspects you need to investigate.	Are you particularly interested in content, process, interaction, intervention – or something else?
Request permission.	Clear official channels examples and adapt where necessary.
Devise a suitable grid, checklist or chart.	Consult published examples and adapt wherever necessary. Is it likely to produce anything of interest? Will the data be sufficiently complete to enable you to come to any conclusion?
Pilot your method and revise, if necessary.	Memorize categories. Devise your own system of shorthand (symbols, letters, etc.). Practice recording until you are confident you can cope.
Prepare carefully before the observation.	Draw a plan of the room, indicating seating arrangements and layout. Make sure you have enough copies of grids or checklists. Consult minutes of previous meetings, agenda, scheme of work, etc.
Discuss where you will sit with whoever is in charge and with people who are to be observed.	You should try to be as unobtrusive as possible. Exactly where you sit will depend on your own preferences and the views of participants.
Remember that no grid, however sophisticated, will tell the full story.	Try to place the event in its organizational context.
Analyse and interpret the data.	Factual statements about what has been observed are only part of the task. Consider what the facts indicate or imply.
Don't forget to thank the people who have allowed you to observe.	You may need their help again!

Table 4: Checklist Observation Studies, Source: (Koul, 2003)

(iii) Interview

Interview is a technique of interaction with the subject or interviewee, where they provide the needed information verbally in a face-to-face situation. Interviews are classified as structured and unstructured. In a structured interview, standardised procedure is followed and the questions are presented in the same order to each subject. On the other hand, unstructured interview

provides greater flexibility. Although the series of questions to be asked and the procedure to be followed are decided upon before hand, the interviewer is largely free to arrange the form and timing of questions.

Interview technique is mostly used in descriptive and case study researches. The guidelines for conducting an interview is presented below:-.

1. **Kind and Context of interview.**

   What is the rationale for using interviews?

   What kind of interview is it?

   How is the interview structured?

   How much flexibility does the interviewer have?

   What is the length, location and occasion of the interview?

2. **Characteristics of the interview participants**

   a) Interviewees

   Who and how many people are involved?

   What is the basis for their selection and how was the selection made?

   b) Interviewers

   Who and how many people are involved?

   What experience of interviewing do they have?

   What is their relationship to the main research?

   What is their status and relationship to the interviewees?

3. **The purpose of the interview**

   What are interviewees told about the purpose of the interview?

   Is this understanding shared with the interviewer?

   Who will have access to the data collected and is it negotiable?

4. **The method(s) of data collection**

   How strictly controlled is the method of asking questions?

   How are responses recorded?

   What other methods of data collection are being used and what is the relative weighting between the methods?

5. **Analysis and reporting of data**

   Who analyses what?

   How are the interviewers concerned with the analysis?

   How many analysts are there and how are disagreements resolved?

   Are full transcripts used?

   What basis is used for filtering the data?

   What level of uncodeable data is tolerated?

   Sorting of results

   How are the outcomes of the interviews being evaluated?

   What access may the academic community have to raw data?

Table 5 : Guidelines for conducting an interview, Source: (Koul, 2003)

(iv) Questionnaire

Questionnaire is the widely used tool of research to collect data/ information regarding any events, phenomenon, practices, or attitudes about an individual or a group of individual through a series of questions pertaining to the particular problem being investigated. A questionnaire is either administered personally to a group of individuals or sent by mail to the respondents located at different places. Before administration, the purpose of the questionnaire must explained to the respondents and directions must be given about how to respond to the questions.

You can ask two types questions either closed-ended questions or open-ended questions. The 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, circle around the alternative in a scale, etc.

Examples of closed-ended questions

i)   Do you have a valid passport?   Yes/No

ii) Please indicate your religion by ticking the appropriate alternative.

     a)   Hinduism   (   )

     b)   Islam   (   )

     c)   Christianity   (   )

     d)   Sikhism   (   )

     e)   Buddhism   (   )

     f)   Jainism   (   )

iii) Below is a statement followed by five options. Put a tick mark on the option you choose.

     Open and Distance Learning System (ODLS) would cater to the increasing demand for education in the future.

     Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree.

