# POSTGRADUATE DIPLOMA IN EDUCATION (PGDE)

# BOOK 5

# PDE 708: RESEARCH METHODS IN EDUCATION

## UNIT ONE: RESEARCH METHODS IN EDUCATION

### INTRODUCTION

Research is a vital tool in the educational enterprise. It is a systematic study of a problem with a view to advancing the frontiers of human knowledge. The purpose of research is to identify, explain, discover, control, and predict human behaviour on certain issues and problems. There will be no need for research, if there are no problems. The purpose of research, therefore, is to provide solutions to problems.

### OBJECTIVES

By the end of this unit, students should be able to:

i.      define educational research;

ii.     briefly explain the origin and goals of educational research in Nigeria;

iii.    discuss various concepts of educational research; and

iv.     describe various types of variables as applied to research.

## MEANING OF RESEARCH

**Research may be defined as the systematic and objective analysis and reporting of controlled observations with a view to arrive at the development of generalizations, principles, theories or explanation of phenomena. Generally, research aims at discovering, correcting, and interpretation of new facts. It is also concerned with modifying, revising, or verifying accepted theories or conclusions based on new information. You can also conceive research as a combination of experience and reasoning. On the other hand, research is commonly defined as the systematic, objective, and accurate search for the solution to a well-defined problem. To uphold these comments, either in data collection, analysis or in data reporting, statistics becomes a veritable tool. You should therefore, bear in mind as educational researchers that in expressing or disseminating research information, the language you employ should be clear, definitive, and concise. When you make inferences under uncertainty, the degree of certainty is specifiable. This is one of the objectives in research in education.**

In recent time, you cannot easily lay your hands on any reputable journal, either in counselling, psychology, technology, evaluation, administration, tests and measurements, or any other discipline in education, without being confronted with the use of statistics. Therefore, any person or group striving to engage in research of any serious nature should be acquainted with some essentials of statistics. To mention a few, such statistical essentials include some elements of sampling techniques, sampling distributions, descriptive statistics, and some methods of analyzing differences in evaluation, spread, and proportion. The use of statistical tables may be veritable. The methodology of research in the behavioural sciences utilizes statistics of various types which we shall discuss later in this module.

In Nigeria, research activities in education are predominant in the universities, colleges of education, and a few corporate organisations. Such organisations include the West African Examinations Council, (WAEC), National Examinations Council (NECO), and the Nigeria Education Research Development Council (NERDC). The NERDC is involved in the formulation of policies in Nigeria, in collaboration with such other bodies as the Federal Ministry of Education and other related supranational educational research bodies. It was established as a distinct educational research institution with its own council in 1970, and as an autonomous government institution with effect from 1971. Apart from conducting researches, it organizes or sponsors both national and international conferences and workshops. It also publishes research reports and provides consultancy services.

The arm of WAEC that is relevant to educational research is the Test Development and Research Organisation (TEDRO). It conducts research and feasibility studies into various activities of the Council, including the study and evaluation of examination papers, standard fixing, testing

procedures, and related problems in educational measurement. Some other 3rganization3 who rely heavily on educational research are the United Nations Educational, Scientific and Cultural Organisation (UNESCO) through the Network of Educational Innovation for Development in Africa (NEIDA), and the African Bureau of Educational sciences (BASE). The BASE is a pan-African 3rganization established in 1973 following the sixth congress of the International Association for the Advancement of Educational Research. It was set up to assist member states to intensify and harmonize their research activities in the fields of education.

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## ACTIVITY I

1.      Trace the historical development of educational research in Nigeria.

2.      Give three reasons why research is relevant in education.

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## CONCEPTS OF EDUCATIONAL RESEARCH

The term "concept" has similar meaning to "Construct". A concept is an abstraction from observed events; it is usually a word that represents the similarities or common aspects of subjects or events that are otherwise different from one another, examples are chair, cat, dog, tree, sheep, gas, solid, liquid, etc. These words describe common aspects of things that are otherwise diverse. The purpose of a concept is to simplify thinking by including a number of events under one general heading. Some concepts of events are close to the events they represent. For instance, the concept of **tree** may be easily illustrated by pointing to specific trees around us. Also the meaning of the concept **dog** is grasped because we can point to dogs around us. The concept is an abstraction of the characteristics of dogs that are more or less "heavy" or "light". "Mass", "energy", and "force" are concepts used by physical scientists. They are of course more abstract than concepts such as "weight", "height", and "length". A concept is of more interest to readers of this unit. "Achievement" is an abstraction formed from the observation of certain behaviours in children. These behaviours are associated with the mastery of "learning" of school task like reading ability, formation of words, solving mathematical problems, drawing pictures, and so on. The various observed behaviours are put together and expressed in a word like "achievement" and "intelligence". "Aggressiveness", "conformity", and "honesty" are all concepts used to express varieties of human behaviour of interest to behavioural scientists.

A construct is a concept that has the added meaning of having been deliberately and consciously invented or adopted for a special purpose. "Intelligence" is a concept, an abstraction from the observation of presumably intelligent and non-intelligent behaviours. But as a scientific construct, "intelligence" means both more or less than it may be as a concept. It means that scientists consciously and systematically use it in two ways: First, it enters into theoretical schemes and is related in various ways to other constructs. We may say, for example, that school achievement is in part a function of intelligence and motivation. Secondly, "intelligence" is so defined and specified that it can be observed and measured. We can make observations of the intelligence of the children by administering $X$-intelligence text to them, or we can ask teachers to tell us the relative degree of intelligence of their pupils/students, (Kerlinger, 1973).

i.      **A Concept:** is an expression of an abstraction formed from generalization of

particulars, for example, weight. This expression is from observations of certain behaviours or weights.

ii.   **A Construct:** is a concept that has been formulated so that it can be used in science. It is used in theoretical schemes. It is defined so that it can be observed and measured.

iii.  **A Variable:** is defined as a property that can take on different values. It is a symbol to which values are assigned.

**Constructs and Words can be defined by:**

i.    other words or concepts; and

ii.   description of an implicit or explicit action of behaviour.

