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**EDUCATION DEPARTMENT DIPLOMA IN TECHNICAL TRAINER EDUCATION**

**UNIT OF COMPETENCE: APPLIED RESEARCH**

**COURSE OUTLINE**

**UNIT CODE: ED/B/7103/CUR/01/ ED/B/7103/OS/01**

**DURATION: 20 HOURS**

## UNIT DESCRIPTION

This unit specifies the competencies required by the trainer to facilitate the training of carrying out applied research. It involves developing a research proposal, collecting data, analyzing data, writing a research report, drafting patent applications and other legal documents and conducting monitoring and evaluation.

## SUMMARY OF LEARNING OUTCOMES

1. Develop a Research proposal
2. Collect Data
3. Analyze Data
4. Write Research Report
5. Draft patent applications and other legal documents,
6. Conduct monitoring and evaluation.

| WEEK | TOPIC | SUBTOPIC | ACTIVITIES | TIME/HOURS |
|---|---|---|---|---|
| 1 | Develop a Research proposal | • Research concepts<br>• Importance of research<br>• Research problem | • Written tests<br>• Oral | 4 |

| | | | | |
|---|---|---|---|---|
| | | • Literature review<br>• Design and methodology<br>• Research proposals<br>✓ Academic<br>✓ Action<br>• Ethical issues in research | questioning<br>• Practical | |
| 2 &3 | Collect and analyze data | • Types of data collection instruments<br>• Piloting instruments<br>• Procedure for data collection<br>• Validity and reliability of instruments<br>• Administration of instruments<br>• Field editing<br>• Quality assurance | • Practical tasks<br>• Written tests<br>• Oral questioning<br>• Observation | 4 |
| 4 &5 | Analyze data | • Qualitative data<br>• Quantitative data | • Written tests<br>• practical<br>• Oral questioning<br>• Observation | 4 |
| 6&7 | Write Research Report | • Components of research report<br>• Design of research report<br>• Ethics in Research<br>• Citations and Referencing | • Written tests<br>• Oral questioning<br>• Report | 4 |

| | | | | |
|---|---|---|---|---|
| 8 | Draft patent applications and other legal documents | • Intellectual property laws and regulations.<br>• Types of intellectual property protections and their applications<br>• Potential Intellectual property issues and risks.<br>• Drafting patent applications and other legal | • Written tests<br>• Oral questioning<br>• Interview<br>• Observation | 2 |
| 9 | Conduct Monitoring and Evaluation (M&E). | • Key concepts and principles of monitoring and evaluation.<br>• Importance of accountability and learning in M&E processes<br>• M&E Steps<br>• Design and implementation of effective M&E plans and systems<br>• Data collection tools<br>• Data analysis | • Written tests<br>• Oral questioning<br>• Interview<br>• Observation<br>• Report | 2 |

**CAT – OUT OF 100%**

Through a year-round grant competition, the Ministry of Education (MOE) is sourcing proposals for innovations that address development challenges and improve lives. MOE will provide funding for those innovations that demonstrate evidence of impact. Show why your innovation is worth the funding. Your class has been asked to participate in the above MOE venture. Based on your skill area, prepare a proposal using the KSTVET format. The proposal should be at least 10 pages. Deadline of submission is 15TH of November 2024.

**Final examination – 100%**

**References**

Babbie, E. R. (2019). The practice of social research (15th ed.)

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**TRAINING MANUAL**

**DIPLOMA IN TECHNICAL TRAINER EDUCATION APPLIED RESEARCH COURSE**

**Summary of Learning Outcomes**

1. Develop a Research proposal

2. Collect Data

3. Analyse Data

4. Write Research Report

5. Drafting patent applications and other legal documents such as IPRs,

6. Conduct monitoring and evaluation.

## UNIT 1.0 Develop a Research proposal

### 1.1 Research concepts

**Research** is a relative concept derived from the French verbs rechercher and chercher. Research stands for an activity that involves searching, investigating, search for truth or search for knowledge.

- The term research also has some technical definitions. Research may be defined as a systematic and objective analysis and recording of controlled observations that may lead to the development of generalization, principles or theories resulting in prediction and possible ultimate control of events.

- Another definition by Mugenda and Mugenda [1999] states that: research means, to carry out a diligent inquiry or a critical examination of given phenomenon. It implies exhaustive study, investigation or experimentation following some logical sequence. Therefore, research means a continued search for new knowledge and understanding of the world around us.

You may have noted the following terms used in defining research:

- Study
- Analysis
- Examination
- Investigation
- Systematic/logical sequence and so on.

**Applied research** Refers to scientific inquiry that aims to solve practical, real world problems. It focuses on using existing knowledge, theories and methods to address specific challenges or improve processes in various fields.

**1.2 Importance of Applied Research**

Knowledge check

Think pair share - Discuss the importance of applied research in teacher education

**1.3 Research proposal**

It's a plan that indicates the strategy the researcher will use to answer research questions.

♣ It is a written document that describes the purpose of a project, activities to be carried out and estimated cost.

♣ It is a written description, suggestion or design of what one intend to study and how he intends to study.

**Importance / Significance of a Research Proposal**

i. It provides a blue print of procedures to be followed in the research process defines boundaries / scope that guide the project.
ii. It contributes a basis for providing advice or guidance to the researcher by recognized authorities.
iii. It provides a basis for evaluating the adequacy of methods, design appropriateness, relevance in the proposed study.
iv. It provides a basis for soliciting funds from supporting organizations willing to sponsor the project.
v. It spells out technical material and financial needs of the study.
vi. It is a basis for communication problem, demands and needs of the society to the government, policy makers, donors, research authorities etc.
vii. It is document – contract that binds one to stated steps.
viii. It's the basis foundation of the final product i.e. research report.