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

Examples of open ended questions

i)   Should teachers' performance be evaluated by their students? Substantiate your answer.

     ....

     ....

     ....

     ....

     ....

Construction of a Questionnaire

A questionnaire needs to be constructed very carefully. A good questionnaire must reflect the objectives of the research problem through specific questions contained in it. Each question must communicate to the respondents its objective so that analysis and interpretation of responses made properly. Moreover, the covering letter of the questionnaire should indicate the purposes of the research study.

The following principles given by Best (1977, pp. 160-162) may be considered to make questions precise:-.

- Properly define terms that otherwise could easily be misinterpreted. For example, "What work did you do in the year 2005?" This question is subject to various interpretations. Hence needs precision in its statement.

- Be careful in using adjectives and adverbs that have no agreed upon meaning. Words like 'rarely','occasionally','scarcely','hardly' may be interpreted differently; hence should be carefully used.

- Beware of double negative. The Distance Education Council should not fund the institutions that do not meet its requirements. This statement may be stated as: The Distance Education Council should fund only those institutions, which fulfill its requirements/conditions.

- Avoid the double-barreled questions. Break it into questions. For example, the question 'Do you agree that distance education is cost-effective and promote democratization of education?' can be split in to two separate questions.

- Be careful of inadequate alternatives. For example, the question 'Are you employed? Yes/No', does not specify the nature of employment to the respondents.

- Underline a word if you wish to indicate special emphasis.

- When asking for rating or comparisons a point of reference is necessary. For example, 'The temperature of place 'A' is (hot, warm or cool)' needs to have a point of reference like 'in comparison to place B.

- Phrase questions so that they are appropriate for all respondents. For example "How many academic counselling sessions for a course do you attend in a month?" may not be appropriate for all distance learners as there is provision of intensive counselling sessions in many cases.

- Design questions that will give a complete response. The question "Do you watch television?" does not reveal the TV viewing habit of respondents.

- Provide for the systematic qualification of responses. For example, number of alternatives to a question may be ranked and given some numerical weightage in a systematic manner. For example in the case of a 3 point scale A may be 3 pt, B may be 2 pt, and C may be 1 pt. based on the type of questions asked.

- A question must correspond to the background information of the respondents.

Characteristics of a Good Questionnaire

- A question needs to be framed in such a way that they are socially accepted by the respondents. They do not feel offended by it.

- Leading questions are to be avoided. For example, "Do you agree that teachers should be consulted in formulation of University's policies?" would always invite positive response from the respondents. Therefore, the questions should be framed without providing any suggestions.

- The questions should be restricted to a single idea or to a single reference. They should be so arranged that they permit the idea of the respondents to flow logically. This is a procedure of asking the most general questions first and following it with successively more specific and restricted questions. This procedure helps the respondent to organize his own thinking and motivate him to respond logically.

- A questionnaire should contain either closed type of questions, or open type of questions or both.

- A questionnaire should not be too long lest respondents should feel bored to respond.

- Once the questionnaire is drafted, it should to be given to a few experts for their comments. After receiving the comments, the draft should be revised in their light.

It has a limitation that it cannot be administered to illiterates and younger children. You might also face the problem of poor response in the case of mailed questionnaire and sometimes, the respondents may not express what they really intend to communicate.

(iv) Sociometric Techniques

In research, this technique can be used to study social adjustments, group dynamics, learning motivation discipline, and other problem areas that involve social relations. There are various types of sociometric techniques which can be used to measure social interaction within groups, but sociogram sociomatric matrices, guess how technique and social distance scale are mostly used in educational research.

(vi) Checklist

 Through checklist you can assess the knowledge of the respondents regarding the presence or absence of certain defined characteristics in an object, a phenomenon or a process. You have to 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.

Construction of a Checklist

First you have to decide about the type of information required for the investigation and then prepare the items regarding the information to be collected. These items may be arranged in a logical or psychological order. Generally, checklist items are framed in the following ways:

- Items may be put in question form followed by 'Yes' 'No' answers. The respondents are expected to encircle or underline the answers. For example:

  Does the school have a science laboratory?   Yes/No

- Item may be in the form of statements. The respondents are asked to put a (✓) tick or (×) cross depending upon the presence or absence of the phenomenon under study. For example:

The school has a well-established computer laboratory. ($\checkmark$)

- Items are developed in the form of a sentence. The respondents are required to chose, underline or encircle the appropriate words.