## A Constitutive Definition

It is where constructs are defined by other constructs.

## A Constitutive Definition

It is where meanings are assigned by specifying the activities or operations necessary to measure and evaluate the construct. Operational definitions can give only limited meaning of constructs. They cannot completely describe a construct or variable. There are two types of operational definitions:

i.    Measured – tells us how the variable or construct will be scaled.

ii.   Experimental – lays out the details of how the variable (construct) is manipulated by the experimenter

## Types of Variables

i.    The independent variable is varied and has a presumed cause on another variable, the dependent variable. In an experiment, it is the manipulated variable. It is the variable under the control of the experimenter. In a non-experimental study, it is the variable that as a logical effect on the dependent variable.

ii.   The dependent variable's effect alter concomitantly with changes or variations in the independent variable.

iii.  An active variable is manipulated. Manipulations mean that the experimenter has control over how the values change.

iv.   An attribute variable is measured and cannot be manipulated. A variable that cannot be manipulated is one where the experimenter has no control over the values of the variable.

v.    A continuous variable is capable of taking on an ordered set of values within a certain range. Between two values there are an infinite number of other values. These variables reflect at least a rant order.

vi.   Categorical variables belong to a kind of measurement where objects are assigned to a subclass or subset. The subclasses are distinct and non-overlapping. All objects put into the same category are considered to have the same characteristic(s).

vii.  Latent variables are unobservable entities. They are assumed to underlie observed

variables.

viii. Intervening variables are constructs that account for internal unobservable psychological processes that account for behaviour. It cannot be seen but is inferred from behaviour, (Kerlinger, 1973).

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**ACTIVITY II**

1. Identify and discuss different types of variables.
2. Distinguish between concept and construct.

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## SUMMARY

- This unit defined research as a vital tool to achieve the systematic and objective analysis and reporting of controlled observations with a view to arriving at development of generalizations, principles, theories, or the explanation of phenomena. It also explained the origin of research in Nigeria. Different concepts of educational research and types of variables applied to educational research were also discussed. Common variables in research are independent, dependent, active, attribute, and continuous variables.

## REFERENCES

Kerlinger, F.W. (1973). **Foundations of Behavioural Research**. 2$^{nd}$ edition. New York: Holt Rinehart and Winston Inc.

# UNIT TWO:    BASIC TYPES OF EDUCATIONAL RESEARCH

## INTRODUCTION

This unit builds on the general background to research discussed in the previous unit and examines different types of educational research and their characteristics. By implication, you are to realize when to use each of the different types of research discussed.

## OBJECTIVES

At the end of this unit, students should be able to:

i. list various types of educational research;

ii. highlight the traits of each type of educational research; and

iii. discuss various characteristics of educational research.

## TYPES OF EDUCATIONAL RESEARCH

There are three basic types of research. They are:

i. Historical

ii. Survey

iii. Experimental.

## HISTORICAL TYPE

This type of research is based on oral evidence; (Mouly, 1978) records such as diaries, case history, autobiography, logbooks, etc. Books, journals, magazines, etc are also useful documents. The purpose of an historical research is to obtain a better understanding of the present, through the evaluation of the past and intelligent prediction of the future. An historical research aids in avoiding past errors and predicting the future and also refreshes ones memory on what is known and unfolds what is not known. There are two main sources of collecting historical data. They are primary and secondary sources. Primary sources are relics and other things that have direct physical relationships, e.g. observation and participation. A secondary source deals with bibliographies, references, materials, and documents recorded by someone else. These are less reliable than the primary sources. In this type of research approach, statistical hypotheses are rarely used.

## Survey Type

Survey type of research can also be called a descriptive research. this type of research is based on information gathered through questionnaires, interviews (oral, written, structured, unstructured, etc), inventories, rating scales, self-report, and observations. Descriptive research is used to find the meaning and obtain an understanding of the present condition. The results obtained through this procedure can be statistically analyzed.

## Experimental (Empirical) Type

This type of research involves conducting experiments for research process. The researcher will find out the effects of manipulating some variables by providing various treatments and later compared with an untreated group called control group. The results obtained through this procedure are usually statistically analyzed. Experimental research is a precise research technique designed to solve specific educational problems. It is perhaps the most reliable type of research that determines situations. In conducting experimental research, three types of variables are usually taken into consideration. They are dependent, independent, and intervening variables.

## Basic Methods of Research

i.  **Descriptive Method**

    Describes systematically a situation or an area of interest factually and accurately, e.g. population census studies, public opinion surveys, fact-finding surveys, task analysis studies, questionnaire and interview studies, observation studies, job descriptions, etc

ii. **Case and Field Method**

    Studying intensively the current background status, and environmental interaction of a given social unit; an individual group, institution, or community, for example, the case study of a child whose IQ is above average, but who is having severe learning disabilities.

iii. **The Experimental Method**

    Investigates possible cause-and-effect relationships by exposing one or more experimental groups to one or more control groups not receiving the treatment.

iv.    **Quasi-Experimental Method**

Approximates the conditions of the true experiment in a setting which does not allow the control and/or manipulation of all relevant variables. The researcher must clearly understand what compromises exist in the internal and external validity of its design and proceed within these limitations. Most so-called field experiments, operational research and even the more sophisticated forms of action research attempt to get at the causal factors in real life setting of the effectiveness of any method or treatment condition where random assignment of subjects to methods or conditions is not possible.

v.    **Survey Research Method**

In a survey research method, you study large and small populations (or universes) by selecting and studying samples chosen from the populations to discover the relative incidence, distribution, and interrelations of sociological and psychological variables. Surveys covered by this definition are often called sample surveys. Probably because survey research developed as separate research activity, along with the development and improvement of sampling procedures. Survey research is considered to be a branch of social scientific research, which immediately distinguishes survey research from the status survey.

vi.    **Casual-Comparative (Ex-Post Facto) Method**

Investigating the extent and possible cause-and-effect relationships by observing some existing consequence and searching back through the data for plausible causal factors, for example, you may want to identify factors related to the "drop-out" problem in a particular school, using data from records over the period of say twenty years; or to identify possible causes of students poor performance in external/public examinations, (e.g. WAEC, NECO, SSCE, etc) in general or in any particular subject of interest.

vii.    **Applied Research**

Applied research deals essentially with conducting research in an attempt to provide solutions. Under applied research, we have Action Research, Investigative Research, and Evaluation Research.

viii.    **Action Research**

Action research is different from other types of research because of its usefulness. This type of research is used by classroom teachers, office administrators, and policy makers. The research attempts to develop new skills, new methods, and approaches and tries to solve problems with direct application to the classroom situation, (Adewumi, 1988).