**Format of a Research Proposal**

It is written in future tense using APA style

**Preliminary Pages**

**Cover page**

- Research title
- Name of the institution
- Title of the report
- Name and registration number of the student
- Name of supervisor
- Date of Submission.

**Declaration (i)**

**Table of Contents (ii)**

**List of Tables (iii)**

**Chapter One:**

**INTRODUCTION**

1.1 Background to the study

1.2 Statement of the problem

1.3 Purpose of the study

1.4 Objectives of the study

1.5 Research questions

1.6 Significance of the study

1.7 Limitations of the study

1.8 Definition of terms

1.9 Abbreviations

**CHAPTER TWO LITERATURE REVIEW**

2.1 Introduction

2.2 Review of related studies

2.3 Summary

**CHAPTER THREE METHOLODY**

3.1 Introduction

3.2 Research design

3.3 Population and Sample

3.4 Data Collection instruments

3.5 Data collection procedure

3.6 Data analysis plan

**References**

**Appendices**

Appendix A - Data collection Instruments

Appendix B - Budget and time schedules

**Explanation of the Components of the Research Proposal**

**RESEARCH PROBLEM/TITLE**

The first step in any research study is to identify and define a research problem. A **research problem** refers to some 'difficulty' which the researcher experiences in the context of either a theoretical or practical situation and wants to create a solution for the same (Kothari, 1984)

- It is an issue or any field (such as education) where the researcher would like to find an answer or solution (Cohen and Manion, 1975)

- It could be a statement that asks: what relation exists between two or more variables? The answer is what is being sought in research (Kerlinger, 1986) For instance, assume that you want to investigate '' how guidance and counselling programmes have influenced students' change in behaviour''

**Once the problem is established the following conditions are to be met**

a) There must be an individual, group or organization to which the problem can be attributed (let us call it, 'students and teachers')

b) There must be some environment(s) to which the problem pertains (say, 'the school environment') which is defined by some uncontrolled variables, such as 'school administration'

c) There must be some objective(s) to be attained (i.e. to determine how G & C programmes have influenced students' change in behaviour)

d) There must remain some doubt in the mind of a researcher with regard to the valid explanation of research problem Thus, a research problem is one, which requires a researcher to find the best solution for a given for a given.

e) The topic selected for research should be familiar and feasible so that related research materials or resources of research are within one's reach.

f) Consultation with an expert may be necessary

g) Review or published current literature available on the subject may also be necessary

**Factors/criteria considered when selecting a problem**

i. Importance of the title/topic
ii. Qualifications and training of the researcher
iii. Costs involved in carrying out the research
iv. Time to be taken on the research process
v. A subject/topic which is overdone should not be chosen. This is because it will be very difficult to shed any new light in such a case
vi. Too narrow or too vague problems should be avoided
vii. Controversial subjects/topics should not become the choice of an average research

**In light of the above, the researcher must consider the following questions**

a) Is he/she well equipped in terms of background knowledge/experience to carry out the research?

b) Does the study fall within the budget he can afford?

c) Will there be adequate co-operation from those who will participate in the research as subjects .

**Sources of Research Problem**

The most likely sources from which a researcher may identify a significant and genuine research problem are:

1. **Review of related literature**. A review of published literature such as textbooks, journals, magazines, etc. may shed some light on the most current areas/ issues that require investigation

2. **Personal experiences of the researcher**. A researcher's education and professional experience, in terms of prevailing educational practices based on little or no research evidence may serve as a good source of a problem. e.g. how does the school transition or culture influence performance?

3. **Consultation with experts and research institutions**. Consultations with an expert, research supervisor, research consultant or a senior scholar in one's area of specialization can be useful.

4. **Participation in professional discussion/forum**. Seminars, workshops and conferences provide forums for discussions and exchange of ideas with professional colleagues, which stimulates problems to be solved. E.g. HIV/AIDS awareness programmes are designed to sensitize people/students about its negative implications. By participating in these forums, the researcher is likely to improve his/her problem awareness.

5. **Social developments and technology changes**. Social changes and developments constantly bring forth new problems and new opportunities for research. For example, the development of computer applications in the operations of an organization has brought forth several issues that require investigation.

6. **A questioning attitude**. A questioning attitude towards prevailing practices and research-oriented academic experiences will effectively promote problem awareness.

i. Studying of educational policies
ii. Personal experience and observation of natural phenomenon.
iii. Reading and studying existing literature and inclusive research findings, articles, journals and professional papers presented at seminars, workshops etc.
iv. Study of scientific theories

**Characteristics/ of a good Research Problem**

1. **Relationship between variables:** A good research problem should express a relation between two or more variables. The relationship between variables, however, may not apply to qualitative research.

2. **Theoretical and /or practical significance** :The problem should be significant enough and involve an important principle or practice. Its solution should add to knowledge or lead to an improvement in the current practices.

3. **Feasibility and amenability:** Feasibility implies the suitability of the problem for research. The researcher should be able to carry out the study through to its successful conclusion. He/she should possess the required competence, knowledge and understanding related to the selected area of study.

4. **Availability of data**: The researcher should ensure the availability of adequate valid reliable data. This is necessary because, it will be on the basis of this data that evidence will be drawn to support research findings or conclusions.

5. **Novelty:** The problem should be sufficiently original so that it does not involve objectionable duplication.