The Parent Teacher Meetings (PTA) are held in the school.

a) Fortnightly, b) Monthly, c) Bi-monthly, d) Irregularly.

After construction of a checklist, it is tried out on a small sample to assess its feasibility in the field.

(vii) Attitude Scale

An attitude scale is designed to measure the attitude or belief of an individual towards an object, event, or a phenomenon. Thurstone (1929) defines an attitude as the degree of positive or negative effect associated with some psychological objects. By a psychological object, he means any institution, ideas, symbol, phrase, job etc. Attitude of an individual is basically his reaction to an object, situation or proposition in favourable or unfavourable ways. Attitude scale is always in the form of a continuum which ranges from favourablesness through neutral to unfavourableness. An attitude scale consists of a set of statements about the particular psychological object. While writing statements for an attitude scale, the following criteria as listed by Edwards (1957) need to be taken into consideration:-

- Avoid statements that refer to the past rather than to the present.

- Avoid statements that are factual or capable of being interpreted as factual.

- Avoid statements that may be interpreted in more that one way.

- Avoid statements that are irrelevant to the psychological object.

- Avoid statements that are likely to be endorsed by almost every one or almost no one.

- Keep the language of the statements simple, clear and direct.

- Statement should be short and should contain only one complete thought.

- Statement with universals such as all, always, name should be avoided.

- Statement should be in the form of simple sentences.

- Avoid the use of double negatives.

There are two types of attitude scale, which are commonly used for assessing attitudes. These are the method of Equal-Appearing Intervals devised by Thurstone and Chave (1929) and the method of Summated Ratings devised by Likert (1932). Let us discuss the latter one in detail.

The Method of Summated Ratings

The method of summated ratings is a convenient and simple method of measuring attitudes of people towards any psychological object. It was introduced by Likert (1932) and hence is popularly known as Likert scale. It is a popular tool for opinion research. The respondents are asked to respond to each item in the scale on a five-point scale, which has categories as Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), and Strongly Disagree (SD).

Construction of Scale

- A large number of statements with favourable and unfavourable opinions towards the psychological objects are written. For example, in preparing an attitude scale to measure students' attitude towards the use of computers in the teaching-learning process, items such as the following may be written:

  - Computers help in the teaching-learning process.

  - Use of computers in the teaching-learning process consumes a lot of instructional time.

- The number of favourable and unfavourable statements in the scale needs to be equal. All the statements are edited. In the beginning of the scale, clear directions are given regarding how to mark their answers, namely, by putting a mark or by putting a circle around the answer.

- Scoring weights of 5,4,3,2 and 1 are used for SA, A, U, D, and SD for the statements with favourable opinion and the scoring weights of 1,2,3,4, and 5 are used for SD, D, U, A and SA for the statements with unfavourable opinion. An individual score on a particular attitude scale is the sum total of these ratings on all items.

- Once the draft is ready, it is administered to a sample of at least 200 subjects selected from the population of the study. Scoring of the items is done as per the scoring weights decided for different items.

- The final selection of the items for the scale are made on the basis of their t-values. For this, item-wise analysis of the responses is carried out. On the basis of the total scores obtained by the respondents, the upper 25 percent obtaining the highest scores and the lower 25 percent obtaining the lowest score are taken. The value of 't' is found out based on the responses of upper and lower group to the individual statement. Finally, 20 to 25 statements with the largest t-values (t > 1.75) are selected for the find draft of the attitude scale.

- The reliability of Likert type attitude scale is computed by the split-half method. The validity of the scale is decided by comparing it with other similar standardised scales.

8.   TEST DEVELOPMENT

You can either adopt a test already developed or stanadardised or you can develop a test on your own. In case, you plan to develop a test you need to follow certain steps which are as follows:-

a)   Planning

b)   Preparation of preliminary draft

c)   Tryout of the test

d)   Final draft

Let us discuss each step in detail.

(a)   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 attitude towards certain phenomena, or objects or individuals,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.