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### ACTIVITY I

1.    List and describe, with three or four major words, different types of educational research.

2.    Students are not performing well in English and Mathematics because teachers are using outdated techniques and students are not actively involved. Which research type can you use to improve achievement

   a.    in the long-term?

   b.    in the short-term?

## CHARACTERISTICS OF EDUCATIONAL RESEARCH

As a science, educational research possesses the following characteristics:

i. **It is Empirical**

It involves the collection of data that can be used to draw conclusions. Conclusions are not based on what the author feels or think but on concrete evidence derived from the data collected by careful observation of the events being investigated.

ii. **It is Theoretical**

Education research, as a scientific research, also aims at the building of a relevant theory that can explain certain phenomena among variables in educational situations.

iii. **It is Cumulative**

Each scientific investigation tries to build upon existing facts and theories and helps in refining and extending the existing principles.

iv. **It is Non-Ethical**

It does not consider issues. That is, scientific investigations do not seek answers to questions such as whether an action is right or wrong. They attempt to find the logical explanation for any action and avoid value judgment.

**It is Verifiable**

A scientific investigation leads to verifiable results. The process adopted in any scientific investigation is such that it can be replicated by other researchers who invariably can get the same results, (Koleoso, 1999), all other things being equal.

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### ACTIVITY II

1. Highlight and discuss various characteristics of educational research.

2. a. In what ways would the primary education component of the National Policy on Education (1998) been different if an appropriate research had been conducted?

   b. Which type of research would have been carried out?

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### SUMMARY

- In this unit, you have learnt types of educational research to include historical, survey, and experimental types. You have also been exposed to basic methods of research.. These include: descriptive, case and field, experimental, quasi-experimental, survey research, etc. The characteristics of educational research are that it is empirical, theoretical, cumulative, non-ethical, and veritable.

## SELF-TEST

Give three characteristics of historical, survey, and experimental research.

## REFERENCES

Adewumi, J.B. (1988). **Introduction to Educational Research Techniques**. Ilorin: Gbenle Press Ltd.

Koleoso, A. (1999). **Research Methods and Statistics**. Ibadan: Ben Quality Prints.

Mouly, G.J. (1978). **Educational Research**: The Art and Science of Investigation. Boston: Allyn and Bacon, Inc.

# UNIT THREE: PROCESS OF EDUCATIONAL RESEARCH AND REPORT WRITING

## INTRODUCTION

In this unit, you will examine the various processes that can be utilized for a variable educational research. It also examines research report as a plan of what you as a researcher want to do in carrying out a research project. It helps you to have a proper perspective of what is involved in executing a particular study

## OBJECTIVES

At the end of this unit, students should be able to:

i.      discuss various stages of educational research;

ii.     identify the main component of research; and

iii.    explain the major part of research methodology of a research project report

## RESEARCH PROCESSES

Any scientific research involves a number of processes or steps that are executed in a systematic manner.  Educational research as a scientific investigation involves sequential; logical steps of execution.  The logical steps you take when carrying out educational; research processes include:

i.      identifying a researchable problem area, or need worth investigating;

ii.     reviewing or related literature to the research topic;

iii.    formulating research questions and hypotheses:  This is by formulating testable and measurable hypotheses and define the basic concepts and variable.

iv.     Designing a study to collect pertinent data: This is by stating the underlying assumptions, which will govern the interpretations of results;

v.      Collecting pertinent data for answering the research questions and testing the hypotheses;

vi.     Selecting the subjects using appropriate sampling procedures:  This is by analyzing the data collected using appropriate statistics, to answer the research questions and testing the hypotheses of the study;

vii. Control and/or manipulate relevant variables and established criteria to evaluate the outcome, identify what variable can be measured and how to measure them;

viii. Drawing necessary inferences or conclusions based on the results of the analysis;

ix. Specify the data collection procedure that is questionnaires, test construction and administration, interview and observations;

x. Select the data analysis methodology (this could be through manual or computer);

xi. Evaluate results, draw conclusions, and make recommendations (Koleoso, 1999).

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### ACTIVITY I

1. List and discuss in logical order the various processes/steps to employ in educational research.

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## WRITING THE MAIN REPORT OF A STUDY

One of the most important aspects of any research study is communication of the results to other researchers. This important aspect can be accomplished through a well-written report. You start most reports with the **title**. The title is the label given to the report. You should write it in such a way that the reader could easily tell what the study is all about, even without reading the whole report. The title should not be too long. After the title comes the **abstract**. The abstract should contain important ideas of the study. The abstract is a brief summary of the whole study containing the main steps in the study, statement of purpose, the types of subjects, brief statement of design, data analysis, results and findings. Usually, the abstract should not be more than 120 – 150 words. The research report, whether it is a thesis, dissertation, or short term paper or report, usually follows a well standardized pattern. The following outline represents the usual sequence of writing a research report, (Adewumi, 1999).