6. **Interesting** :The problem should be interesting to the investigator. The investigator should have strong motivation for it. This will give him/her the courage and determination to pursue the study in spite of difficulties that may be involved. He/she should be willing to risk criticisms.

7. **Empirical Testing** ;We can decide whether to use quantitative or qualitative methodology. This implies that the variables of the relation can somehow be measured.

**NB:**

**Research title the title a research title should be:**

i. descriptive, short, clear, self-explanatory and specific
ii. It should capture and reflect the content of the research proposal
iii. The title should clearly indicate the problem, the purpose of the research
iv. Avoid any obscure technical terms within the title

**Task**

Now that you have read about the title, think about an area of study that may be of interest to you. Write a title for your study. Ensure it has the qualities mentioned. Identify a study problem which is applicable in nature.

**ABSTRACT**

Is a short summary of a research. It should be concise, explaining ones work as brief and clearly as possible.

**Areas captured in the abstract**

- Introduction
- Purpose
- Method
- Results
- Conclusion

**Note: Abstract is part of research report.**

## CHAPTER ONE: INTRODUCTION

### Background to the Study

Is a brief overview of the problem the researcher aspires to tackle. Its role is to:

- Help clarify what brought about the need for the study
- Points out the challenges faced due to identified issue
- Indicates the opportunities of improvement
- Helps to convince the reader that the problem exists and it should be addressed.

**Factors to consider when writing the Background of the study**

- Content should be brief, specific and give overview of the problem regarding the following perspectives ( Global, Africa, Kenya and area of study)
- Language used should be simple and straight forward
- Previous studies that justify what authors are proposing are cited

**Statement of the Problem**

Refers to an issue or concern that puzzles the researcher. This may be due to its effect or consistence despite measures taken.

**Qualities of an effective Statement of Problem**

- Should be clearly stated
- Should have impact on the whole topic being investigated.
- Clearly indicates the urgency of the research
- The problem is researchable
- The problem has supported statements
- Language used is simple

**Purpose of the Study**

This shows the general intention of the study under investigation**.** It mainly reflects the title of the study.

**Objectives of the Study**

Objectives are intentions of the study and are stated in specific measurable terms. They specify what the researcher will do in the study.

**Importance of the Objectives of the Study**

- Guide decisions in selection of respondents
- Influence all components of the research design including data analysis and report writing
- Helps to limit the scope of the literature review
- Serve to clarify the variables of the study

- They serve as a guide for evaluation
- Provide common consistent focus for the many activities in research.

**Research questions/hypothesis**

**Research questions**

These are issues that the researcher seeks to answer. They are related to the research objectives. These questions guide the research process by addressing the variables of the study.

**Research Hypothesis**

This is a guess or an assumption. It is a statement that describes an unknown but tentatively reasonable outcome for the existing problem.

-It is a tentative answer to what the researcher as ought to be the possible outcome of the existing problem

**Ways of Stating the Hypothesis**

They include;

- Null form
- Alternative form

**NULL FORM**

- It states that **there is no difference between the variables studied**.
- So the results are rejected or nullified
- NULL is symbolized by H0
- When writing, it is based to the research objectives eg H01, H02…..

**EXAMPLE**

H01: There is no significant difference between …… and ……in KSTVET, Nairobi County, Kenya (area of study) (Derived from obj 1)

H02: There is no significant difference between…. and……in (area of study)(derived from obj2)

**ALTERNATIVE HYPOTHESIS**

- States a value or relationship in the null is not true. In research the null hypothesis is tested and if rejected, the alternative is accepted.
- Alternative is opposite of null
- It is symbolized by H1

  **EXAMPLE**

  H1: There is a significant difference between perception and attitude of learners towards STEM courses in KSTVET, Nairobi County, Kenya.

**TYPES OF ALTERNATIVE HYPOTHESIS**

They include;

- Alternative directional hypothesis
- Alternative non- directional hypothesis

**Alternative directional hypothesis**

- Proposes that there is a difference between variables and suggests the direction of the difference

**EXAMPLE**

H1: The rural based pupils outperform the urban based pupils in KCPE examination in Nairobi County, Kenya.

**Alternative non- directional hypothesis**

- States that there is a difference between variables but fails to provide the direction of the difference

EXAMPLE

H1: There is a difference in performance between rural and urban based pupils at KCPE examination in Nairobi County, Kenya.

**Importance of hypothesis**

i) It states the researchers expectations concerning expectations concerning the relationship between the variables in the research problem
ii) They refines the research problem
iii) Enables the researcher to collect data that either supports or rejects the hypothesis

**Significance of the Study**

This section outlines the importance of the issue at hand. The study states the stakeholders who may benefit from the study

**Limitations of the Study**

The section indicates the challenges anticipated by the researcher. It also explains how the researcher plans to solve the challenges identified**.**

## Definition of terms

In this section the researcher gives operational definitions of selected terms used in the study. They are arranged alphabetically.

**Abbreviations**

All the abbreviations used in the study are outlined in this section. They are arranged alphabetically.

**CHAPTER TWO: LITERATURE REVIEW**

It would be of interest to note that: "Research starts in the library and ends in the library." What is literature review? Visualize the term review and list all the words that cross your mind. According to Webster's Advanced Learners' Dictionary (1980) literature review means:

- See again
- Examine or study again
- To re-examine judicially
- To look back
- To take a retrospective view of
- To examine critically or deliberately
- To give a critical evaluation of.

Thus, in the context of research, **literature review means**:

- Locating literature in a variety of sources,
- Reading it carefully and thoroughly,
- Evaluating the content
- Breaking it down into themes • Organizing it along the themes of the study.

**In conclusion**, the literature review is a systematic and critical analysis of existing literature relevant to the current research topic. It involves reading an appropriate proportion of the extensive literature that is available. It is basically a method of acquiring information.

**Purposes of literature review**

The literature study serves the following purposes:

- Define and limit the research problem (delineate the research problem).
- Seek new approaches and recommendations for doing research and avoid sterile approaches.
- Gain understanding and insights into other methods of doing research and the trends that have occurred.

• Develop a clear research design. The researcher will be able to identify strengths and limitations of research methods used by others, in order to adopt or improve on them in his/her own research.

• Sharpen and deepen the theoretical framework of the study

• Share with the readers the results of other studies that are closely related to the study being reported. • Relates a study to a larger, ongoing dialogue in the literature about a topic, filling in gaps and extending prior studies so that the researcher will be able to add to existing knowledge and introduce new ideas and perspectives.

• Clarify the relationship between the proposed study and previous work on the topic, this gives the researcher an idea of what has already been done. It also reveals the latest development in the area of study.

• Identify variables that must be considered in the research.

• Avoid unnecessary replication. You should conduct a thorough literature study to be able to select a problem that has not been exhausted by other research studies. However, deliberate replication of a study for verification or challenge is acceptable. Literature in any field forms the foundation upon which all future research must be built. It helps avoid naivety and minimizes duplication of identical work already conducted and accomplished by other researchers. Indeed, all these reasons are helpful to a researcher. But, did you know that "Research' without theory is blind, and theory without practical focus is Empty". Keep in mind that you should make every effort to complete a thorough review before starting the research. This is because the insights and knowledge you have gained through the review almost inevitably lead to a better-designed project and greatly improve the chances of obtaining important and significant results.

**NOTE**

Keya and Makau (1989) came up with these reasons for literature search as follows; that literature review is a continuous process that cuts across all stages of the research process in a dynamic way. As the researcher argues her/his case, she/he shows how the study will enlarge modify, depart from or compliment existing knowledge. Thus, the literature review helps to make the problem apparent when done comprehensively and critically. To conclude the review of literature is the very first step in proposal writing and must be carried out well. A good literature review saves time later in the process of conducting research and forms the framework within which the research findings are to be interpreted. It demonstrates the researcher's familiarity with the existing body of knowledge which in turn increases the readers' confidence in the researcher's professional ability. You can also source problems for further research from the suggestions and recommendations made by previous researchers as you review the literature.

**How to organize the literature review section**

Some suggestions include:

• You need to be clear on the headings and sub-headings of the whole study, which then become the lines upon which the literature review will be organized.

- It involves locating, reading and evaluating reports of research and those of casual observation and opinion that are related to the individual planned research project.

- A short introductory paragraph should be included at the beginning of the literature review section. You should then tie up the existing literature with objectives of the study –

Finally, you should summarize main ideas and issues of the literature review towards the end of the section.

**Activity**

List down some of the sources of information you would use to locate literature for your study. Compare your answer with the ones outlined here below.

Sources of information in locating and using educational research

There are three major sources of information namely: preliminary, primary and secondary.

**Preliminary sources**:

These are used to locate books, articles and other educational documents related to the research problem. Most preliminary sources are indexes, which give the author, title and place of publication.

**Primary Sources**:

These are the original research and writings of researchers. They include research articles in journals, abstracts, research reports, and scholarly books. Most primary sources are journals and they contain more up-to-date information than secondary sources. An individual who actually observed or witnessed an occurrence could also describe it directly. More examples of primary sources are: - Development plans - District annual reports - Court-case judgments Secondary sources: these are publications written by an author who was not a direct observer or participant in the events described; but is reporting on research conducted by someone else. Examples are: - Review papers - Text books - Encyclopaedias - Summaries - Citations of other works - Journal articles These sources can be used to track down references to primary sources. You need to develop a systematic approach to literature study from the very beginning.

- Be familiar with all the library facilities.

- Consult subject abstracts [which provide a summary of articles] reviews, indexes [which list the bibliographical details of articles by subject]

- Bibliographies

- Library catalogues, which come in various formats (, for example, hard copy, CDROM, on-line and microfiche).

- The Internet. Ask the following questions when reviewing and selecting material:

i) Is the literature relevant to my study?
ii) Why am I including this study or reference?

iii) How will the source contribute to my study?

iv) Is it a primary source? If not, how can I access the primary sources? v) Is the source reliable?

v) Is the source up-to-date? It is essential to begin with a clear idea of your research topic.

**Secondary sources**

Refer to works that interpret, analyze or summarize primary research**. Examples:**

- Review articles
- Books and books chapters
- Dissertations and theses
- Conference papers
- Government or institution reports
- News articles and media reports
- Review papers in academic journals

**NOTE**

A literature study should be purposeful and logical to avoid time wasting by wading through irrelevant literature.

- Keep an accurate and up-to-date list of all the sources you consult.

- Keep a record of where you found the material. You can use a card as illustrated herein: Author, year, title, publisher, Town, page, location in the library. Some key words describing the nature and content of the source. You could use a computer and develop your own system. Adopt a system to organize your material, for example, classifying material according to topics and or the chapters of your thesis. Keep a separate Box File for each chapter in which you place the material that pertains to specific chapters. Literature review is an ongoing process that requires a great deal of: - Self discipline - Perseverance - Persistence You, therefore, need to remain focused and to use your time expediently and efficiently.

- Include only the necessary and relevant information.

- Avoid repetition of what has already been written

- Be open and challenge even the works of famous theorists (thus, adapting a constructive critical approach)

- Do not report everything you now know. Be selective and include only essential and valuable sources.

- Keep focused on your research problem avoiding time wasting on emerging issues. To conclude, the key to completion of a research study is: - Commitment - Perseverance - Consistent handwork A lot more is given by Mugenda and Mugenda (1999) who have given some examples of sources of information (p.23) as:

- Scholarly journals

- Internet websites
- Theses dissertations
- Government documents
- Conference research papers
- Books
- References given at the back of the book
- International indices
- Abstracts
- Periodicals like magazines local dailies or journals published periodically

**The eight (8) steps in reviewing educational literature**

- Define the problem.
- Review secondary sources.
- Select the most appropriate preliminary sources.
- Translate the problem statement into key words.
- Search the preliminary sources. • Read primary sources: Make the cards.
- Organize the notes.
- Write the report.

**Activity**

1. Choose a topic of interest and write a three-page literature review based on this 8-step model.

2. Answer the following Review Questions:

i) Discuss the significance of literature review
ii) Describe how a researcher can draw tentative hypotheses from a review of literature.
iii) List four indicators of a good literature review.

## CHAPTER THREE: METHODOLOGY

### RESEARCH DESIGN

A research design is the overall strategy used by the researcher as a means of collecting and analyzing data in order to test research hypotheses or to answer research questions.

**Types of research designs**

**1. Experimental designs**

Experimental research designs use the symbols discussed herein:

R = Random selection of subjects and assignment to experimental and control groups.

X = Experimental treatment (variable) applied.

C = Control condition.

O = Observation or test. - = A line between levels indicates equivalence of groups.

**Characteristics of experimental designs**

- They employ randomization to provide for equivalence between experimental and control groups.

- They are the strongest type though difficult to arrange especially in social sciences, but used whenever possible.

i) The post – test only, equivalent groups R X O1 R C O2

- The experimental and control groups era equated by randomization. b) The Solomon four – groups design, for example, R O1 X O2 R O2 C O4 R X O5 R X O6

i) Subjects randomly assigned to four groups
ii) Two groups receive treatment (x)
iii) One experimental group receives a protest (01).
iv) Two control groups receive no treatment.
v) One control group receives a pro-test.

**2. Survey designs (survey research)**

These are research designs which study large and small populations (or universe) by selecting and studying samples chosen from the population to discover the relative incidence, distribution and interactions of variables. They employ a flow plan or chart to outline the design and subsequent implementation of a survey. The flow plan starts with the objectives of the survey, lists each step to be taken and ends with a final report

**3. Exploratory design (field studies)**

The exploratory design is mainly used in qualitative studies. It is a non-experimental scientific investigation aimed at discovering the relation and interaction between variables in real social structures. The investigation in a field study first looks at a social or institutional situation and then studies the relation among the attitude, values, perceptions and behaviours of individuals and groups in the situation. Data is mainly collected through observation and interviews. Purpose of exploratory study is to discover significant variables in the field situation; to discover relations among variables; and to lay groundwork for later, more systematic and vigorous testing

of hypothesis. **Exploratory research primarily uses qualitative research**. Formulating objectives of the study Sampling and Sampling Design Designing methods of data collection and constructing instrument Collection of data, time and location Processing, coding, tabulation and analysis of data Interpretation and reporting of findings Validity and reliability of a research design The two essential characteristics of research designs in terms of the arrangement of conditions that ensures relevance to the research purpose and accuracy of results are:

i) Reliability
ii) Validity

**Reliability**

It means the consistency or accuracy of the research instrument, in measuring whatever it measures. It is the degree to which an instrument will give similar results for the same individuals at different times. Statistically, or in any measurement process, theory assumes that there is an 'error' contained in all forms of measurements. An observation score can be seen as consisting of two parts, namely:

- The individual's 'true score'

- An 'error score', which is due to the inaccuracy in measurement 'True score' + 'error' = 'observation score' Reliability is related to these scores. If scores have large error components, then reliability is low, but if there is little error in the scores, then reliability is high. Reliability is thus a statistical concept based on the association between two sets of scores representing the measurement of individuals on two different occasions.

**Validity**

Validity refers to the extent to which a measurement does what it is supposed to do. Validity may be determined by use of well-devised research designs which:

- Provides a good strategy for the hypothesis (es) or answering research questions

- This means an adequate plan of procedures for data collection and analysis that should be undertaken to evaluate a particular theoretical perspective: accurately and purposefully.

**Internal validity**:

refers to the extent to which relationships between independent and dependent variables in a research study can be said to be genuine. It implies the minimum control arrangement of conditions necessary to interpret the results. It is concerned with the adequacy of procedures for collection and analysis of data and interpretation of results in a manner that is relevant to the research purpose. Specifically, it refers to the extent to which the independent variable (s) can be said to have a genuine effect on the dependent variable(s). Internal validity, therefore deals with the degree of control of the influence of extraneous and other variables factors.

**Activity**

Find out the meaning of extraneous variables

**External validity**:

refers to the, extent to which the research findings / results can be generalized to other populations, other than the research setting. It is concerned with such questions as:

i) To what group of people can the findings be generalized?
ii) In which type of settings and under what conditions can the results be generalized
iii) To what other variables, situations and so forth do the results generalize? Thus, external validity is a matter of sampling .The broader or wider, the sampling from a given population, (for example, work, home school), and conditions (for example, work demand, income levels, educational attainment), the greater the independent – dependent variables relation. Factors affecting internal validity

- History History is made up of specific external events beyond the control of the researcher that may have stimulating or disturbing effect on the performance of subject. It is also made up of the unanticipated events occurring while the research is in progress that can affect the dependent variable. Examples are anxiety, emotional stress and fatigue.
- Maturation Maturation refers to progress operating within the subject as a function of time. It includes the physical and mental changes of subjects over a period of time. Examples are: a subject may become tired, bored or wiser, etcetera leading to reduced or increased effect on final observation
- Instrumentation An instrument is valid for a particular purpose and group. Example: an interview schedule designed for CBD employees in a service industry cannot be valid for employees in a manufacturing concern. Instrumentation is an effect due to inconsistent use of measuring instruments. For instance: o A questionnaire may be changed between pre-test and post-test. This change is like likely to result in an effect that is independent of the effect due to the research variables. o In observation, observers may become tired, acquire a second dimension and behave as if they were 'only human'.

- Testing (effect of pre-testing) When a pre-test is given, it is possible that the initial experience with the test during the first assessment period can cause inflated (exaggerated) scores on the second measure. Subjects become "aware" after the first test, so that improved scores on the second tests threaten the internal validity.

**Statistical regression**

This occurs when a sample which is extreme on some variable is selected, for example, poor readers, and remedial groups, etcetera. The group is usually obtained by using some measurement in the first instance, if a second measure is administered with the purpose of variable. An extreme group, initially below the mean will, on second testing, seem to have improved even if it has no treatment whatsoever.

- Selection (maturation interaction) A combination of differential selection and maturation produce a joint (interaction) effect, either additional to or in the absence of any biases resulting from the two separately. Example: A group of delinquents treated over a period of some years might show substantially greater gains on behaviours rating compared to a 'normal' group solely because of selection bias' and maturation ( long period ) effects. Factors affecting external validity a) Interaction

between testing and experimental variable Subjects may be extremely sensitized by the pre-tests, which may have serious effects on the influence of experimental variation.

4. **Correlation Design**

This design enables the researcher to assess the degree of relationship that exist between two or more variables.

5. **Case Study Design**

This design seeks to describe a unit in detail, in context and holistically. It's a way of organizing data and looking at the object to be studied as a whole.

6. **Cross Cultural Design**

This is used to compare the behaviour patterns of different cultures. Using this design you can perceive how various cultures perceive certain social outcomes.

**OTHER RESEARCH DESIGNS INCLUDE**

- Historical
- Longitudinal etc

**Knowledge Check**

Discuss the advantages and disadvantages of the various research designs

## Population and Sample

Population is a group of individuals ,objects or items from which samples are taken for measurement. The population has at least one thing in common.

## Sample

Refers to a subset of a population that is selected for a study or experimentation. The sample should ideally represent the population to ensure that the findings are generalizable.

## Sampling Techniques/Methods/Designs

**Sampling** is the procedure a researcher uses to gather people, places or things to study. The **sampling method or technique or Design refers** to that part of the research plan that indicates how cases are to be selected for observation. The designs are divided into TWO broad areas:

i. Probability sampling
ii. Non- Probability sampling

**Probability Sampling**

The key component behind Probability sampling is randomization, or random selection. Thus each unit in the population has an equal chance of being selected. Various methods have been established to accomplish probability sampling. They include:

- Simple random sampling
- Stratified random sampling
- Systematic random sampling
- Cluster random sampling

**Simple Random Sampling**

This is a procedure in which all the individuals in the defined population have an equal chance of selection. For example selecting papers with YES and NO marks and those who pick the papers marked YES are the ones selected.

**Stratified Random Sampling**

This involves dividing the population into homogeneous subgroups and then taking simple random sampling in each subgroup.

**Systematic Random Sampling**

This involves selecting respondents following an interval. This method is appropriate when the list of population is high. Example selecting every $20^{th}$ from the list.

**Cluster Random Sampling**

In the event that the population is dispersed across a wide geographical region, one may have to use cluster random sampling. This method allows for the division of the population into clusters and then apply random sampling of everyone in those clusters.

**NON – PROBABILITY SAMPLING**

In this method the researcher is interested in the representativeness of the concepts in their varying forms. This method is mainly applied to find out how a small group or representative group is doing for the purpose of illustration or explanation. The methods include:

- Quota sampling
- Convenience sampling
- Purposive sampling
- Snowball sampling

**Quota Sampling**

The sampling technique begins by dividing the population into relevant strata such as age, gender, region etc**.** The total sample is allocated among the strata in direct proportion to their estimated or actual size in the population**.** Once the researcher identifies the people to be studied, they have to resort to haphazard sampling because no efforts is usually made to contact people who are difficult to reach in the quota.

**Convenience Sampling**

This method is based on using people who the researcher meets haphazardly. For example using people who happen to be passing by, or show interest in your research.

**Purposive Sampling**

In this method, the researcher purposely targets a group of people believed to be reliable for the study.

**Snowball Sampling**

Is a method used in research to recruit participants by asking current participants to identify potential new subjects.

**Data Collection Instruments**

There are various data collection instruments namely:

**Questionnaires**

It is a set of printed or written questions within a choice of answers for survey and studying purpose

**Advantages**

i) information can be collected from a large sample and diverse regions
ii) confidentiality is upheld
iii) saves on time
iv) since they are presented in paper format there is no opportunity for interviewer bias

**Disadvantages**

i) Responses rate can be quite low
ii) There is no direct contact so the researcher cannot deal with any misunderstanding
iii) There is no opportunity to ask for further information related to answers given
iv) No clear reason can be given for incomplete responses

**Interviews**

These are questions that are asked orally

**Forms of interviews**

i) Unstructured interviews
ii) Structured interviews

**Unstructured interviews**

The researcher has some idea in mind of the topics to be covered and may use some sort of topic list as a reminder

**Advantages of unstructured interviews**

i) They are flexible
ii) The respondent feels part of the team since no rigidity is displayed
iii) Answers given are more reliable
iv) It allows the interviewer to be responsive to individual differences and situational characteristics

**Disadvantages**

i) They are time consuming
ii) Can get out of control when the researcher is not careful
iii) Since there is no set format for conducting these interviews ,it is difficult to systematize and analyze data
iv) They are not systematic as a respondent can comment on issues in a haphazard way

**Semi –structured interviews**

These are interviews based on the use of an interview guide with written list of questions or topics that need to be covered by the interviewer

**Types of semi structured interviews**

i) Focused interviews –investigate a particular topic
ii) Case studies –collect comprehensive ,systematic and in depth information about a particular case of interest

**Advantages of semi structured interviews**

i) They are flexible
ii) In-depth information is collected
iii) The researcher gets complete and detailed understanding of the issue under research

**Disadvantages**

i) They are time consuming
ii) Analysis if data may be problematic

**Structured interviews**

**Advantages**

i) The reliability of the information gathered is high
ii) It gives in-depth information about particular cases of interest to the researcher
iii) It is systematic
iv) It is time saving
v) The researcher gets a complete and detailed understanding of the issue from the respondent
vi) It is comprehensive and systematic since questions are formulated before the interviewer
vii) The data collected is quantifiable

**Disadvantages**

i) The rigidity displayed by the researcher can affect the responses given
ii) It is too formal
iii) The researcher may miss out on some important points that are not included in the questions formulated

**3 Focus Group Discussions**

This is a special type of group in terms of its purpose, size, composition and procedures. A focus group is composed of 6 to 8 individuals who share same characteristics which are relevant to the study. Special criteria is used in selecting focus group participants

**4 Observations**

This is a tool that provides information about actual behaviour. Direct observation is useful because some behaviour involves habitual routines of which people are hardly aware .

**Forms of observation**

i) participant observation
ii) unstructured observation
iii) structured observation

**5 Standardized tests**

Standardized test of one sort or another are used in most educational research studies. There are different types of test that one may consider for use in their study. Commonly used test are:

i) achievable tests
ii) personality tests
iii) aptitude tests including tests of academic aptitude intelligence tests

**Characteristics of standardized tests**

Validity-a test that measures how well a test measures what it is supposed to measure

Reliability –is a measure of how consistent the results from a test are

The reliability of the test is the answer to the question

6. **Document analysis……**

**Activity**

1. In pairs, compare and contrast qualitative and quantitative research (25 Marks)

**Data collection procedure**

In this section, the researcher outlines in order the activities which will take place during data collection

**Data analysis plan**

In this section, the researcher outlines how qualitative and quantitative data will be analyzed and presented.

**References**

Done following APA format

**APPENDICES**

**It entails:**

**APPENDIX I : research instrument 1 eg Questionnaires for the principals**

**APPENDIX II: Research instrument 2 eg Interview schedule for the HODs …**

**APPENDIX III: BUDGET**

**APPENDIX IV: WORK PLAN**

**……END OF PROPOSAL……..**

**REPORT WRITING**

This refers to the process of presenting the findings, methodology and analysis of of research project in a clear, structured and formal written format.

- It is written in past tense. Meaning the content in the proposal is the one changed to past tense
- In the preliminary pages there is addition of List of tables and of figures, declaration, dedication, acknowledgement
- In THE **ABSTRACT** there s additional content on research findings, conclusion and recommendations.
- **After CHAPTER THREE**, there is addition of **CHAPTER FOUR AND FIVE**
- **IN THE APPENDICES, WORKPLAN AND BUDGET ARE NOT INCLUDED**

**CHAPTER FOUR; DATA ANALYSIS AND INTERPRETATION**

In this chapter, the researcher analyses the findings, presents and discusses them.

**DATA PRESENTATION**

There are 3 ways of presenting data after analysis. They are;

- Using statistical techniques
- Using graphical techniques
- Using a combination of both

**A) Statistical techniques**

This are a set of mathematical methods used to extract and clarify information from observed data. They include;

i) Frequency distributions
ii) Measures of central tendency
iii) Measures of dispersion

**Frequency distributions**

This captures grouped or ungrouped data which constitutes a distribution

**Example of ungrouped data**

11, 24, 18, 23, 30, 12

**Examples of grouped data**

7-9, 10-12, 13- 15, 16-18, 19-21

**Measures of central tendency**

These are numbers that define the location of a distribution's Centre. They include;

**Mean**- This is **average**. It is found by the sum total divided by the number

**Median**- Is a set of ungrouped data.it is the **middle** value of the entire distribution

**Mode**- Is the value that occurs **most often**

**Measures of dispersion**

It describes how much the distribution varies around the central point. The measures include;

**Range**- Is the difference between the highest and lowest values in the data eg7-9, 10-12, 13- 15, 16-18, 19-21 here the range is **2 ie 9-7 =2, 12-10= 2 etc**

**Variance:** Is the measure that indicates the distribution of data. Is the difference from the **mean**

**Standard deviation-** Is the square root of the variance

**EXAMPLE OF A TABLE SHOWING MEASURES OF DISPERSION**

**Data**

17, 15,23,9,3,13

a) Mean 17+15+23+9+3+13 divides by 6 = 14

b) Variance see the table

| X | - X(mean) | - **x-x(x minus mean)** | - **(x-x)2** |
|---|---|---|---|
| **17** | **14** | **17-14=3** | **9** |
| **15** | **14** | **15-14=1** | **1** |
| **23** | **14** | **23-14=9** | **81** |
| **7** | **14** | **7-14=-7** | **49** |
| **9** | **14** | **9-14=-5** | **25** |
| **13** | **14** | **13-14=-1** | **1** |
| **84** | **14** | | **166( variance)** |

C Standard deviation

Square root = x minus mean squared divide by n minus 1

166 over 6-1

N= 166 divide by 5 =33.5

B) **GRAPHICAL PRESENTATION**

This can be done by use of;

- Graphs eg bar graphs, histogram, polygon or cumulative frequency curve
- Pie charts
-

**CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS**

This chapter summarizes the whole research process. It provides brief summary of the main findings, conclusions and recommendations. The chapter should be reasonably short.

**Summary**

The researcher should identify the findings of the study and discuss them briefly.

**Conclusion**

Should indicate what the study results reaffirm. It should also briefly discuss some of the strategies highlighted by the respondents. In this section the researcher should clearly state how the study has contributed to **knowledge.**

**Recommendations**

This section exposes further problems and introduces more questions. The researcher is expected to make suggestions about how his/her work can be improved and also based on the study findings, point out whether there are areas that that deserve further investigations.

**MORE NOTES ON REPORT WRITTING**

**Introduction**

This topic will enable you to be conversant with the format of writing a research report, how to disseminate the research findings and to identify some of the challenges in educational research. The focus is the research report format. The dissemination of research findings is explained. Lastly, the challenges of educational research are presented.

**LEARNING OUTCOMES**: By the end of the lesoon the learner should be able to:

- Define a research report
- Prepare a report following the stipulated format
- Discuss ways of dissemination of research findings
- Discuss challenges in educational research.

**Research report format**

A research report is a document that informs you of the problem the researcher initially set out to investigate, the method of investigation used and the researcher's findings. The Report should present data fully and adequately including accurate interpretation of the analyses of such data relating findings back to the objectives, hypotheses or research questions. A report must therefore be formal, precise and economical. It must be consistent with an orderly flow of ideas from the beginning of the document to the end.

**Activity**

Come up with your own definition of a research report? Compare your version with the previous discussion. The organization of the research report essentially follows the format used in developing the research proposal. Recall the major components of proposal writing in section two. A well-written research report comprises a number of distinct sections or components.

**Suggested outline of parts of a Research report**:

**I) Preliminary pages**

- Title page

Dedication page

- Acknowledgement
- Abstract
- Table of contents
- List of tables (if any)
- List of figures (if any)

**II) Main body of the report**
**CHAPTER ONE: INTRODUCTION**

Background of the study

- Statement of the problem
- Literature review
- Statement of hypotheses/research questions,
- Definition of key terms
- Scope and plan of development [organization]

**CHAPTER TWO: LITERATURE REVIEW**

**……**

**CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY**

- Research design
- The sample
- Research Instruments
- Procedure

**CHAPTER FOUR: DATA ANALYSIS**

Research findings

**CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

- Summary
- Conclusions
- Recommendations

**References**

**Appendices**

Each component of a research report is described briefly. You can greatly improve on the quality of your report if you follow the guidelines.

**The preliminary pages:** The preliminary pages introduce the research report; so that you can get some idea of what the report is about, who has helped in its making and how it is organized. It indicates where tables, figures and illustrations (if any) are located within the body of the research.

**Title page:** This should be as it was designed in the proposal. The title page should give the title of the report, and bear the author's name, institutional affiliation and the date the report was finalized. The title, which should be brief and simple yet informative (15 words or less is recommended). It should be self-explanatory to give readers what the article is all about. The title should identify the major variable of the research, the target population and if possible, the geographical location of the research.

**Dedication**

Dedications are especially common in academic research reports [thesis, dissertations]. Some researchers dedicate their work, to a person(s) they consider special in their lives. You could do the same to a person of your choice for example a spouse, children, parents or very dear friends. Sometimes the author may give a reason for the dedication.

**Acknowledgements**

In this sub-section, the researcher expresses gratitude to those people who have significantly contributed to the completion of the study by name such as donors, professional colleagues,

supervisors, institutions of affiliation, research assistants and all the respondents collectively. Make a general statement to recognize all contributors. Keep this section as short as possible.

**Abstract**

The abstract should be placed at the front of the report preferably after the table of contents, but on a separate page. It should enable the reader to determine the problem of the study, the purpose of the study, the population studied, the methods of a data collection, the analysis and the major findings and conclusions of the study. A good abstract is a brief report that makes it possible for the reader to grasp the reports significant information at a glance. Abstracts should be written after the report has been completed. It should be short, not more that half a page long [100-300 words, double spaced] type written.

**Activity**

Write an abstract of your research report to give a mini report of what is contained in the document.

**Table of contents**

**ETHICAL CONSIDERATONS**

Ethical considerations govern the researcher when doing the study. They include:

**Informed consent**: Researcher should seek consent from the participants so as to participate in the study.

**Confidentiality**: Researcher should uphold confidentiality regarding participant's information

**Non- Maleficence (Do no harm):** Researchers must avoid causing harm to participants whether physical, psychological or emotional.

**Beneficence**: The researcher should aim to benefit society or the participants themselves. The study should have potential to contribute to knowledge.

**Integrity and honesty**: Researchers must conduct their studies with honest and integrity.

**Justice:** fairness in research involves ensuring that benefits of the research are shared with fairness.

**Respect for participants**: Researcher should treat participants with dignity and respect.

**Plagiarism**: Is the act of using someone else work without giving them proper credit.

**Activity**

Discuss more ethical considerations in research