(b) Preparation of Preliminary Draft

After having obtained a fair idea of the different aspects of the test, you prepare a preliminary draft. You write test items as per the test specifications. Although you are required to create new test items for the test, yet it is advisable that you consult the existing tests in the concerned area. This helps you to create similar kind of items. You must develop double the number of items as are required for the final draft. While developing test items, you 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 respondents, directions for responding to the items, etc. The preliminary draft is then referred to experts for their opinions and comments. Based on the experts' opinions, the test items can be modified. At this stage, the test can be administered to a group of subjects to find out the correctness of answers. It is called 'small group try out' of the test. With its feedback, the test items, if required, may be again modified accordingly. After the necessary modification, the test is ready for final 'try out'. Then the preliminary draft is duplicated for try out on a large sample.

(c) Tryout of the Test

The preliminary draft is administered to a large random sample of the population for which test is developed. You can try out the test on the sample of 30 subjects. Through this try out you can find out the whether there is problem at the understanding level of the items prepared, about the language of the test etc.

(h) Development of Final Draft

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. Let us discuss how validity and reliability of the test are ensured.

Whether you develop a test or plan to select a test from the available tests, you should ensure that the test selected or developed must fulfill the following characteristics. These characteristics are validity, reliability, usability and objectivity. Let us discuss each of them briefly.

● Validity

Gronlund (1981), referred it to the extent to which the results of an evaluation procedure serve the particular uses for which they are intended. For example, a test of attitude towards science

ought to evaluate the childrens' attitude towards science. The validity of test may be low or high which depends upon the result of the test. The following different types of validity:

Content Validity

Content validity of test refers to the proper representation of contents (learning tasks) in the test. Content validity of test is ensured by subjecting the test to the judgment of several subject experts.

Criterion-related Validity

When the test developer intends to predict the future performance of the test takers or evaluate their current performance in a test against some criterion, it is presumed that he/she is concerned with criterion-related validity.

Concurrent validity

It is concerned with correlating the results of a new test with the results of a currently available standardized test, which measures the same traits as intended in the new test. For example, a test developer develops a test of creativity and correlates the results of his/her test with the results of Torrance Test of Creativity and finds out the correlation coefficient to establish the validity of his/her test. A significant positive correlation between the two tests is an indicator of concurrent validity of the test.

Construct Validity

When the objective is to measure certain psychological constructs, the test maker must ensure construct validity of the test. Construct validity is established through a long continued experimentation based on imagination, reasoning and observation. Even the results of test can be compared with like and unlike tests. For example, the results of an attitude test can be compared with the results of another attitude tests (like test) as well as with the results of an intelligence test (unlike test).

The validity of test is always reported in terms of validity coefficient and it is recommend that a test ought to have a validity coefficient of at least + 0.70 (Lovell and Lawson 1973). But many tests with lower coefficients can be used in the absence of better ones if they measure something for which no other test has been constructed.

● **Reliability**

Cohen et al (2000) defines reliability as a synonym for consistency and reliability over time, over instruments and over group of students. Thus, reliability refers to consistency of measurement from one testing situation to another. For example, a teacher of class IX has developed an achievement test in mathematics, which is administered to students. After six months, she/he administers the same test again to them. If the test results in two situations match with each other, the test seems to have reliability. Reliability of a test is estimated through following four methods:

Test-Retest Method

This is the method in which the same test is re-administered after a gap of time. The time gap given in between the two administration of the test determines whether the reliability of test results is overestimated or underestimated. If the time gap given is too short, immediate memory, practice and the familiarity of the test may overestimate the reliability of the test.

Similarly, if the time gap is too long, maturation of the test takers may under-estimate the reliability of the test. In order to overcome the shortcoming of test-retest method, the test developer may prefer other methods of estimating reliability.

Equivalent or Parallel Forms Method

In this method, two equivalent or parallel forms of the test are prepared and both forms of the test are administered to the same group of students. The results obtained from the administration of both the forms are taken to estimate the reliability of the test.