**Format of the Research Report**

i. **Preliminary Section**

Title Page

Abstract

Table of Contents

List of figures (if any)

ii. **Main Body of the Report**

Introduction

Problem Statement or Statement of the Problem

Significance of the Problem

Justification of the Study

Major Study Assumptions

Hypotheses or Specific Research Questions (or both)

Delimitation (or Scope and Delimitations)

Definition of Key (or Operational) Terms.


iii.    **Review of Related Literature**

State previous research efforts in this area.  Area of similarities and/or dissimilarities as well as possible input to be drawn for the present study.

iv.    **Methodology**

Definition of Population

Procedure for Collecting Data

Instrumentation

Pilot Study (if any)

v.    **Findings and Analysis**

vi.    **Summary, Conclusion and Recommendations**

Restatement of the Problem

Description of Procedures Used

Major Findings and Conclusions

Recommendations for Further Research.

vii.    **Reference Section**

Bibliography/References

Appendix

## THE RESEARCH PROPOSAL

Every activity needs thorough planning. When you have thought out a research problem you must plan how the research will be carried out. This plan which is like the building plan or blueprint to a builder is called a **Research Proposal**

The proposal provides a basis for the evaluation of the work and demonstrates clearly that the researches know what he wants to do to arrive at the solution of the problems at hand. It affords him also, a systematic plan or procedure to follow

There are various formats for the research proposal and it varies from Institution to Institution. However, most formats include the following


**ABSTRACT**:

On a single, separate page, prepare a summary of the proposal to indicate its objectives and procedures.

**I        INTROCUTION**

- Background to the study
- Purpose of the study
- Statement of the problem
- Significance of the study (Implications and Application)
- Operational definition of terms
- Assumptions of the study
- Limitations of the study
- Delimitations of the study

**II       THEORETICAL FRAMEWORK OF THE STUDY**

## III        REVIEW OF RELATED LITERATURE

- Literature Review
- Appraisal/Summary of Literature review.

## IV       RESEARCH QUESTIONS AND HYPOTHESES

## V        RESEARCH METHODOLOGY

- Research Design
- Subjects (Population and sample; Sampling Technique)
- Instruments (construction and administration)
- Validity and reliability of Instrument

- **Method of data analysis**
- Statistical Procedure to be used.

**VI      BUDGET AND TIME SCHEDULE**

**VII     REFERENCES**

**Background to the study**

After choosing your research area, there is need to give cogent reasons for deciding to work in this area. This area is of extreme importance as it is the pillar upon which you will build subsequent work. You should advance adequate reasons for choosing the topic. If it was borne out of the shortcomings of previous work or to further knowledge in the area, you will need to explain. You will need to think deeply on how your work and the previous ones will throw more light on the problem area or lead to new knowledge.

Background to the study cannot be treated with levity. It should discuss all the variables in the study and shed light on the problems and its nature.

# Purpose of the Study

This is just a simple statement of what the concern of your research work is all about. It should be stated in two or three sentences.
It should not be a lengthy affair but straight to the print.

### Statement of the problem

The statement of the problem is usually a declarative statement which you must make early at the beginning of your research. This section defines your intention and brings your work into focus. It clarifies outlines and limits the problem area. Thus, it must be good, clear, concise and stated early in the proposal.

You should avoid bringing elements of the background to the study into this section or attempt to justify the work by stressing its significance here. A sentence or two should do the job adequately. e.g.

This study sought to:
> "*determine the extent to which the mother tongue interferes with the learning of English Language in schools*"

## Significance of the Study

Researches are not trivial or superficial endeavors. You should be able to justify the importance of your study in terms of its implications or possible applications to the general practice of education.

The emphasis in this section is on the benefits of the study to educational theory or practitioners. All the stated hypotheses and research questions should point to this direction.

## You should therefore ensure that your study can increase knowledge, solve problems and answer some thorny questions in the field of education.

In addition, it should afford other researchers the opportunity to delve further in the particular area.

# Operational Definition of Terms

It is not everybody that will come in contact with your work that will be familiar with the areas of study. You should therefore define terms and concepts as you used them in the study.

All un-usual terms must be defined to avoid their being misinterpreted. All variables, terms or methods of obtaining data that are subject to ambiguity must equally be defined. You should try as much as possible to define them in your own words and as you used them in your study.

**Assumptions**

You may assume certain facts in the course of your research. These must be clearly started. There are certain facts also you may believe but which you cannot verify. There is need to state them as this will strengthen the basis for your investigation.

## Limitations

The research or is often confronted with a number of constraints during the course of an investigation. These are often beyond his/her control. They may place restrictions on the conclusions of the work or their applications in other situations. There are myriads of them ranging from Physical, Human, Financial, administrative polities to unvalidated data gathering instruments, time and sampling technique. These limitations should be clearly and concisely stated as they affect your study.

## Delimitations

Your study must have boundaries in terms of sample, variables, time, subject matter, location and variable matching. Delimitations show the scope of your investigation and the extent to which conclusions can be extended in terms of sample, variable and subject matter. It is important you state the scope of your study very clearly.

# II     REVIEW OF RELATED LITERATURE

## Theoretical Framework

This may as well be a major part of the review of related literature. Its main purpose is to hinge your study to an existing theory in education. Hardly is there any study that is completely new. A background theory gives basis for your study. There are a number of theories to which you can link your studies i.e. Bruner, Piaget, Gagne, Deurtsch etc.

The theoretical framework sets the theoretical base for the research.

The other parts of the review of Literature often relate the current research to what had gone before it. When the writings of recognized authorities and previous research are summarized and presented, it lays credence to the fact that the researcher knows much about the current research in terms of what is known and unknown about the subject.

Best and Kahn (1980) stated that "citing studies that show substantial agreement and those that seem to present conflicting conclusions helps to sharpen and define understanding of existing knowledge in the problem area, provides a background for the research project, and makes the reader aware of the status of the issue",

It is advised that parading a long list of annotated studies relating to the problem is ineffective and inappropriate. Only those studies that are plainly relevant, competently executed and clearly reported should be included.

Best and Kahn (1980) further advised that the researcher should note certain important elements:

(1)     Reports of studies of closely related problems that have been investigated

(2)  Design of the study including procedures employed and data-gathering instruments used

(3)  Populations that were sampled and sampling methods employed

(4)  Variables that were defined

(5)  Extraneous variables that could have affected the findings

(6)  Faults that could have been avoided

(7)  Recommendations for further research

Thus, the review of literature is a valuable guide to defining the problem, recognising its significance, suggesting promising data-gathering devices, appropriate study design and sources of data.

It is always good to present the review in topical form as the previous studies can be better organised. It is also better to paraphrase cited works rather than assembling paragraphs upon paragraphs of quotations. The last section of the review of related literature should be an appraisal of the reviewed literature. This in essence is a brief summary of the whole literature showing its congruence with the present study. The findings and their implications will be discussed. The gaps presently existing in what had been reviewed about the topic will be pointed out and how this leads to the problems at hand.

## RESEARCH QUESTIONS AND/OR HYPOTHESIS

The problem of the research, which had earlier been generally stated, is now made specific through Research Questions or Research Hypothesis.

The formulation of hypothesis clarifies further the nature of the problem and the logic underlying the investigation. Hypotheses also give direction to the data-gathering process.

Research Hypothesis is a tentative answer to the question being investigated. It is an informed or educated guess or lunch that is based upon prior research to be subjected to the process of verification or disconfirmation Hypothesis are often started in a **"Null form"** since it is the null hypothesis that will be subjected to statistical test. However, at this stage, they could be stated in the research form so that you can give a cleaner picture of the intent of your study and to show the anticipated relationships between he variables in your study.

You should try as much as possible to include the operational definition of each element within the hypothesis otherwise you may need to give definitions and stipulations required to do this separately.

Of necessity, hypothesis must be formulated before data gathering so that your investigation will not be biased.

The characteristics of a good hypothesis are that it should be

−  reasonable

−  consistent with known facts or theories

−  stated in such a way that it can be tested and found to be probably true or probably false

– stated in the simples possible terms

Okpala (1995) holds that Hypothesis and research questions are two alternatives (in most cases) and it is best to use one at a time except in situations where it is necessary to combine them but without duplication (i.e. it is better not to have hypothesis and its equivalent of research questions).

**Research Question**

What is the attitude profile of SS3 Biology teachers in FCT, Abuja Secondary Schools towards computer mediated instructions and students achievement?

**Null Hypothesis**

Attitude of SS3 Biology teachers towards computer mediated instructions do not significantly explain students achievement in Biology.

# CHRONOGRAM

In this section, the whole study is broken down into smaller components and a time schedule is attached to it.

A chart of what to do and when to do it will thus be produced. This often prevents unnecessary delays and drift when the study is been carried out. It minimizes the natural tendency to procrastinate.

# RESEARCH METHODOLOGY

This section of the proposal shows how the hypothesized relationships will be observed. It consists of the following components

        Research Design

        Sample/Subjects

        Instrumentation

        Data collection and ⎫
                      ⎬ Procedures
        Data analysis       ⎭

# Research Design

The research design is the plan, structure and strategy operated by the researcher in order that the research question can be answered.

The hypothesized relationships can be observed only through a through and effective control of all sources of variance in the study i.e. extraneous variance, systematic variance, and error variance.

There are various designs available to do this. You have to select the most appropriate for your study.

# Systematic Variance

This is associated with the main variable of the hypothesis and is maximised by ensuring that the methods, treatments, independent variables etc are not alike.

## Extraneous Variance

These are external factors to the study, which can influence the dependent variable. You can take care of this by randomising your subjects (sample), using statistical control, matching the subjects, including the factors as moderator or attribute variable etc.

## Error Variance

This comes mainly from measurement and individual differences (fatigue, guessing, lapses in memory, inconsistency of responses etc)

This is often control with controlled experiments. Again, the use of valid and reliable instruments is of utmost importance.

# Sample/Subjects

You have to define the population from which you plan to select the sample or subjects of your study. Variables often included in this consideration are: age, grade level, socio-economic status, gender, race, IQ, metal age, academic achievement level etc.

You should also specify the number of subjects to be selected from the population and how they will be selected. Random selection is advised but where this is not possible the reasons for using other methods must be given.

## Instrumentation

Researches often strive to establish relationships between various constructs that are usually not directly measurable or observable. An indicator of such a construct will have to be developed, or adopted. Such indicators show what data to be gathered and hence how it will be gathered.

The researcher will therefore describe the instrument in detail. It should be stated clearly whether the instrument is developed, adopted or adapted. In either case, the source and modifications made must be explained. The sources must be acknowledged. If developed, the process of the development must be given.

If adopted or adapted, the evidence of validity and reliability for the purpose of the study must be reported. If developed, the steps taken to ensure validity and reliability must be stated.
Note that the procedure for the study is very essential whether in experimental study or descriptive research.

# Data Collection

The data must be collected carefully to ensure its quality. Bias and error must be avoided. Again, there is the need to plan before data collection is commenced. How the data will be organized and presented should have been determined.

The use of tables, figures and charts are essential in organizing and summarizing data.

## Data Analysis

The type of design used for the study is a pointer to the statistical techniques that could be used. This also depends on the type of hypothesis and the type of data (nominal, ordinal, interval or ratio)

The various statistical procedures are not discussed in this text but will be given in another. You should lay your hand on a good book on Educational statistics.

However, the table below illustrates the statistics that could be used for various purposes, with different types of data and for specific purposes.

**Table 1: Descriptive Statistics**

| PURPOSE OF THE STATISTICS | | | | | |
|---|---|---|---|---|---|
| | *(1)* Central Tendency | | *(2)* Variability | | *(3)* Location |
| Type of Scale of Dependent Variable | One Group | More Than One Group | One Group | More Than One Group | One Group | More Than One Group |
| Interval | Mean | Difference between Means | Standard deviation or Variance | Difference between Standard deviations or Variances | z-score,t-core, or other standard scores | Difference between an individual's standard score in more than one distribution |
| Ordinal | Median | Difference between Medians | Quartile deviation | Difference between quartile deviations | Percentile rank* | Difference between an individual's percentile rank in more than one distribution |
| Nominal | Mode | Difference between Modes | Range | Difference between ranges | Label or Categorization | Label or Categorization |

| | *(4)* Correlation | | *(5)* Subsets | | *(6)* Interaction |
|---|---|---|---|---|---|
| Type of Scale of Dependent Variable | One Group | More Than One Group | One Group | More Than One Group | One Group | More Than One Group |

| | | | | | | |
|---|---|---|---|---|---|---|
| Interval | Pearson *r*s | Difference in Pearson *r*s for same variables in two groups | | | Difference between observed cell means and expected cell means in factorial ANOVA (observed interaction) | Difference in observed interaction among groups |
| Ordinal | Spearman rho or Kendall's *W*\* | Difference in Spearman rhos for same variables in two groups | | | | |
| Nominal | Point biserial correlation\* | Difference in point biserial correlations for same variables in two groups | Proportion or percentage | Difference in proportions or percentages | Differences between observed cell frequencies and expected cell frequencies | Differences in observed interaction among groups |

**Table 2: Inferential Statistics**

| Type of Scale of Dependent Variable | PURPOSE OF THE STATISTIC | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | *(1)* *Central Tendency* | | *(2)* *Variability* | | *(3)* *Location* | |
| | One Group | More Than One Group | One Group | More Than One Group | One Group | More Than One Group |
| Interval | Standard error of the mean | *t*-test or one-way ANOVA | | Bartlett's test*or *t*-test for homogeneity of variance;* *F*-max* statistics | Standard error of measurement* | Standard error of difference scores* |
| Ordinal | Standard error of median* | Median test, sign test, * Kruskal-Wallis one-way ANOVA, * or Friedman's test* | | | | |
| Nominal | | | | | | |

Table: 12.2    **(cont.)**

| | PURPOSE OF THE STATISTICS | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | *(4)* | | *(5)* | | *(6)* | |
| | *Correlation* | | *Subsets* | | *Interaction* | |
| Type of Scale of Dependent Variable | One Group | More Than One Group | One Group | More Than One Group | One Group | More Than One Group |
| Interval | $t$-test for Fisher's $z$ transformation or F-test for linearity* | $t$-test Fisher's $z$ transformation* | | | $F$-test for multifactor ANOVA | $F$-test for multifactor ANOVA |
| Ordinal | Test for Spearman's Rho or Kendall's $W$* | | | | | |
| Nominal | Chi-square or test for significance of point biserial* | Cochran's $Q$* | Chi-square or Fisher's exact test* | Chi-square or Fisher's exact test* | Information theory A* | Chi-square test for information theory A* |

Source: Donald Ary et al (1979) Introduction to research in education.

f.    **Expected End-Product**

This should include preliminary reports of findings periodically during the project, and a final report.

**Personnel**

Provide name, title and a brief statement of the research experience of the principal investigator and of the other key personnel involved if possible.

**Facilities**

Indicate special facilities and similar advantages including research staff and resources available to the organization.

**Other Information**

Indicate other information pertinent to the proposal including the following:

a.    extent of agreed cooperation in project by agencies whose support is necessary for the successful accomplishment of objectives, include names and titles of officials of such agencies giving assurance of cooperation.  For example, in a training – research project,

cooperation of State Ministry of Education may be vital to the success of the Project (Aina, 1994)

b.      amount of financial or other support available for this project from other sources.

c.      whether this proposal has been or will be submitted to any other agency or organization for financial support.

d.      whether this proposal is an extension or an addition to a previous project supported by the Ministry of Labour or other government agency.

e.      whether this project or a similar one was previously submitted to the Department of Labour or other government agency.

**Appendix**

This is the last part of a research project report.  Materials which are related to the report and which can be referred to for greater detail but which are unsuitable for inclusion into the main body report are usually placed in the appendix.  Such materials are the instrument used for data collection, raw data such as a list of school used for the study, letters of introduction, etc. (Koleoso, 1999).

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### ACTIVITY II

1.      What steps will you take to write a proposal on a research topic of your choice? State these steps.

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## RESEARCH PROJECT REPORT

After the conduct of a study, the researcher must write the report with a particular format.  A research report may be a term paper, thesis or dissertation.  The format for writing a report varies from place to place and from discipline to discipline.  Research project report is usually written in past tense.  Essentially, a research project report comprises three major sections, viz:-

i.      The Preliminary Section.

ii.     The Main Body

i.      The Appendix

**The Preliminary Section**

i.      The title Page

ii.     Certification Page

iii.    Acknowledgement

iv.     Table of Contents

v.      List of Tables

vi.     List of Figures

vii.    List of Appendices

viii.    The Abstract

## The Title Page

This carries information on the project, the programme (degree, diploma, or certificate), the department and the university/institution to which the report is being presented, the particulars of the student or the researcher submitting the project, the month and year the project is submitted.

## Certification Page

This is where the supervisor and head of department will append their signatures for approval of the report.

## The Acknowledgement

This is used to show gratitude and indebtedness to individuals, institutions, or organizations for their contributions toward the success of the project.

## The Table f Contents

This contains chapters, parts of the report and the pages where they appear.  Only the first pages are indicated.

## List of Tables and Figures

Follows the Table of Contents

## The List of Appendices

The appendices and their pages are listed.

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### ACTIVITY III

1.    List the major components of a research report.

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## THE ABSTRACT

This is a short description of the work.  It gives an ideal of and purpose of the work, brief description of the methodology and the major findings of the study.  It usually consists of about 150 words.  The main body of the Report is divided into five chapters as follows:

### Chapter 1:    Introduction

i.      Background to the Study

ii.     Statement of the Problem

iii.    Purpose of the study

iv.     Research Questions and/or Hypotheses

v.      Scope and Delimitation of the Study

vi.     Definition of Operational Terms

## Chapter 2:    Review of Literature

This treats the review of related literature

## Chapter 3:    Research Methodology

This chapter comprises the following sub-sections:

i.      Research Design

ii.     Area of Study

iii.    Population

iv.     Sample and Sampling Procedure.

v.      Instrument for data Collection

vi.     Validation of the Instrument

vii.    Reliability of the Instrument

viii.   Method of Data Analysis

ix.     Result and Discussion

## Chapter 4:    Summary, Conclusion, Implications and Recommendations

i.      Summary

ii.     Conclusion

iii.    Implications of the Findings

iv.     Recommendations arising from the Study

v.      Limitations of the Study

vi.     Suggestions for Further Studies

## Chapter 5:    References

i.      References

ii.     Appendix

References are the final state on reporting. References are those works or studies which the researcher cited in his report only. This does not include all other works he consulted but did not cite. If however, the researcher wants to include a list of the works or studies he consulted but not cited, then he is not writing a reference, but a bibliography. Usually, references and bibliographies are listed in alphabetical orders. First, the authors' family name, initials and title of the work. If the cited work is a journal, the journal name is underlined or bold followed by the year, volume and pages. If the cited work is a book or other materials, the title is underlined or bold followed by the country/city of publication, publisher, and the year. References should be indicated clearly enough for other readers to do a follow up studies if they wish. All reference made in the body of the report plus other additional pertinent information, (e.g. footnotes where they are allowed), are put under bibliography, (Koleoso, 1999).

## SUMMARY

●       In this unit, you have learnt the various stages that you pass through in conducting an educational research.  Simply put the processes include: identifying research problem, reviewing literature, formulating research questions and hypotheses, stating underlying assumptions, collecting, analyzing data, drawing inferences, implications and conclusions.  This unit also identified the main components of research reports or proposals.  These components include: preliminary section, main body of the report, literature review, methodology, analysis and findings, summary, conclusion, recommendations etc.  The unit also discussed what should be in each chapter of a research project report.  The unit is established for you to be able to apply these to various research efforts that may come in your way during this course and any other future courses.

## ASSIGNMENT

1.      List the steps you will pass through in undertaking a study on the effect of parenting on behaviour of youths in school.

2.      Take a research topic of your choice and outline the steps you will take in carrying out the study.

## REFERENCES

Adewumi, J. B. (1988).  **Introduction to Educational Research Techniques**.  Ilorin:  Gbenle Press Ltd.

Aina, O. (1994).  **Introduction to Research Methods**.  Lagos:  Department of Educational Management, Lagos State University.

Koleoso, A. (1999).  **Research Methods and Statistics.**  Ibadan:  Ben Quality Prints.

# UNIT FOUR:   USES AND ABUSES OF EDUCATIONAL RESEARCH

## INTRODUCTION

Research problems as used in this context do not refer to the problems encountered by the researchers in the process of his activities while tackling the problems that set off the tasks.  Rather, they are the questions the research is posed to answer.  The identification of a suitable and worthwhile research problem is sometimes one of the most difficult aspects of an educational research.  But this shouldn't be so, especially in an underdeveloped society like

Nigeria whose educational system needs improvement in several diverse ways. It usually poses a problem to beginning researchers. Although, there are no rigid rules to adopt in selecting research problems/topics in education, the suggestions in this unit would help beginning researchers.

## OBJECTIVES

At the end of this unit, students should be able to:

1.      discuss the uses of educational research; and

2.      highlight problems associated with educational research and how they are abused.

## EDUCATIONAL PROBLEM(S)

Adeboyeje and Afolabi (1997:9) define educational problem as "a disturbing perplexing or embarrassing condition or situation that arises in an educational setting which demands an urgent solution, through a well planned investigation. For instance, research investigation led to the introduction of 6-3-34 system of education in Nigeria in 1986. That is, primary school education for 6 years, then junior secondary, 3 years, senior secondary, 3 years, and university education 4 years. The Senior Secondary Certificate Examination (SSCE) replaced West African School Certificate Examination (WASCE). Since the inception of this innovation, many problems have surfaced. Through investigation and observations, some of the problems identified concern the implementation of science and mathematics curricula in secondary schools such as:

i.      Inadequate funding;

ii.     Insufficiency of competent and experienced science and mathematics teachers;

iii.    Large student population;

iv.     Lack of infrastructural facilities, e.g. laboratory equipment, chemical and materials;

v.      Lack of laboratory personnel, e.g. laboratory technicians, laboratory assistants, etc;

vi.     Problem of each subject curriculum; and

vii.    Prohibitive cost of equipment and textual materials.

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### ACTIVITY 1

1.      What are the uses of educational research? List as many uses as you can.

---

## SOURCES OF RESEARCH TOPICS

Research problems can be sourced from any of the various sections of education as a discipline. Occasionally, some problems cut across other disciplines and call for inter-disciplinary research, e.g. education and sociology, (e.g. youths and drug abuse), education and religion, (e.g. integrating Qur'anic and Almajirai children into conventional schools), etc. In practice, sourcing for research problems/topics could be done through the following procedures:

i.      **Professional Literature**:  to be able to conduct a good research work and effectively

utilize the work, the researcher needs to consult relevant textbooks, magazines, dailies, gazettes, newsletters, research project, thesis, dissertations, Encyclopedia of Educational Research, Psychological Abstracts, Education Research Information Centre (ERIC), Journal of Educational Research and Educational Journals that are published in Nigeria such as Journal of Theoretical and applied Research, Journal of Science Teachers Association of Nigeria (JSTAN), Journal of Curriculum Organisation of Nigeria, etc and some other sources that could be consulted. A researcher reading the above reports can identify meaningful research problems.

ii.   **Theory**:  The researcher can examine and use relevant educational theories. Learning theories or counseling theories, for example, can serve as a basis for identifying worthwhile research problems. Theories normally give rise to deductions that need to be tested. Making deductions from theories may not be very easy for a researcher. However, and more often than not, when identified problems through this source are utilized, they may likely lead to other problems or an extension of another theories demanding for new information or investigation.

iii.  **Personal Experience**:  Students in tertiary institutions such as Colleges of Education and Faculty of Education in the universities often encounter problems that require investigation in their chosen fields of studies. Majority of the students more often than not use the field work, personal experiences to identify research problems while some abuse the information, data, documents made available to them to blacklist schools and their educational programmes. Students could have also personal experiences during lectures, seminars and workshops. Serious students, through careful observations in his chosen field of study and interest, can identify a problem worthy of investigation. For instance, through such experience, a science student may decide to investigate the effect of the use of mother tongue in the teaching of integrated science in the junior secondary school. If on the other hand, he may wish to compare the relative effectiveness of medium of instruction – English and Yoruba – in the teaching of integrated science at the junior secondary school level.

iv.   **Previous Studies**:  previous research reports can be useful from programmes such as NCE, B.A. Ed/B.Sc. Ed, M.Ed, M.Phil., Ph.D and other published research reports. The projects are usually concluded by making recommendations and suggestions for further research. Such recommendations and suggestions can usually provide bases for you to select research problems. Also you can decide to replicate a previous research study which you consider significant. However, such replication of a study is good if the findings of the previous study are controversial or invalid, or its methodology is faulty or the need for changes in time and location.

v.    **Professional Contact**:  a researcher can identify a researchable topic through contact with his professional colleagues. Also, membership of professional association and regular attendance at meetings, symposia, conferences, seminars and workshops organized by such professional bodies as Science teachers Association of Nigeria (STAN), National Association of Professional Educators (NAPED), Social Studies of Nigeria (SOSAN), Nigeria Association of Educational Media and Technology (NAEMT), and so on, would assist you as a prospective researcher in identifying good researchable topics. However, some researchers abuse some of the above-listed points negatively by replicating the work of other researchers (Plagiarism).

vi.     **Academic Adviser/Project Supervisor**:  the academic adviser or project supervisor can be a source of research topic, if contacted (Koleoso, 1999).

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**ACTIVITY II**

1.      Discuss the various problems confronting educational research in Nigeria.

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## EVALUATION OF RESEARCH PROBLEMS

A research problem must satisfy the following criteria in order to justify its usefulness:

i.      **Contribution to knowledge**:  the research problem and the solution should contribute to the body of knowledge in education.

ii.     Creating room for further research:  The solution of an identified research problem should lead up to new problems leading to further research in that area.

iii.    **Researchability**:  The identified research problem must be researchable.  To be researchable, a problem must be concerned with the existing relationship of two or more variable that can be defined and measured.  An example is the relationship between the school learning environment and students' academic achievements.

ii.     **Suitability** of the problem to current issues in education and the society at large.

iii.    The researcher must have interest in the problem.  Your interest in a particular research topic will motivate you to exact meaningful time and energy to successfully see the end of the research.  The problem must be in the area in which you have knowledge and experience.  You as a researcher should be familiar with the existing theories, concepts, and facts in order to identify a worthwhile problem.  You must have skills and competencies needed to carry out the study successfully.  You must be capable of developing and validating the research instruments.  You should also possess necessary statistical skills in order to be able to analyse the research data.

iv.     The problem must be one that is feasible in the situation which, you as a researcher find yourself.  You must ascertain whether or not the data necessary to answer the questions are or will be available.  You should also ensure that the necessary subjects for the study will be available or that the appropriate subjects for the study will be available or that the appropriate school records or governmental documents are accessible.

v.      Financial consideration is also important.  You must consider the financial involvement of the problem before embarking on the research.  Many research studies have been abandoned halfway due to time and financial constraints, (Koleoso, 1999).

**The Statement of Research Problems**

Research problems are stated in declarative or question form.  But it is better to state a research problem in question form.  The forms or variations of questions recommended and commonly in use include:

i.      A single question

ii.     One question which represents the major problem followed by general questions which

are known as sub-problems.

iii.  Several questions

iv.  A statement followed by restatement of the problem in the form of a question.

All variations of the problem statements are known as research question.  An example of research report could be:

i.  **Author – Title:  Adenekan Olufemi (2004)**

Correlation between Students' Performances in Mathematics and Integrated Science in JSS III Result in Ife Central Local Government Secondary Schools.  **Statement of the Problem**:  It is believed that there is a relationship between performance in integrated science and mathematics, i.e. a student who performs well in mathematics will also perform well in integrated science.  The research seeks to inquire into the validity of the unsubstantiated belief.

ii.  **Author – Title:  Nneji, John (2004)**

Problems facing the teaching of Physics in Secondary Schools in Ikot-Ekpene.

**Statement of the Problem**:

a.  Are there sufficient laboratory equipment for physics?

b.  Are there enough teaching aids for physics subjects?

c.  Are there sufficient qualified and competent physics teachers?

d.  Are there enough physics textbooks for teachers?

e.  Are teachers' salary paid regularly?

iii.  **Author – Title: Danladi F. A. (2004)**

Effects of using Hausa and English as medium of instruction on students' achievement in mathematics.

Statement of the Problem:  is there any significant difference in the achievement of students exposed to mathematics using Hausa as a medium of instruction and those exposed to mathematics using English as a medium of instruction.

**Uses of Research in Education**

Research according to Best (1977) is considered to be the more formal, systematic and intensive process of carrying on a scientific method of analysis.  Adeyemi and Fasina (2004) in the same vein stressed that good knowledge of research work will enable the teacher and other educators to plan and anticipate the consequences of the important decisions they have made.  The uses of research in educating among all include:

•  Assist to discover new ideas and relevant information on the relevant information on the identified problem.

•  Help establish creative and technological reasoning.

•  Assist individual and collective research work in solving local, state and national

problems.

- Help to monitor the development and progress of education programmes.

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**ACTIVITY 3**

1. Highlight various ways by which problems confronting educational research could be eliminated.

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## SUMMARY

- This unit has discussed the need and importance of educational research. It has also suggested how you can source research topics by consulting professional literature, examining relevant educational theories, falling back on your personal experiences, previous studies, professional contact and the academic supervisor, the unit ends with criteria that a worthwhile research problem must satisfy.

## ASSIGNMENT

1. Take a research project at your disposal and assess it using the evaluative criteria.

## REFERENCES

Adeyemi, B. A. & Fasina, P. A. (2004). **A Multifaceted Approach to Research Methods**.. Osogbo: Jehovah Lovelinks Press and Publisher.

Akinboye, J. O. (1999). **Simple Research Methods**. Ibadan: Less Shyrades Publishers.

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