Split-Half Method

You, as a test developer, can estimate the reliability of test from a single administration by dividing into equal halves on the basis of odd and even numbered items. The results obtained from both the halves are correlated to estimate the reliability of half test. Spearman-Brown formula given below is applied to estimate the reliability of the full test.

$$\text{Reliability on full test} = \frac{2 \times \text{Reliability on ½ test}}{1 \times \text{Reliability on ½ test}}$$

Suppose the reliability of the half test is 0.60, the reliability of the full test is:

$$\frac{2 \times .60}{1 + .60} = \frac{1.20}{1.60} = .75$$

Rational-Equivalence Method

The rational equivalence method is used to find out a measure of internal consistency. Reliability is estimated from a single administration of a single form of test with the help of formula given by Kuder-Richardson known as Kuder-Richardson formulae 21. The formula mentioned in Gronlund (1981) is as follows:

$$\text{Reliability estimate (KR21)} = \frac{K}{K-1} \quad 1 - \frac{M(K-M)}{KS^2}$$

Where   K = The number of items in the test

       M = Mean (arithmetic average) of the test scores

       S = Standard deviation of the test scores

This formula is applicable for tests where one point is given for every correct answer and zero for a wrong answer.

Like validity coefficient, reliability of a test is reported in terms of reliability coefficient

9.   ANALYSIS AND INTERPRETATION OF DATA

Data collected from various sources or samples through the use of different tools and technique generally comprise numerical figures, descriptive narrations, responses to open-ended questions, quotations, field notes etc. In educational studies, usually two types of data are recognized i.e. quantitative and qualitative data.Quantitative data is a metric data which is obtained by using various scales or tests where as the qualitative data is a non-metric data is the detailed

description of observed behaviours, people, situations and events verbal or other symbolic materials.

We make use of various types of techniques in the analysis of quantitative and qualitative data.

Statistical techniques have contributed greatly in gathering, organizing, analyzing and interpreting quantitative (numerical) data. In the analysis of quantitative data with the help of statistical techniques, the researcher is required to understand the concepts involved in use and applications of these methods. Their strengths and limitations need to be understood so that there is no ambiguity in the use of these techniques. Quantitative data analysis techniques include the use and application of various descriptive statistical measures: (i) measures of central tendency or averages; (ii) measures of dispersion or variability; (iii) measures of relative position; and (iv) measures of relationship. Inferential or sampling statistics, with the help of various parametric and non-parametric tests, enable the researcher to make generalizations or inferences about populations from the observations or measures of the characteristics of samples. Z-test, t-test, analysis of variance and co-variance, regression analysis, chi-square test, median test and Mann-Whitney U Test are examples of some parametric and nonparametric tests which are widely used in the analysis of quantitative data.

Qualitative data in form of responses and narratives are analysed to study or discover inherent facts. These data are studied from as many angles as possible to explore new facts or to reinterpret already existing facts. Content analysis, inductive analysis and logical analysis are mostly used in the analysis of qualitative material.

Once the data have been analysed, you can proceed to the stage of interpreting the results. The process of interpretation is essentially one of stating what the results show. It is not a routine and mechanical process, but calls for a careful, logical and critical examination of the results obtained after analysis, keeping in view the limitations of the sample chosen, the tools selected and used in the study. There is always an element of subjectivity, which should be reduced to minimum by the researcher while interpreting the results.

Formulation of Conclusions and Generalizations

In the light of interpretations of the results, you as a researcher have to use all care and caution in formulating your conclusions and generalizations. This final step of the project work demands critical and logical thinking in summarizing the findings of the study and compare them with the objectives, research questions and hypothesis(es) formulated in the beginning. You should not draw conclusions which are inconsistent among themselves or with external realities. The generalizations drawn on the basis of research findings should be in agreement with facts and should not conflict with the known laws of nature. The implications of the conclusions for the education processes and practices may also be indicated here. The suggestions for the applications of research findings in practical settings and suggestions for problems for further research may also be provided with conclusions and generalisations.

10.   WRITING THE RESEARCH REPORT

After completing the research work as per the requirements of the research proposal, you are required to write the detailed account of the research work highlighting the statement of the problem, research objectives, hypothesis(es) of the study based on the review of the related literature, method and procedures used in respect of selection of sample groups, development and use of tools, collection of data, analysis and interpretation of data, conclusions with

educational implications and suggestions for further research in the area. The detailed account of all these aspects constitute a research report. There are certain rules and principles involved in writing a research report a dissertation which will be discussed in the present section.

- **General Format of the Research Report**

For the purposes of presentation of a dissertation report, several style manuals are available which provide us guidance as to the specific rules and on style and format to be followed in reporting the objectives, methods, procedures and findings of the research study. But all formats are somewhat similar to the following outline which comprises three main sections: (i) the preliminary section; (ii) the body of the report; and (iii) the reference section. Each main section consists of several sub-sections.

(a) Preliminary Section

(i) Title Page

Several parts of preliminary material are presented prior to the body of a research report. Generally, it contains the following information.

- Title of the Dissertation

- Name of the institution to which the dissertation is being submitted.

- Name of the Student (if desired, previous academic degree may be listed after name).

- Month and Year of submission of the dissertation.

(ii) Preface

The preface usually includes a brief statement of the purpose and scope of the dissertation report. It should also include thanks for those who provided you substantial guidance or help in the completion of the dissertation work. If you have little to say about the contribution of her/his research project, the preface can easily be omitted. In such situation, the page should be labeled **'Acknowledgement'** rather than 'preface'. Acknowledgement should be brief and simple. A long list of effusive acknowledgements full of flattery is not in a good taste. The brief statement of acknowledgements should sincerely recognize the persons and institutions to whom you are indebted to for providing academic guidance, administrative support and facilities.

(iii) Table of Contents

The table of contents includes the major divisions of the report; the introduction, the chapters with their sub-sections, the bibliography and the appendces, along with the page numbers. The preface or acknowledgements, list of tables and list of figures are also entered in the table of contents.

(b) Body of the Report

The main body of the report contains following logical divisions:

(i) The Introduction

The introduction of dissertation report should be lucid, complete and concise. It should introduce the research problem in proper context, and arouse and stimulate the reader's interest.

In the introduction section you define, analyse, state the nature of the problem with research objectives. You also review the related studies so as to provide a rationale for the formulation of hypothesis(es). The introduction also includes the significance of the problem and the need for undertaking the dissertation work. After reviewing the background of the problem, its scope and delimitations, you present the research questions, objectives of the study, the hypothesis (es), if required, assumptions and operational definitions of the terms used in the title of the study.

(ii) Design of the Study/Methodology of the Study

This section explains the design of the study in detail. It includes a detailed description about the research method which was used in the conduct of the study, the details about the nature of the population, the size of sample (s), the method of sampling, tools and techniques used for data collection, procedure of data collection, quantitative (statistical) and qualitative data analysis methods to be used and reasons for selecting such methods, and how data will be organized and presented for analysis and interpretation, are also provided in this section.

(iii) Analysis and Interpretation of the Data

This section is the heart of the research report. The data analysis and interpretation may either be presented in separate chapters or may be integrated and presented in one chapter. The data are presented in table and figures accompanied by textual discussion. Tables, which are complex and lengthy, should be placed in appendix, otherwise the continuity of textual discussion gets broken. In the textual discussion the report should not repeat all the detailed information that is provided in tables and figures. It should only point out important facts and relationship to give meaning to the data and make certain generalizations about the data. Any weakness or limitations in the study pertaining to the research design, tools, or population that have come to light during the completion of the project work should be reported frankly alongwith the manner in which factors may have affected the findings of the study.

(iv) Summary and Conclusions

This section includes a brief re-statement of the problem, objectives and hypotheses of the study, a description of the methodology of the study, and discussion of findings, conclusions of the study and suggestions for further research. The conclusions are presented concisely and related directly to the objectives of the study and hypotheses that were tested. As stated earlier they state whether the findings of the study accept or reject hypothesis(es). Conclusions are answers to the questions raised and suggest modifications in the existing knowledge. In addition, the researcher may list unanswered questions that have occurred in the process of study and which require further research beyond the scope of the problem investigated. The discussion and presentation of conclusions should leave the reader with the impression of completeness and of positive gain.

It should be noted that summary and conclusion section is the most widely used part of the research report because it reviews all the information that has been presented in its previous sections. Most readers scan this section of the report first to get an overview of the study and to determine its utility to them. If the study is of some utility to them, they go through the remaining chapters also.

(v) Reference Section

The reference section includes bibliography and appendices. The bibliography follows the main body of the report. It is a record of those sources and materials that have been used

for the study. If the number of references is large, the researcher may divide the bibliography into various sub-sections, one for books, one for periodicals and journals etc.

An appendix follows the bibliography. All the relevant supporting unwieldy materials, that are important but not essential to the understanding of the report, are presented in the appendix. These materials include copies of the tools like tests, questionnaires, interview schedule, courses of study, raw data etc.

11. STYLE OF REPORT WRITING

The presentation of the dissertation report should be creative, logical and concise making use of simple common words and sentence structure whenever possible. Its language should be formal and straightforward. The personal pronouns I, we, you, my, our and us should not be used. Their use should be avoided by the use of such expression as "the researcher" or "the investigator". The use of abbreviations, except some universally acceptable ones such as IQ, EQ, etc., should be avoided in the main text of the research report. In the footnotes, the tables and the bibliography, some standard abbreviations should be used to conserve space. A researcher should be familiar and should master the standard abbreviations, viz., et al, edn, eds, fig etc.

Numbers of less than three figures, round numbers and numbers that begin sentences are spelled out, except in statistical discussions in which they are used frequently. Fractions are also spelled out unless they are part of longer numbers. Figures are used for decimals and percentages, but word 'per cent' is spelled out e.g. 12 per cent.

To ensure continuity of the text, neither the standard statistical formulae nor the computations are included in the research report.

A good dictionary, a spelling guide and Roget's Thesaurus should be made use of by the researcher. The past tense should be used when referring to what the researcher or other researchers have done. The present tense should be used when the researcher is referring the reader to the tables and charts that are presented before him and when he is presenting general truths and well established principles.

12. WORD PROCESSING THE RESEARCH REPORT

The dissertation report should be typed by a professional a data entry operator. When the entire report is typed, you should proof read each page personally. If there are more than one or two corrections on a page, you are advised to retype the page. While retyping care should be taken to accommodate the material in such a way so that the last line on the page comes even. If no care is taken, you may have to retype the rest of the chapter and renumber the remaining pages of the dissertation. However, such problems can be overcome if you type your dissertation in the computer. Since, word processing on the computers is easily available, it is advised that you must type your report in the computer.

13. SUGGESTED READINGS AND REFERENCES

Are, D.; Lucy C. Jacobs, and Asgher Razavieh (1992) *Introduction to Research in Education*, New York: Holt, Rinehart and Winston, Inc.

Bell, John, (1993) *Doing Your Research Project* A Guide for First-Time Researchers in Education and Social Science Buckingham: Open University Press.

Borg, W. R. and Gall, M. D. (1979). *Education Research: An Introduction* (3rd ed.). London: Longman.

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Dash, N.K. (2007). Block 3 Data collection and analysis, C-6 *Methodology of Educational Research*, New Delhi: Indira Gandhi National Open University.

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Patton, M. Q. (1982) *Qualitative Evaluation Methods*, London : Sage Publications.

Guidelines for Project Work of PGDEMA Programme

- The student has to carry out research work on a problem from any of the compulsory courses or from the elective courses related to the programme.

- The student has to choose a guide from the approved list of guides and prepare the research proposal under his/her supervision. He/she has to get the research proposal approved by the guide.

- Research proposal along with the filled-in proforma given Appendix- VII should be submitted to the concerned Regional Director for approval.

- The Regional Director will send the proposal back to the students after getting it approved by experts.

- After completing the project work, the student will submit two copies of dissertation to the Regional Director of the Concerned Regional Centre for evaluation.

- After evaluation of project is completed, viva-voce will be conducted at the concerned Regional Centre.

Checklist for Submission of Project Report

- The dissertation should be typed or word-processed in double space, 12 fonts in A-4 size (29 × 20 cm) paper.

- The student should attach a copy of the approved project proposal while getting the copies bound.

- The cover and the first pages should have title of the study, name of the researcher, enrolment number, full address, name of the supervisor/guide etc. (please see specimen of cover page at Appendix-III).

- For fulfillment of the requirements of the Degree of PGDEMA, a declaration from the student that the work is original and has not been submitted to IGNOU or any other university or institution, must also be included in his/her dissertation (please see format at Appendix-IV).

- A certificate from the supervisor stating that the Project has been done under his/her supervision and is a genuine and original work (See format at Appendix-V).

- Binding should be done with hard cover page.

- Two copies dissertation reports should be mailed by registered post or submitted by hand to: The Regional Director of the concerned Regional Centre.

- The dissertation reports submitted to IGNOU will not be returned to the student.

Specimen of the Cover Page of Project Work

TITLE OF THE STUDY

A Project Report

Submitted to

Indira Gandhi National Open University

for the Degree of

PGDEMA

Name of the   **Name of the**
Researcher   **Supervisor**

Enrolment Number

(Month and Year of Submission)

School of Education
Indira Gandhi National Open University
Maidan Garhi
New Delhi-110068

DECLARATION

I hereby declare that the Project work entitled…………………………………………

……………………………………………………………………………………………

(Write the title in Block letters) submitted by me for the partial fulfillment of the PGDEMA. to Indira Gandhi National Open University. (IGNOU), New Delhi is my original work and has not been submitted earlier to IGNOU or to any other institution for the fulfillment of the requirement for any course of study. I also declare that no chapter of this manuscript in whole or in part is lifted and incorporated in this report from any earlier work done by others or me.

Place: **Signature**

Date: **Enrolment No.**

Name

Address

CERTIFICATE

This is to certify that Mr./Miss/Mrs……………………………………………………..

Student of PGDEMA from Indira Gandhi National Open University, New Delhi was working under my supervision and guidance for his/her Project work for the Course MES-049. His/Her Project has a title …………………………………………………….....................
which he/she is submitting, is his/her genuine and original work.

Place :   **Signature**

Date :   **Name**

                                                                          Address of the Supervisor

A Sample of Table of Contents in Project work

TABLE OF CONTENTS

Chapter – I

Introduction

- Background and rationale of the study
- Statement of the problem
- Research questions
- Objectives of the study
- Hypotheses of the study, if required
- Operational definitions of the terms
- Delimitations of the study

Chapter – II

Review of Related Literature

Chapter – III

Methodology of the Study

- Research design
- Population of the study
- Sample of the study
- Tools and techniques used for data collection
- Procedure of data collection
- Procedure of data analysis

Chapter – IV

Analysis and Interpretation

Chapter – V

Summary and Conclusions

Brief restatement of the problem, objectives, hypotheses, delimitations, methodology of the study

- Major findings of the study

- Discussion of Results

- Implications and conclusions of the study

- Suggestions for further research

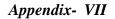**Bibliography**

- Books

- Journals

- Dissertations/Thesis

- Reports

Appendices

- Approval of Project Proposal

- Tools and techniques used

- Courses of study, if any

- Raw data (lengthy and complex), if any, not given in Chapter-IV)

- Any new materials developed for research, e.g. PLM, SLM, CAI, etc.

Note: Kindly give corresponding page numbers against the contents

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PROFORMA FOR APPROVAL OF PGDEMA PROJECT PROPOSAL

Note: i)   Please ensure that all entries of the proforma are correctly filled-in.

        ii)   The filled-in proforma along with the dissertation proposal should be submitted to the concerned Regional Director for approval.

(To be filled in by the student)

Project Proposal No.: .... **(for office use only)**

Enrolment No.: ....
Study Centre: ....
Regional Centre:……………….... ……
E-mail: ……………………………...
Telephone No.: ………………………..

1**.**   Name and Address of the student ………………………………………………………

....

....

2.   Title of the Project work ....

....

....

3.   Name and Address of the Guide ....

....

....

Signature of the Student   Signature of the Guide

Date: …………………   Date: ………………...

For Office Use Only

….……………………………

Signature, Designation, Stamp of
the Project Proposal Evaluator

Approved   Not approved   Date: ……………..

Signature of the Regional Director

Date and Stamp:

Suggestions for reformulating the Project Proposal: