A STUDY OF STATISTICAL METHODS IN EDUCATION AND LIBRARY AND INFORMATION SCIENCE POSTGRADUATE THESES AND DISSERTATIONS OF AHMADU BELLO UNIVERSITY, ZARIA, 1987 TO 1997

BY

HABIBA KATE GARBA

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE
AHMADU BELLO UNIVERSITY,
ZARIA

JULY, 2000

A STUDY OF STATISTICAL METHODS IN EDUCATION AND LIBRARY AND INFORMATION SCIENCE POSTGRADUATE THESES AND DISSERTATIONS OF AHMADU BELLO UNIVERSITY, ZARIA, 1987 TO 1997

HABIBA KATE GARBA

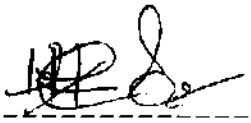
A THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL, AHMADU BELLO UNIVERSITY, ZARIA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF LIBRARY AND INFORMATION SCIENCE.

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE,
AHMADU BELLO UNIVERSITY,
ZARIA

JULY, 2000

DECLARATION

I hereby declare that this thesis has been undertaken by me and that it is a record of my research work. It has not been accepted in any previous application for higher degree. All the sources of information are specially acknowledged by means of references.



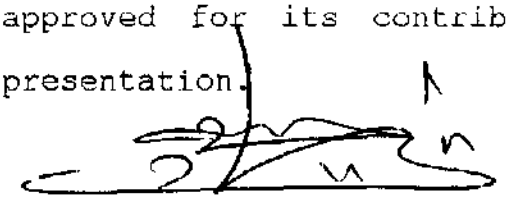
Garba, H.K

10/8/2000

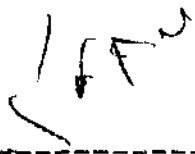
Date

CERTIFICATION

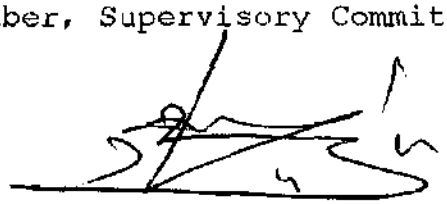
This Thesis entitled "A STUDY OF STATISTICAL METHODS IN EDUCATION AND LIBRARY AND INFORMATION SCIENCE POSTGRADUATE THESES AND DISSERTATIONS OF AHMADU BELLO UNIVERSITY ZARIA, 1987 TO 1997". by GARBA, HABIBA KATE meets the regulations governing the award of the Degree of Masters of Library and Information Science, Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.



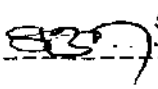
Dr. Zakari, Mohammed — Date 10/8/2000.
Chairman, Supervisory Committee



Mr. John Otim — Date Aug 13th 2000
Member, Supervisory Committee



Dr. Zakari, Mohammed — Date 10/8/2000
Head, Department of Library and
Information Science



Dean, Postgraduate School — Date 25/03/01

DEDICATION

This thesis is Dedicated to

My Heavenly father, the Almighty God,

My Husband S.U. Akpoo, my children

and

all women of Great Courage, Great Understanding, and Great Faith especially my late sister Mrs Lydia D. Zock.

ACKNOWLEDGEMENTS

To my Heavenly father, the Almighty God, through our Lord Jesus Christ, the one who was, who is and who will be, to Him be the Glory for all His provisions, wisdom and leadership throughout my MLS degree programme. I thank Him for making the successful completion of this course a reality despite all odds. To Him, I give all praises, Honour and Adoration. I worship His majesty Amen.

I would like to extend my sincere appreciation to Dr. Mohammed Zakari my able supervisor and Head of Department. I am particularly indebted to him for his invaluable advice and encouragement, assisting me out of my endless problems by way of making pertinent comments and suggestions through out this work despite his tight schedule. And, to professor Michael Afolabi who went through the work half way with me, I say thank you. May God bless you both abundantly, in Jesus Christ Name. Amen.

My sincere and profound gratitude is also to my Head of Department (PRS) Dr. Engr. F.I Soribe, My Deputy Directors, Mr. S.A Sonoiki and Mr M Afanda. My A.D Mrs M. Iyela, Alhaji A.A Alani my head of section, Isa H. Segun Garba my small brother, my colleagues in the library and all the staff of the Department of Planning Research and statistic, M FCT for their

interest in the progress of my work and their moral support.

A special thank you to Mr John Otim, Mr Boman for your useful suggestions, encouragement and materials for this work. Others to whom I must express my gratitude are the lecturers and member of staff of library and information science department, A.B.U Zaria. They have all in one way or the other, enlightened and encouraged me in the course of this academic pursuit. To them all, I say a big thank you.

My appreciation also goes to my numerous friends Tamar for being there always. Rhodisco for your support, Esther for the pains you took to always get in touch. Tina, Rahab, Mrs Fibi, Mr & Mrs Elisha, Oga Sam and fidel of A.B.U. Bernie, My postgraduate friends and colleagues. To my sisters and brothers, especially Mr & Mrs Ibrahim, for their love, financial support, understanding and prayers that provided me the necessary strong backing that saw me through this work. And also to Zainab and Fati for your company.

I wish to express my heart felt gratitude to Bishops P.Y Jatau, J.D Bagobiri, Rev Fr. Tony Mallam, for your prayers and support. And to my dear and beloved parents Mr & Mrs Garba for giving me the foundation for this present work. I feel highly indebted to them all for the priceless and invaluable support they provided me.

ABSTRACT

The objective of the study was to analyse and determine the research and statistical methods used in the postgraduate theses and dissertations of Education and Library and Information Science Departments of Ahmadu Bello University, Zaria from 1987 to 1997.

Titles of completed theses and dissertation approved and submitted to the Departments of Education and Library and Information Science and were available to the researcher during the period of study constituted the population of the study. 279 titles of these theses and dissertations were compared and analyzed.

The method adopted for this study was the documentary method. The theses and dissertations of the two Departments were physically examined using evaluative and content analysis method. The result showed that in terms of statistical methods used, Post graduate students of Education department used more of inferential statistics in the analysis of their theses and dissertations than those of Library and Information Science Department which are mostly descriptive in nature. However, there are some theses and dissertations from both Departments that did not use any form of statistics. In terms of the research method adopted by the postgraduate students from the

two Departments under study, it was discovered that the students from both Departments used almost the same research methods. There are some students from some sections of Education Department that used some methods such as quasi experimental, expos facto in their theses and dissertations.

On the whole, there were similarities in both the research and statistical methods used in the analyses of the theses and dissertations of the postgraduate students of Library and Information Science and Education departments. This could be due to the fact that both category of students are taught by the same statistics and research method lecturers.

In the light of these findings, the researcher recommends that postgraduate students of Education and Library and Information Science should be firmly grounded in their knowledge of both research and statistical methods.

TABLE OF CONTENTS PAGE

Title Page.....i

Declaration.....iii

Certification.....iv

Dedication.....v

Acknowledgement.....vi

Abstract.....viii

Table of contents.....x

CHAPTER ONE INTRODUCTION

1.1 Background of the study.....1

1.2 Statement of the Problem.....6

1.3 Research Questions.....8

1.4 Hypotheses.....8

1.5 Objectives.....9

1.6 Significance of the study.....10

1.7 Assumption.....11

1.8 Scope and Limitation.....12

1.9 Operational definition of terms.....13

References.....15

CHAPTER TWO REVIEW OF RELATED LITERATURE

2.1 Introduction.....17

2.2 The concept of research and statistics.....17

2.2.1Research.....17

2.2.2Statistics 24

2.3 The Utilization of Statistical Techniques in Research Studies in Education and Library and Information Science.....31

2.4 Research Methods adopted in Education and Library and Information Science Research.....46

2.5 Summary.....53

Reference.....55

CHAPTER THREE METHODOLOGY

3.1 Introduction.....62

3.2 Description of research method.....62

3.3 Description of population of the Study.....63

3.4 Description of instrument used for data Collection.....64

3.5 Description of data collections procedure.....65

3.6 Description of data analysis procedure.....66

CHAPTER FOUR ANALYSIS AND INTERPRETATION OF DATA

4.1 Introduction.....67

Descriptive Statistical Analysis.....67

4.2 Research Question I.....68

4.3 Research Question 2.....69

4.4 Research Question 3.....71

4.5 Research Question 4.....73

Inferential Statistical Analysis.....73

4.6 Hypothesis 1.....80

4.7 Hypothesis 2.....82

4.8 Hypothesis 3.....83

4.9 Hypothesis 4.....85

4.10 Hypothesis 5.....88

4.11 Summary.....92

CHAPTER FIVE SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATION

5.2 Summary of findings.....93

5.3 Conclusion.....95

5.4 Recommendation.....96

Bibliography.....98

LIST OF TABLES

Table **Page**

4.1 Research Methods used in Research.....68

4.2 Frequency of Research Methods Adopted.....69

4.3 Statistical Methods Used.....71

4.4 Frequency of Statistical Methods Used.....73

4.5 Frequency of Statistical Methods Used.....,...75

4.6 Justification for Selection.....77

4.7 Hypothesis 1 & 2.....80

4.8 Hypothesis 3.....83

4.9 Hypothesis 4.....85

4.10 Hypothesis 5.....88

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

A University is an Institution dedicated to the development and dissemination of knowledge in diversified academic and professional fields. It is to assist students in their search for knowledge and to help them develop the wisdom and skills needed to assume responsibility in a given society. It assumes as its objective, the maintenance and enhancement of an institutional environment that encourages the development and expansion of human mind and spirit. While continuing to fulfill its mission, the University is evolving and expanding its role to meet the needs of the state, national and international communities.

The University, according to Texas A & M University Brochure (1990) aspires to prominence in teaching, research and service. In keeping with this, it establishes procedures to guarantee that the Educational experience is of highest quality; fosters and facilitates inter disciplinary programmes and research activities; and strives to maintain and enhance an environment conducive to creative scholarship and scientific inquiry.

Boman (1994) states that Nigerian Universities have general functions which they perform towards the progress of the society. According to Ifidon (1984) these functions are teaching, research, communication services and cooperation with other Institutions of higher learning for the purpose of advancing knowledge, wisdom, understanding and the pursuit of truth. Research as one of these functions, is carried out in every Nigerian University in all subject disciplines. The findings of these researches are supposed to be made known to the whole world for better access, dissemination and use.

Students, are admitted to study course which usually identify with a particular department. In some cases, the courses may involve course work, and research activities in several departments. The postgraduate course usually consist of a combination of course work, independent study and scholarly research resulting in a report of record of study for Masters theses or Doctoral dissertations. The overall objective is to provide students with intellectual and appropriate training necessary to pursue productive careers in given professions, various field of teaching, research and to make meaningful contributions to the society.

Brett (1993) defines research as that which presents new original findings relating to specific problem, a scientific

method of inquiry (and is published), while Afolabi (1996) states that it is a systematic enquiry in order to find solution to a problem, discover new knowledge, confirm or disprove findings in previous research. Thus, from these definitions, new discovery is emphasised. That is, the unknown is discovered so as to know that which will be beneficial to mankind. A scientific researcher wants objectivity rather than subjectivity. Kerlinger (1973) defined scientific research as a systematic controlled empirical, and critical investigation to hypothetical propositions about the presumed relations among natural phenomena. Regardless of its origin, all research begin with a basic question about some phenomena. For example, why do people use the Library ? What section of the Library do people use most often ? Each of these questions could be answered to some degree in a research study.

The word statistics is used to refer to numerical facts such as the number of people living in a particular town and the study of ways of collecting and interpreting these facts. Thus it could be argued that figures are not facts in themselves. Rather, it is only when they are interpreted that they become relevant to discussion and decisions.

The term statistics has been defined in various ways by different people. Stephen and Hornby (1995) define it as a way

of thinking in many areas of life. Shaibu (1997) states that it is the method of studying large quantitative data gathered from a sample in order to compare sources of variance of phenomena, to help make decision, to accept or reject hypothesised relations between the phenomena and make reliable inferences from the data. The Encyclopedia Britanica (1974) puts it as the science of making valid inferences about the characteristics of a group of persons or objects on the basis of numerical information obtained randomly from selected sample of group. Statistics also refers to the statistical principles and methods which have been developed for handling numerical data. Statistical methods or statistics ranges from the most common or elementary descriptive devices which may be understood by anyone to those extremely complicated procedures which are understood only by experts.

Frederick et al (1967) further defines statistics as the collection, presentation analysis and interpretation of numerical data. The fact which one is dealing with must be capable of numerical expansion. They also state that without an adequate understanding of statistics, the investigator in the social sciences may frequently be like "the blindman groping in a dark closet for a black cat that is not there". The methods of statistics are useful in an ever widening range

of human activities in any field of thought in which numerical data are involved. Statistics should not be thought of as a subject belonging to only the pure sciences such as physics or chemistry. It is not a science but a scientific method. These methods and procedures are often indispensable tools in research.

Statistics provides the researcher with a variety of techniques or methods to adopt in the analysis of data. It enables one to come in contact with abstract statistical concept and learn how to use these various tools and techniques or methods to produce satisfactory results. It is a creative process. Statistics leads us to vigorous logical thought which is a vital aspect of professional work. It engenders a critical outlook that is essentially a reliable piece of cognitive development. Klein (1975) states that if concepts and theoretical notions are weak, no measurement however precise will advance an explanatory science. Suffice it to say that it may be misleading to attempt to measure what one does not understand. But it is a fact that we cannot runaway from the increasing use of statistical arguments. Therefore, we should be prepared to deal with statistics and statistical methods in our daily endeavour especially as they relate to research.

1.2 STATEMENT OF THE PROBLEM

Statistics, statistical methods and research cannot be divorced from one another. They are two sides of the same coin. They are interrelated, because all deal with information gathering, analysis, interpretation and documentation. Postgraduate students of library and information science and Education Departments of Ahmadu Bello University, Zaria as well as those from other faculties and departments are expected to write theses or dissertations as pre-requisite for the award of either Master or Doctoral Degree in their areas of specialization. However, most of these potential academics or researchers may likely find it laborious to select the most appropriate and suitable statistical methods in the treatment of their data. Perhaps this might be due to poor mathematical background of some of the students. This could have negative effect on data analysis, interpretation and finding of research. Shara (1979) opined that there is a need to have common concern for knowledge of the principles and methods of research as applicable to a research investigation, integrated with the ability to evaluate research results in terms of appropriateness, reliability and validity of statistical methods used and the results obtained. In the same vain

Abudllahi and Korau (1994) stated that for a research work to be carried out successfully, the students and their supervisors need a thorough knowledge of statistical methods. They should be conversant with methods of collecting, analysing and interpreting data in order to arrive at sound conclusions.

A search of published papers in library and information science abstracts, periodicals and other sources known to the researcher reveal that little research work has been done on the use of statistical methods in postgraduate theses and dissertation particularly in Nigeria. Apart form the study of Abudullahi and Korau (1994) which examined the application of statistics in library and information science postgraduate theses and dissertations at Ahmadu Bello University. It is not known yet however, whether the statistical methods used in library and information science theses and dissertations have some relationships with those of Education Department, how appropriate these statistical methods are to the research topics and the justification for using any particular statistical method. The focus of this study is to make a comparative study of the statistical methods used in the postgraduate theses and dissertations in Education and Library and information science.

1.3 RESEARCH QUESTIONS

1. What are the research methods applied in the postgraduate theses and dissertations in Library and Information Science and Education department ?
2. What is the frequency of research method used in the postgraduate theses and dissertations in Education and Library and Information Science departments?
3. What are the statistical methods used in the postgraduate theses and dissertations in Library and Information Science and Education Departments ?
4. What is the frequency of statistical methods used in the postgraduate theses and dissertations in Education and Library and Information Science ?
5. Are there any significant differences in the research and statistical methods used in the theses and the dissertations of Education and Library and Information Science Departments?

1.4 HYPOTHESES

1. There are no significant differences in the research methods used in the Postgraduate theses and

dissertations in Library and Information Science and Education Departments.

2. There are no significant differences in the frequency of methods used in the postgraduate theses and dissertations in Library and Information Science and Education departments.
3. There are no significant differences between the statistical methods used in Library and Information Science and Education postgraduate theses and dissertations.
4. There are no significant differences in the frequency of statistical methods used in the postgraduate theses and dissertations in Library and Information Science and Education departments.
5. There are no significant differences between the research and statistical methods used in the theses and dissertations of Education and Library and Information Science Departments.

1.5 OBJECTIVES

1. To find out the research methods used in the postgraduate theses and dissertations in the Library and Information Science and Education departments.

2. To identify the statistical methods used in the postgraduate theses and dissertations in Library and Information Science and Education departments.
3. To examine the frequency of statistical methods used in the postgraduate theses and dissertations in Library and Information Science and Education Departments.
4. To find out the differences in the use of statistical and Research methods in postgraduate theses and dissertations in Education and Library and Information Science departments.
5. To determine if there are significant differences in the research and statistical methods used for theses and dissertations in Education and Library and Information Science Departments

1.6 SIGNIFICANCE OF THE STUDY

The significance of this study can be comprehended from a number of perspectives namely:

1. It will identify the statistical methods generally used in postgraduate theses and dissertations in Library and Information Science and Education.
2. It will be able to shed light as to whether Library and information science theses and dissertations in

particular utilise a variety of statistical methods which are commonly used in Education research.

3. By finding out the inclusion of the statement justifying the use of selected statistical methods, this study will reveal the capability and ability of the researchers in their choice of statistical and research methods.
4. The study will shade more light on the differences that exist between research and statistical methods used in the theses and dissertations of Education and Library and Information Science Departments.
5. The study will identify the frequency of research and statistical methods used in the theses and dissertations of Education and Library and Information Sciences Departments.

1.7 ASSUMPTIONS

The study is based on the following assumptions that:

1. A good knowledge of statistical methods enhance the efficiency of research.
2. The basic knowledge of statistics facilitates its application in research.

3. The quality of a research output depends on the statistical method used in analysing the data collected for the study.
4. The frequency of the statistical research methods used will reveal the capability and ability of the researcher in the choice of statistical methods.
5. That a number of research studies conducted in Education and Library and Information Science utilise statistical techniques in the analysis of data.

1.8 SCOPE AND DELIMITATION

This study is based on the physical examination of statistical methods used in the theses and dissertations approved and submitted for the award of Masters and Doctoral Degrees in the Departments of library and Information Science and Education Ahmadu Bello University, Zaria between 1987 to 1997. This period is chosen because of the currency of the material to be used. The study is limited to the two Departments during the stated period under study. It is also limited to the postgraduate theses and dissertations available to the researcher during the period under study at Kashim Ibrahim Library, Faculty of Education Library, Library

and Information Science and Education stores, and the postgraduate school library for the study period.

1.9 OPERATIONAL DEFINITION OF TERMS

The following terms are operationally defined as used in this study

1. Statistics: A set of decision making techniques which aid researcher in drawing inferences from samples to population and hence in testing hypothesis regarding the nature of social reality.
2. Statistical methods: The techniques or tools used for collecting and analysing data e.g chi-square tests.
3. Research Methods: The techniques or tools used for collecting research information eg survey method.
4. Descriptive statistics: It involves tabulating, depicting and describing a collection of data eg mean, median; mode and charts.
5. Inferential statistics: It allows us to make inferences about the meaning of our research out come and also enable us seek justification for them e.g chi-square test, t-test.
6. Population: Refers to theses and dissertations.

7. Theses and dissertation: refers to researches carried out by postgraduate students of Education and Library and Information science as part of a University requirement for the award of higher degrees.

REFERENCES

Abdullahi, L. S. and Korau, K (1994): "The application of statistics in Library and Information; Post graduate these/Dissertation in Ahmadu Bello University, Library school from 1977-1991", Proceedings of the 7th National Conference of the Nigerian Association of Library and Information Science (NALISE) June 29 - July 1 1994

Afolabi, M (1996): Introduction to research methods for writing proposals projects and theses. Ahmadu Bello University, Zaria p.28 - 30

Boman, D.D. (1994) Accessibility to Research work in library and information Science in Nigeria. Proceedings of the 7th National conference of Nigerian Association of Library and Information Science (NALISE) June 29th - July 1st 1994.

Brett, S. (1993) Statistics London Mitchel Beazley Publisher p.15 - 20.

Encyclopedia Britanica (1994) Chicago Vol. 11 p.225 - 227.

Frederick. E. Croxton et al (1967): Applied general Statistics Sir Isaac Pitman and Son Ltd, London p.59 - 63.

Kerlinger, F.N. (1973): Foundation of behavioral research. Holt, Rinehat and Winston, New York P.16 - 19.

Klein, S. (1975) A note on statistical techniques in communist China. The American Statistician Vol 2 No. 5 p.18-21.

Shera, J.H (1979): The Foundation of Education for Librianship, New York: Becker and Hyes. p.72 - 79.

Stephen, P. and Hornby, S. (1995): "The joys of statistics". Library review vol 44 No 8. p. 56-62

Texas A and M University Brochure 1989 - 1990 graduate catalog p: 5 -10.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 INTRODUCTION

The main aim of this chapter is to review the previous literature on the use of statistical methods in research. This is presented under the following sub-headings namely: The concept of research and statistics, the utilisation of statistical techniques in research studies in Education and Library and In formation Science, the problems of utilising statistics in the field of Education and Library and Information Science, the research methods used in Education and Library and Information Science and summary of the reviews.

2.2 THE CONCEPT OF RESEARCH AND STATISTICS

2.2.1 RESEARCH

Weaver (1953) asserts that several years ago, a communications scholar discussed the meaning of language and identified the difference between "God" and Devil". A God term he states is positive and has connotations of strength, goodness, and significance, democracy, innovation and freedom. A devil term, on the other hand represents a negative image

and connotes weakness, evil or impending doom communist moral/decay and infener are examples of devil terms. He equals these terms with research. He states that research can be a devil term especially for students who consider statistics and research to be detours on the road to receiving a degree. But it should not be viewed like that. Rather, it should be seen as a tool to search for answers.

Thornton (1963) is of the view that research is a careful or diligent search, a close searching, studious inquiry or examination specifically and unusually critical and exhaustive investigation or experimental having for its aim the discovery of new facts and their correct interpretation. He states that research as new knowledge is yet to be understood. Thornton states that, it is often used to describe reading by those to whom reading is a recherche activity and for many graduate students, it is a euphemism for a wholesale plagiarism.

The question one would ask here is that is research really a matter of new knowledge ? Since from the oral tradition in the history of knowledge man has always lived his life doing one research or the other. Where the students are concerned is part of the research activity aimed at teaching the discipline research or is it always purely the search for new knowledge? Scientific research as a systematic and

controlled inquiry is directed towards solving identified problems; it therefore provides the basis for improvement and further development in human knowledge and condition.

While Fedrick et al (1967) stated that the research worker must be constantly in the alert to avoid the misuse of her materials. Illogical and careless reasoning or improper use of data will destroy the value of a study which may be technically acceptable in its earlier phases. That is to say that a researcher should be concise and consistent in her work.

John (1978) feels that the idea of the future is one of the central symbols through which human beings have ordered their present and have given meaning to their past. While future research in academic sense is a recent pursuit, conjecture, speculations and exploration of future events have always been prime features of the human condition. Human survival itself is very largely predicated on the conscious capacity to organise and present actions in terms of past experience and future goals.

According to Busha and Harter (1980) research is a more efficient and effective approach to expand knowledge. However, it is the conduct of a specific planned and structured

investigation. Thus research in its broadest context is a systematic quest for knowledge.

Becker (1981) is of the opinion that the presence of bias on the part of a researcher is definitely and necessarily enough to disqualify or discredit the whole work. Bias can be conscious or deliberate as such it is synonymous with falsification. That is why the researcher should be prepared and have an open mind. She should stand at a distance and not take sides.

Rubin et al (1985) in the same vein stated that scientific method of investigation is geared toward the provision of an objective and an unbiased evaluation of data. To investigate research questions and hypotheses systematically, researchers should follow eight developmental stages namely; selection of a problem, development of hypotheses or research questions, determination of appropriate methodology/research design, collection of relevant data, analysis and interpretation of results in appropriate form and replication of study where necessary.

Researchers should ensure that their research topics have merit by answering seven basic questions as follows: I the topic broad? Can the problem really be investigated? Are the data susceptible to analysis? Is the problem significant? Can

the results of the study be generalised? Is the planned approach appropriate to the project? These questions are proposed by Rubin et al (1985). These questions are very relevant for a research to be meaningful and standard.

Babbie (1986) noted that time and effort to be expanded on data analysis and its interpretation is central in the purpose of a study of methodology adopted. He further states that each analysis should be carefully planned and performed in accordance wit laid down guidelines designed for that particular analysis. When statistical computation are accomplished results should be analysed with references to its external validity and to its accuracy. He further stated that the internal validity of an instrument is affected by either history, maturation, testing, instrumentation, statistical regression, experimental mortality, sample selection, demand characteristics, experimental bias and evaluation apprehension while external validity may be affected by the interaction in the analysis of independent and dependent variables such as subject selection, instrumentation and experimental conclusions.

Adetoro (1987) opined that researchers should reduce their studies to what they can immediately manage as this will aid in data collection, identifying and using appropriate

statistical techniques as well as in the general conduct of the study. Thus, the researchers in Library and Information as well as Education need to have a well defined objective and appropriate statistical methods.

Wimmer and Dominick (1987) stated that four characteristics of research designs are to be adopted for a study to produce reliable and vital results. These include naturalistic study, clear cause and effects relationship, unobstructive valid measurement and realism. It should be noted that statistical method selected in any given research should possess the aforementioned attributes. This assertion is related to this because it will act as guiding principles or yardstick to measure the level of implementation of these criteria in the application of statistical methods by library and information science and education postgraduate students.

There are five characters that highlight scientific methods of inquiry and other research methods. Any research approach that does not conform to these methods of inquiry cannot be considered to be a scientific research. These include making research findings public, being objective, empirical, systematic and constructive as well as predictive.

Line (1990) states that the line between research, data collection and market study is a very thin one. There is a

great deal of semi-research going on in the course of normal activities. Many library and information scientists study as a matter of routine how they are performing. They often do so unsystematically. They also act upon their observation without articulating them, but they may also collect a coherent body of data that would be part of a formal research project. Research should be a matter of interest to the researcher. Line (1990) further stated that the quality of research can be assessed at various stages namely:-When a proposal is received, when the research is in the process of being carried out, when it has been done, and sometimes after it has been done. To the assess quality, when research is finished, it is nearly always carried out in some way or another, but very rarely at all systematically. Thus to avoid unsystematical way, statistical methods should be properly adopted.

Wilbur (1994) states that accurate information of a particular research would contribute to greater effectiveness in dealing with such topic. Abdullahi and Korau (1994) further states that for a research work to be carried out successfully, the students and their supervisors need a thorough knowledge of statistics. This is to come out with a research work whose data has been well collected, interpreted and analysed.

2.2.2 STATISTICS

The various definitions of statistics has given rise to two types of statistics namely, descriptive, and inferential. The principal descriptive quality derived from sample data is the mean which is the arithmetic average of the sample data. It serves as the most reliable single measure of the value of a typical number of the sample. If the sample contains a few value that are so large or so small then they have an exaggerated effect on the value of the mean. The sample is more accurately represented by the median, which is the value that half the sample valid falls below and half above.

As measures of dispersion of the value above their mean, the quantities most commonly used are variance and its square root and the standard deviation. The variance is calculated by determining the mean, subtracting it from each of the sample value (thus bringing about the deviation sample) and then averaging the squares of these deviations.

The mean and the standard deviation of these samples are used as estimates of the corresponding characteristics of the entire group from which the sample is drawn. They do not, in general completely describe the distributions of values within either the sample or the parent group. Indeed, different distributions may have the same means and standard deviation.

They do however, provide a complete description of the so-called normal distribution in which positive or negative deviation from the mean are equally common and small deviation are much more common than larger ones.

Butcher (1965) defines population as an arbitrarily defined group in which the statistics happened to be interested in.

Frederick et al (1967) states that statistics is used in either of two senses. In common, it is generally employed synonymously with the word data. Thus someone may say, I have seen the statistics of road accidents in Nigeria. It would be conducive to a greater precision of meaning if statistics is not used in this sense but rather to say data or figure of road accidents in Nigeria.

They further gave a brief history of statistics. They traced its origin to the administration of the state which required the collection and analysis of data of population and wealth for the purpose of war and finance. Gradually data of more diverse nature were obtained for the general use of government. Certain phases of statistics were developed by students of games of chance, Insurance and Biology, as well as other natural sciences were fertile fields for the application and development of statistical methods. Today, there is hardly

a phase of human endeavour which does not find statistical devices at least occasionally useful. Economics, Sociology, psychology, Library and Information Science, Education and the rest leaned heavily upon statistics. The medical research worker often must rely upon statistics to determine the significance of his results. The lawyer especially if he is in corporate practice may frequently find statistical devices of definite use. It should, of course be added that the writer of fiction would rarely have occasion to employ statistics. But even here, the analysis of certain data of sales box-office receipts and trends of population taste might prove useful.

Popham and Sirotnik (1973) gave another aim of statistics. They stated that it is to gain an understanding of the impact of statistical ideas on public policy and one's primary area of specialization. Statistics is also used for prediction, that is, it can state what may likely happen before hand in the future.

Statistics is a field of study that deals with specific predictions that will ultimately be compared with actuality. Statistics prediction however, remains a problem simply because of uncertainty. Probabilistic and statistical tools

are therefore necessary components of scientific approach to the formalisation of prediction problems.

The theory of statistics is rooted in mathematical probability and the group under study called population and sample. The theory of statistics as stated by the Encyclopedia Britanica (1974) makes it positive to evaluate the performance of a statistical procedure in terms of the populations of sample leading to correct conclusion.

The Encyclopedia (1974) further stated that inferences made in statistics are of two types. The first is estimate which involves the determination with a possible error due to sampling of unknown value of a population characteristics, such as the proportion of having a specific attribute or the average value of some numerical measurements.

Leonard (1974) tells us that the British Royal Society in the second half of the 17th Century gave birth to social statistics in the form of birth, death, marriage and other related records. In the 19th century such records were not only given legal status but became easily available to the public.

Klein (1975) stated that its concepts and theoretical notions are weak, such that no measurement, however precise will advance an explanatory science. Suffice it to say that it may be misleading to attempt to measure what one does not

understand but it is a fact that we can not run away from increasing use of statistical arguments and as such we should be prepared to deal with them in our daily endeavours.

Moore (1979) states that statistics deals with numerical facts called data but usually for more serious purpose. According to him, statistics originated as state-istics" an accessing to government wanting to know how many taxable farmers and military-aged men their realms contained. This systematic study of data has now found its way into the heart of many areas of academic or practical endeavour.

Moore (1979) states that the main aim of statistics is to provide insight by means of numbers. To this end, statistics has been categorized into three levels, namely; data collection, description and presentation as well as drawing valid conclusions from data. Thus the objective of studying statistics is to reach an understanding of statistical ideas. The basic concepts and modes of reasoning in statistics are major intellectual accomplishments.

But according to Moore (1979), numerical arguments are like any others; some good, some bad and some irrelevant but a bit of qualitative sophistication will enable one to hold on against the number slinger.

Another aim of statistics as put forth by Martin and Firth (1983) is to acquire the ability to deal critically with numerical arguments. Many people are unduly credulous when numerical arguments are used (that is, they are only impressed by the solid appearance of a few number and do not attempt to penetrate the substance of the argument) while others are unduly cynical. They think numbers are liars by nature and never trust them.

Hannagan (1983) however, states that data are things known or assumed as a basis for inference. As such statistics is concerned with the systematic collection of numerical data and their interpretation.

Hypothesis testing according to Nworgu (1991) is a conjectural proposition, an informed, intelligent guess about a solution to a problem. It is an assumption or proposition whose veracity and validity is to be established. Thus, formulation and testing of hypothesis are very important and necessary steps in any research work. It provides necessary guide in searching for solution to a problem under investigation.

According to Murry (1992) statistics is concerned with scientific methods of collecting, organizing, summarizing presenting and analyzing data as well as drawing valid

conclusions and making reasonable decision on the basis of such analysis. In other words, statistics is used to denote the data themselves or number derived from the data such as average. Thus he speaks of employment statistics, accident statistics, research statistics, library and information statistics, and a whole lot.

Lemu (1995) states that Statistics is as old as the art of the country. It got its name from status or state (Latin) and owes its prime place to the state's need for adequate economic, social and political indices. He gave examples of earlier use of statistics such as Moses head count of Israel during the period of Exodus and its application in early Egyptian civilization. China, Greece, Rome and Peru.

Kojosola (1996) gives the origin of statistics when he states that from reliable information the systematic collection of official statistics started from Germany towards the end of the 18th century. In England too, government's attempt to introduce new taxes after Napoleonic wars made it mandatory to collect such systematic data that would enable the government to accurately determine its income and expenditures. He stated that it is of little wonder that today some people still believe there is a highly positive correlation between statistical surveys and taxation.

Statistics was originally seen as a set of such data that the government or state required for its official purpose. But today, it involves much more than that as data are collected not only for the interest of government alone. They serve all sections, public and private. The subject statistics has witnessed a lot of theoretical developments from various researches that have been carried out by many famous mathematicians over the 16t^{h} and 17th centuries.

2.3 THE UTILISATION OF STATISTICAL TECHNIQUES IN RESEARCH STUDIES IN EDUCATION AND LIBRARY AND INFORMATION SCIENCES

Library and information systems duties encompasses statistical reporting. Views and impressions may have to be confirmed or otherwise as such statistical methods ought to be adopted in order to improve the quality of presentation of research or information being communicated. Draft (1960) proposes the adoption of statistically sound random sampling methods in determining how to cope with the important aspect of library use or users satisfaction. These are used because valid statistical inferences have great value or administration, planning and decision making on behalf of librarians. Their suggestions are useful and important since there is no field that has not embraced statistics and its

methods in their various publications. This is for the fact that accurate information of a particular research would contribute to the effectiveness in dealing with such topic. Thus, it would be difficult to see how efficient decision can be on a clear range of problems without accurate and comprehensive information.

Salverson (1967) recommends the adoption of a standard methodology to determine accurately the extent of book use in the library and information centres.

Grotzinger (1970) opined that the library school should recognise research both theoretical and applied as an imperative responsibility in its planning, budgeting and organizational design. Thus for a research to be carried out successfully, the students and their supervisors need a thorough knowledge of statistics.

Schick (1972) opined that statistics deals with numerical data and methods of collecting and interpreting them in order to arrive at sound conclusion.

Dipeolu (1973) notes that Librarians and Information scientist like Director of Industrial Organisation face problems and challenges of management as they consider ways and means of delivering services to their clients at minimum cost but ideally with maximum benefit. They also plan the

growth and development of their organisations. In order to perform these functions successfully and effectively, they need certain facts which can be presented in different forms. One method of presentation is that of statistic. Thus, statistics is as important to library and information sciences. It importance is not only for purpose of research work but in the day to day management of Libraries and Information centres.

While Steel and Torris (1981) state that statistics is a pure and applied science creating, developing and applying techniques such that the uncertainty of inductive inferences may be evaluated. They claim that statistics is logic or common sense with a strong supplies the method by which data are to be collected and determines how extensive they are to be i.e the arithmetic together with certain numerical tables yield the material on which to base the inference and its uncertainty. The arithmetic is often routine, requiring no special mathematical training for the user. Statistics provides people especially research worker with knowledge.

Thomas and Nelson (1985) are of the view that research of any kind is viewed as a structural way of solving problems. It is therefore seen to have an important role to play in educational process because it provides a source of new

knowledge both for the field of librarianship in general and library education in particular. As such research should be taken with all seriousness as good and well co-ordinated research brings about the prestige of a researcher.

Statistics even through a relatively new field as remarked by Simpson (1988) is gaining its way into many fields of life.

As Shera (1991) observed, there is the need to have a common concern of scholars and professionals of any field identified as a specific part of the course of student graduates of librarianship to acquire knowledge of the principle and methods of research results in terms of appropriateness and reliability of methods used and the validity of results obtained. Thus if a graduate student of library and information science is to present a qualitative and intellectual research work, then she must have a basic knowledge of statistical method to enable her make a good analysis of her research.

As Spiegal (1992) stated, Statistics formerly deals with only the affairs of the state but now it has manifested itself to other fields of human endeavours namely Agriculture, Botany, Business, Economics, Commerce, Education, Medicine, Psychology and other disciplines. Thus, if the field of

Library and Information Science must justify its name, then statistics should be taken with all seriousness especially now that most fields are moving with technological innovations in form of computer that are statistically alienated.

Nwosu (1992) stressed the need for statistics in Library Science as he observes that statistics is of paramount importance and should not be neglected. In supporting this view.

As stated in the findings of a study conducted by Abdullahi and Korau (1994) over 70% of the researchers in library and information science department of Ahmadu Bello University, Zaria are descriptive in nature and that wrong statistical methods were applied in hypothesis testing. It should be of interest to note that statistics provide library and information scientists with a variety of techniques to adopt in the analysis of data. Data may be analysed by using measures of central tendencies or other statistics.

Nkereuwean and Uwen (1994) were of the opinion that many Library and Information Scientist appreciate that there is need to improve the relevance of statistics which are used in Library and Information Science research.

According to Stephen and Hornby (1995) the pervasiveness of statistics to Library and Information science is a way of

thinking in many areas of life. Inference drawn from data by Library and Information scientists can only be meaningful given some ingenuity and an understanding of the nature of information, how it was gathered and what would have been the drawback. Though as essential as statistical methods are in professional subjects such as Library and Information science, many library and information scientists find it extremely difficult to digest statistical concepts and make inferential statements.

Stephen and Hornby (1995) further states that statistics is subject that is loved by a host of other professionals but hated by Librarians. This should not be the case rather it should be seen as a subject that of great value. They praise the foresight of those who included statistics in Library Department of Manchester Metropolitan University, because it has brought change in the operating environment of the Libraries. They stressed the fact that increasingly, library and information scientists have had to become managers and as libraries have had to compete for diminishing resources, the need for hard objective evidences for planning nd for supporting arguments has become even more critical.

To them, Information managers, like managers in other organisation need information on their stock, their readers

and Library usage, in order to compile profiles of their communities and maximize the impact of the services. For instance, do they know about their users age, class, ethnic profile and how often they use the library? What about the non-users. Do they know why they do not use the library? would they use the services more if changes are made? The data obtained if used in a meaningful way will go a long way to improve their services and change their images. Therefore, having an indepth knowledge of statistical methods and its application will go a long way helping library and information science as well as education researchers to write a proper and well recognised and organised research.

Frederick et al (1967) stated that it should not be assumed that statistical method is the only method used in research; neither should this method be considered the best attack to any problem. According to them, just like a carpenter has a number of tools each of which is appropriate for a particular job or work, so also should the researcher avail herself of different techniques which are tools of their work and each should be appropriate for a type of situation. If a carpenter used a chisel instead of a hammer the results will likely not be satisfactory. Likewise, the researcher should consider her problem carefully from

beginning and make use of the appropriate techniques or methods. Just like the carpenter needs more than one tool to complete his work so also a researcher need to make use of various methods to accomplish more work.

When information about an individual or occurrence is desired, our data here may be non-quantitative in nature. The method to be adopted will be the case study method of investigation. The purpose is to consider in detail the characteristics peculiar to the individual case and to generalise from a number of such detailed studies. Some information from case study history such as wages may be made of the non-quantitative information obtained.

If the research is centred on change in behaviour or attributes, the panel technique is used. This involves interviewing the same group of people two or more times. The data here may be qualitative in nature. Sometimes the research may be historical in approach, even though here historical methods are mostly descriptive and non-quantitative. There may be some statistical elements, when growth or population are considered. Again one could also consider the experimental method, whereby the factor under study may be allowed to vary and then an attempt to control as many other factors as possible.

Experimental method are hardly used in social sciences, as such certain aspects of statistical method are used in lieu of it. For example, we cannot ascertain the effect of different sorts of diet upon length of life by forcing group of people to live upon prescribed diets and by actually making all other phases of their lives identical. Rather, we must find groups of people on different diets and then we must measure the importance of, and control statistical method as many as possible of the other phases of their lives since we cannot control them experimentally. The experimental and statistical methods are not antithetical , but under practical condition the statistical method supplement the experimental method.

As stated by Fredick et al (1967) there are many mistakes made while writing a research in the application of statistical method. Therefore, the researcher must constantly be on the alert to avoid any misuse of her materials. Illogical and careless reasoning or improper use of data will destroy the value of a study which may be technically acceptable in its earlier stages.

According to them the presence of bias on the part of the researcher is definitely necessary enough to disqualify or discredit the whole work. Bias can be conscious or deliberate

as synonymous with falsification. An example of one well published example of statistical impropriety concerns a rail road train crew in communist China which for one year apparently made very long safe runs without major overhauls and with very low fuel consumption. It was later discovered that numerous accidents had occurred and that secret repairs and refueling had taken place.

They further state that the unconscious bias may be operative and is more dangerous as the researcher may not even be aware of it. It is universally known that individuals read, interpret and remember facts that are most favourable to them. Statistical data cannot be picked out of the air as the conjurer appears to produce coin at his finger tips. The process is one requiring care and attention to details. The data when obtained should be a value and casually disregarded. Note, what a reviewer said of a certain author. Blank is through and undaunted. Have statistics on any subject been collected before? He has collected more and better ones. If it is by its intrinsic nature uncharitable, he has charted it none the less" chronology itself fares badly in hands at times. If has examples require to be century or two misplaced, Blank can forget even his statistics and his charts in the good cause of logic". Omission of important factions

and carelessness also affects a researcher in his work. Though we can not go through without mistakes but carelessness should be reduced to its minimum.

Non-comparable and insufficient data results in a high degree of uncertainty in respect of any conclusion which may b made from them, A few sample may lead to a correct conclusion but cannot place a high degree of assurance in the conclusion. It is not often to announce efficiency after trying out just a few samples in a research work one can be relatively sure of her results. They also said that if two or three subjects respond favourably, one cannot be safe inaiming that the occurrences were not due to chance. The favourable responses of these few might have been without the treatment or insight of it: of course, there must be a control group to show how the subjects would respond without any treatment, or with usual treatment. Both the control and treatment group must be sufficient enough to guarantee a conclusion.

There is also the case of unrepresentative data, whereby the data are numerically sufficient but not representative. That is to say that sometimes a small or few samples may be representative while a large one may not. There are other improprieties such as concealed classification and future of defined units.

There is also the misleading of tools and poorly designed experiments. For an experiment to be valid, it must be so designed that the results which are arrived at cannot be attributed to factors other than those which are under consideration. An example is given of a rail road which installed flourescent light and, hoping to counteract this belief undertook an experiment in which one group of rats were subjected to in candescent light, while another group were subjected to flourescent light. After a period of time, the first group had usual number of offspring, while the second group had none. A skeptical executive asked that the second group of rats be examined with care, and it was discovered that all the rats of the group were of the same sex.

According to Levis (1979) a vast range of statistical data is collected throughout the world. Much of this is published mostly by governmental organization and is thus easily available for variety of purposes. The data provides a cheap and convenient way of making an initial statistical appraisal of a given topic and often of investigating it in some detail. For the businessman, the administrator and the sociologist, this can prove invaluable though a certain expertise is required to unveil the complexities of the valuable sources. It will take a researcher some quality of

expertise in statistical method to be able to present a tangible research work.

Hannagen (1982) states that test of significance in statistical computation of some facts or theory is believed to be true, but when a random sample is taken, the result may not wholly support the stated facts or theory. The difference between the belief or hypothesis and sample results may be ascribed to either the original theory or hypothesis was wrong or that the sample rejected was one sided. The test of significance is aimed at revealing whether or not the difference could be ascribed to chance factors operating at the time of the selection of the sample.

Wimmer and Dominick (1987) highlighted four different levels of statistical measurements. The operating or statistical method that can be applied in a given set of score is centred on the level of measurement achieved. The four levels are nominal, ordinal, interval and ratio scales.

Wimmer and Dominick (1987) further opined that Nominal scale is the weaker form of statistical measurement. It classified subjects or characteristic. The properties of this scale is that of equivalence and categories are exhaustive and mutually exclusive.

The ordinal scale is ranked according to some dimensions from smaller to greater. It has the property of equivalence and a sense of higher lower order relationship.

Wimmer and Dominick (1987) continued by stating that interval level incorporates formal property of equal differences in statistical terms, numbers are assigned to position of objects on our interval scale in a fashion that allows arithmetic operations on the differences between variables. The disadvantages of this are lack of zero point, while the ratio has all the properties inherent in interval scale and the existence of a zero point. Wimmer and Dominic also noted that researchers using interval and ratio data use parametric statistics specially designed for these data. Statistical measures are having more weight than those designed for use for nominal or ordinal level of measurements. Thus if an investigator or researcher has achieved the interval level of measurement, parametric statistics should be adopted.

According to Kojusola (1996) as a word in plural sense, statistics can be a set of figures (that is numerical) arrived at by direct measurements on counting. Seeing it as a singular word, it means simply a subject just as we have others like mathematics, physics, etc. As a subject it is just a

scientific process that entails theories and methods of collecting, analysing and interpretation such set of numerical figures using mathematical theories. From what he has stated, one can see statistics as the collection, presentation, analysis and interpretation of numerical data obtained from the field of human endeavour.

Adetoro (1997) states that measurement enables researchers to describe differences of phenomena that are related to situation being examined, make use of sophisticated tools such as the central tendency, charts and graphs. He also noted that if there is a conflicting result in a research finding, Researchers should analyse the report and the interprets findings in the light of strength and weakness of the study. The effect of design flow and bias on the result of the study should be eliminated, disregarding deliberate bias or distortion, sample bias, none inclusion of important variable, use of weak or inappropriate measurement procedures, observer's bias, etc. The problem discovered can be resolved though a critical evaluation of the previous researches in which the strength and weakness of each study are carefully weighted.

He further described statistics as a branch of science methodology dealing with collection, classification,

description and interpretation of data that are obtained by surveys or experiments. Its aim is to describe or make inferences on the numerical properties of a target population. He stated that the method of measurement used to describe a variable are classified into nominal ordinal interval and ratio scales.

Statistical test designed for nominal and ordinal levels is called non-parametric statistics, while those or the interval and ratio are called parametric statistics. Descriptive statistics are procedures used in describing the characteristics of a population based on what are deduced from the sample data. In making an inference they deal with probability sample error and maximizing error.

Adetro (1997) further state that questionnaire, interview and observation are the most commonly used techniques in collecting data. Data are arranged, measured and interpreted in research. Data tell the researcher what is required in order to solve a problem.

2.6 RESEARCH METHODS ADOPTED IN EDUCATION AND LIBRARY AND INFORMATION SCIENCE RESEARCH

Research is conducted so as to be able to generalise conclusions on observations for a proper research to be

Conducted. It will involve comprehending the problem involved by way of surveying the background to the problem, finding out if such problems have existed some where else and exploring the methods used in solving these problems, exploring if other related problems have occurred previously and if they can help amplify the present problems. Defining the purpose of the research, and stating basic assumptions designing methods of investigation then compare the findings with earlier ones.

Research in Education is based on one of the methods of knowing that method is science. Kerlinger (1979) identified four methods of knowing namely; methods of tenacity that is, where man holds firmly to the truth, method of authority, which is based on established truth, method of intuition in which the knowledge agrees with reasons and method of science. This method is different from the others in the sense that it is self-correcting. He further defined scientific research as systematically controlled, empirical and critical investigation of hypothetical preposition about the presumed related natural phenomena. This definition though compact can be explained thus. That scientific research is systematically controlled, which then means that the investigation is so planned that we rely on its results and that the investigation is empirical that is to say that the scientist does not just

depend on reasoning but also tests his belief outside himself. According to Black and Champion (1976), scientific thinking is empirical, rational and abstractive.

The problems of Education differs with those of library and information science. Even when these problems appear the same, they may occur in different environments. Thus different problems will have different approach to their investigation. Similarly, similar problems, that occur in different settings may also need different approaches to their investigations. Thus there are defined types of research methods.

Historical research method:

This a method where a researcher might be interested in finding out the major contributions of some persons, in a particular community for a particular period. The researcher then embarks on digging up facts, through written documents oral traditions or interview. In doing this the researcher is involved in a historical research.

Historical research according to McMillan and Schumacher (1984) is grouped under the analytic research just like philosophical, legal and linguistic research. This analytic research they say involves a synthesis of information, arguments, or events to derive relationships and consequences that may not be empirical in nature.

Obioma et al (1987) stated that historical research is geared towards reconstructing or constructing history of an event for a given period, in a given place. It is also directed at providing information on events or using historical facts to solve a problem.

Survey Methods:

Wolman (1973) stated that survey research is one which involves the assessment of public opinion using questionnaire and sample methods. While Van Delen (1973) simply puts it that it takes the form of description or they may be explanatory in nature.

Kerlinger (1979) described survey research as that research which involves large and small population where samples are selected, and studied in order to discover relative incidence, distribution and integration of sociological and psychological variables. The major aim of survey research which differentiate it from ordinary status survey is that it studies the relationships among variables rather than just provide information on the status quo. Survey method is often called sample survey. Survey methods according to McMillian and Schumacher (1984) are used to learn about people's attitudes, beliefs, values, demographic facts, behaviour; opinions, habits, desires, ideas, and other types

of information. They are used frequently in business, politics, government, sociology, public health, psychology and education because accurate information can be obtained for large number of people with a small sample.

Case Study:

This type of research is motivated by problems on an individual or individuals as a group. The focus of inquiry is one unit. Case study should not be confused with case history of an individual done by social workers, clinical psychologist and school psychologist as part of their work. According to Mcmillian and Schumacher (1984) the findings of a case study are generalizable or practicable to other settings or population like experimental findings. But this does not make the study less valid or important in social science. It merely reflects the immediate purpose of the research to discover and understand the complexities of a single phenomenon.

Evaluative Research:

This research method differs in many ways from basic and applied research, Campbell (1982) stated that an evaluation research is communicated in concrete language, specific to the practice and meaningful to the participants. The findings should have "site-specific interpretability". Because it aids in immediate decision making, the findings usually have a

limited generalisability. Macmillan and Schumanchar (1984) stated that it focuses on a particular practice at a given site. The practice may be a program, a product or a process. It assesses the merit and worth of a particular practice in terms of the values operating at single site or more than one site.

Comparative Research:

Mcmillian and Schumacher (1984) stated that this type of research qualitatively compares similarities and differences in educational events to those of other periods. The analysis may indicate a consistent trend, a series of unique situations, or the beginning of a new duration. While Afolabi (1993) stated that it attempts to establish the similarities and difference that exists between two entities in in order to postulate valid generalization and principles.

Observation and Descriptive:

McMillian and Schumancher (1984) stated that observational research assesses the factors or variables of interest as they occur. In other words, it describes what is happening by means of recorded observations. It refers only to the way the information is collected. The purpose can be established cause-effect relationships or to describe the present state of phenomena McMillan and Schumacher (1984) also

identified other research methods as questionnaire, test, interview, ethnographic and unobtrusive researches.

Experimental Research:

Kerlinger (1979) describes three broad types of experimental - Laboratory experiment, field experiments and field study. Just like the case of Ex-Post-facto research experimental, research studies in a systematic ways, cause and effect relationship among variables. The basic difference, however is in direct control or manipulation of the independent variables or experimental conditions.

Christensen (1980) broadly describes non-experimental research as descriptive researches.

According to McMillian and Schumachter (1984) meets specific procedural criteria, and quisi-experimental.

While Obioma et al (1986) stated that there are two types of experimental research.

According to Afolabi (1993) the method involves controlling the conditions that will prevail in the research, manipulation of one or more independent variables, the effect of the manipulation on the values of the dependent variables with regards to one or more experimental groups is observed.

Contest Analysis:

Bruce (1988) describe it as research technique for the objective systematic and quantitative description of manifest content of communication.

This method according to Afolabi (1993) is designed to facilitate the objective analysis of the appearance of words, phrases, concepts, themes, characters or even sentences and paragraphs contained in printed or an audio-visual materials.

In any research, the method of research should be specified, described and justification should be provided for its selection.

2.5 SUMMARY OF THE REVIEWS:

Research is a systematic search for new knowledge of the subject of study or application of knowledge to the solution of a new problem in the area of study. Thus, the main aim is to improve the efficiency of educational process and provide a guide to positive change. It is done studying the growth and development of a student, and to provide information which will help in decision making processes. Thus for a meaningful research to be carried out successfully, there is the need to have a good background knowledge of statistical methods which will be used in the analysis, interpretation and presentation of the research work.

From the foregoing review of literature related to this study, the uniqueness of this research has been established. In as much as it has fundamental relationship with the reviewed work, it is important to note that non of them could stand in as substitute to it in any case. Rather they are useful for establishing the state-of-the-art in this area of research

REFERENCES

Abdullahi, L.S and Korau Y. (1994); The application of statistics in Library and Information Science: Postgraduate thesis/dissertations in A.B.U., Library School from 1971 - 1991". Proceedings of 7th National Conference of Nigerian Association of Library and Information Science (NALISE June 29 - July 1, 1994.

ADETORO, S.A (1997); Research technique for project, proposals, report Thesis and dissertation (revised ed.) A.B.U. Press Nigeria. P.27-36

AFOLABI M. (1986); Introduction to research methods for writing proposals, project and thesis. Ahmadu Bello University, Zaria. P. 19-22

AKUEZUILO, E.O.(1990); Research Methodology and Statistics Christon Printing and Publishing Co. Enugu - Nigeria. P. 25-26.

BABBIE, E.R (1986); The practice of social research 4th ed. Balmont C.A. Wadsworth p. 15-20.

BECKER, L.B(1981); "Secondary analysis in G.H. Stepel and B.H Westley (eds) Research Methods in Mass Communication. Prentice Hill Engle Wood Cliffs. N.Y. p. 29-30.

BUSHA, C.N and HARTER S.P.; Research methods in Librarianship: Techniques and Internations New York Press p.18-22.

DIPEOLU, J.O (1973); Library statistics Library standard and library development.Nigerian Libraries 9(1 and 2) April and August, p.57-63.

DROTT, M..C. (1969); Random sampling: A tool or Library Research.College and Research Library P. 55-60.

Encyclopedia Britanica (1974) vol II P. 19-20 P.225-227.

FREDERICK, E.C. et al (1967); Applied general statistics. Sir Isaac Pitman and Son Ltd. London p. 35-37.

GROTZINER, L. (1970) ; "Characteristic of research courses in Master's level curricula. Journal of Education For Librarianship P. 14-18.

HANNAGEN,T.J(1982): Mastering Statistics. Macmillian Press Ltd. Hong Kong p. 1-15.

JOHN, M. (1978); The emergence of future research in handbook of feature research edited by I. Fowles, Greenwood press London p. 22- 25.

KERLINGER, F.N. (1973); Foundation of behavioural research. Holt, Rine Hat and Winston, New York p.16-17.

KLEIN, S. (1975); "A note on Statistical technique in Commu nist China" The American Statistics Vol. 2 No. 5 p. 18-21.

KOJUSOLA, E.B. (1986) "Nature and application of Statistics": A Paper presentation in a workshop in capacity binding organised by the department of planning, Research and Statistics MFCT - Abuja.

LEMU, M.I (1995): Descriptive Statistics. Fembo books and graphic

Kaduna-Nigeria. P. 3-10

LEONARD, J.M. (1974) Understanding Statistics. EUP Ltd. London P. 19-20

LEVIS (1979) "Sources of statistics on the European Economic Community Statistics and Market Intelligence Library". In Sources of Information on European Community edited by Doris M. Palmer. Mansell, London p. 2 -12.

LINE, M.B.(1990): Research Policy in Librarianship and Information Science. British Library Research and Development. Taylor Graham Press Ltd. Oxford p. 8 - 9.

MARTIN, E.T. and FIRTH, J.R. (1983), Statistics Beazky Publisher. London. p.30-33.

MOORE, O.S. (1979). Statistics; Concepts and Controversies: MacGraw Hill Book Co. London p. 18-25.

MURRAY, S. (1992) Theory and problems of statistics 2nd ed. MacGraw Hill book Co. London p. 16-20.

NKEREUMEN, E.S. and UWEM, E. (1994) "The application of

operations research in Library Management Library Review Vol. 43 No. 6 p. 19-20.

NWORGU, B.G. (1991) "Education Research: Basic Issues and Methodology Wisdom Publishers Lt. Ibadan Nigeria. p.20-25.

NWOSU, C.A. (1992) "Construction relidation and reliability determination of statistics skill test for Library/Information Science in Nigeria Library School." An experimental investigation. Information Sciences Digest Vol. 1. No.2 p. 44-50.

POPHAM W.J. and SIROTNIK, K.A. (1973): Educational Statistics: Use and Interpretation 2nd ed Harper and Row New York p. 21-24.

RUBIN,R.B. RUBIN,A.M. and PIELE, L.J. (1985): Communication Research strategies and Sources Belmont, CA Wordswordth P. 21-24.

SALVERSON, C.A. (1969);"The relevance of statistics. Library evaluation College and Research Library P. 45 -50.

SCHICK, F.L. (1972);"The International Standardization of Library statistics. UNESCO Bulletin Library 25(1) Jan - Feb p. 2-11.

SHAIBU, M.J. (197): lECTURER NOTES.

SHERA, J.H (1979): The foundation of Education for Librarianship, New York: Becker and Hges. p.72-76.

SIMPSON, J.S. (1988): Basic Statistics for Librarianship. 3rd ed. Clive Bingley. London P. 1-12.

STEEL, R.C.D. and TORRIE, J.H. (1981): Principles and Procedures of Statistics Biometrical approach wnd ed. MacGraw Hill. London. p. 19-23.

STEPHEN, P. AND HORNBY, S. (1995): "The joys of statistics". Library review vol 44 No 8. p. 56-62.

THOMAS, J.R and NELSON, J.K (1985): Introduction to research in health physical Education recreation and dance. Human Kinetics Publisher Illinois. p. 33-44.

THORNTON, E. (1963): Research in a College Library in the place of a research Library in liberal Art College. Brunsmick, Maine Bowdown College. p. 16-19.

TRIVEDI, K.S. (1988): Probability and Statistics with reliability Queuing and Computer Science Application. McGraw Hill London p. 30-38.

WEAVER, R.M. (1953): The ethics of Rhetric. Henry Regney Chicago. p. 16-20.

WIBUR, W.J. (1994): "Non perametrik significance tests of retrieval performance comparism". Journal of Information Science Vol. 20. No. 4, P. 270-277.

WIMMER, R.D. and DOMINICK, J.R. (1985): Communication research; Strategies and Sources. Belmont C.A. Wadswtch P. 25-30.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

This chapter described the methods and procedures adopted in the conduct of this study. It is divided into the following sub-headings namely; description of research method adopted for the study, the population of the study. Instruments used for data collection, data collection procedures and data analysis procedures.

3.2 DESCRIPTION OF RESEARCH METHOD

For the purpose of this study the research method adopted was the documentary method of research. The Documents here are the postgraduate theses and dissertations in Education and Library and Information Science Departments used in order to get relevant data and information for the study under consideration. Access to these documentary source were gained through Kashim Ibrahim Library, Faculty of Education Library, Education and Library and Information Science stores and the Postgraduate school library.

This method involved the studying and analyzing of Masters theses and dissertations approved for higher degrees and submitted to the Departments of Education and Library and Information Science of Ahmadu Bello University, Zaria between 1987 and 1997.

3.3 DESCRIPTION OF POPULATION OF THE STUDY.

Population is often described as the totality of all the elements, subjects or members that possess a specific set of one or more common characteristics. In inferential statistics it is the group to which inferences are made. When a very large or limitless group is being considered it is called continuous population but if a specific group such as a class in a school is used for a study it is discrete populations. Population tends to answer questions such as: What is the source of subjects? Where are they located? Are there any unique characteristics which should be considered?

The population of this study were all the postgraduate theses and dissertations submitted, approved and were available in the Departments of Library and Information Science and Education from 1987 to 1997. These theses and dissertations as at the time of this study were 279 in number for both departments. The researcher made used of Kashim

Ibrahim library, Faculty of Education library, Departments of Library and Information Science and Education stores and the postgraduate school library. The theses and dissertations that were found and were available during the period covered by this study were 206 theses and dissertations for Education and 73 theses and dissertations for library and information science.

3.4 DESCRIPTION OF INSTRUMENTS USED FOR DATA COLLECTION.

The instruments used for collecting data for this study is documentary evidence. The documentary evidence constituted the two subject areas under study. These were the postgraduate theses and dissertations of Education and Library and Information Science Departments from 1987 to 1997.

Documents are records of past events. They are written or printed materials that may be official or unofficial, public or private, published or unpublished, prepared intentionally to preserve a historical record or prepared to serve an immediate practical purpose. These may be letters, diaries, wills, receipts, maps, autobiographies, journals, news papers, court-records, official minutes, proclamations, regulations, laws and the like.

3.5 DESCRIPTION OF DATA COLLECTION PROCEDURE

To obtain the data for this study, the researcher made use of the evaluative and content analysis method. Evaluative method can either formative or summarative. Formative evaluative method collects data about a programme while they are still being developed or to modify such programmes. While the summarative evaluative method occurs when the programmes have been fully developed and determines the worth of the final programme in relation to similar types.

The content analysis is a research technique for the objective, systematic and quantitative description of manifest content of communication.

A letter was collected from the department to Kashim Ibrahim Library and postgraduate school.(Appendix I). In examining the theses and dissertations, special reference was made to the methodology chapter and the chapter on analysis and interpretation of data. In most cases they are chapters 3 and 4. This was done on the assumption that relevant information will be found therein, such as the research methods used, statistical methods used and the frequency of statistical methods used for the analysis.

3.6 DESCRIPTION OF DATA ANALYSIS PROCEDURE

The researcher designed a score sheet where all the data was recorded year by year by way of frequency count for each Department and which were later tallied and finally presented in a tabular form (appendix II).

The data collected was analysed using percentages and frequency distribution to answer the research questions and T-test was used to test the hypotheses stated in chapter one.

Since percentages are used to compare groups of objects on an equitable basis, it was decided by the researcher to use percentage to determine the overall picture of statistical methods used in the theses and dissertations by of postgraduate students of Information science and Education Departments. T-test is applicable when we have only two groups to be compared. It is used to determine the significant difference between groups.

CHAPTER FOUR

ANALYSIS AND INTERPRETATION OF DATA

4.1 INTRODUCTION

This chapter analyses the data collected and discusses the findings.

In obtaining data for this study the researcher went through all the postgraduate theses and dissertation in Education and Library and Information Science Departments from 1987 - 1997 which were available at Kashim Ibrahim Library, Faculty of Education Library; Departments of Education and Library and Information Science and the Postgraduate School library. The research questions were answered using descriptive statistics as follows: Research question 1,2,3,4 and 5 while the hypotheses were tested using inferential statistics as follows: Hypotheses 1,2,3,4 and 5.

4.2 DATA ANALYSIS USING DESCRIPTIVE STATISTICS.

Descriptive statistics involves tabulating, depicting and describing a collection of data.

4.2 RESEARCH QUESTION 1

What are the research methods used in postgraduate theses and dissertations in Library and Information science and Education Departments?

It was found that some research methods were commonly used by the postgraduate students from both Library and Information science and Education Departments. The research methods are: survey research methods, case study, experimental, comparative, documentary, correlational, Quasi-experimental, Historical, content analysis, Evaluation and Ex-post facto.

TABLE 4.1: RESEARCH METHODS ADOPTED IN THE POSTGRADUATE THESES AND DISSERTATION OF EDUCATION AND LIBRARY AND INFORMATION SCIENCE, 1987 - 1997.

RESEARCH METHOD	EDUCATION	LIBRARY	BOTH DEPTS.
Survey	69	35	104
Case Study	50	11	61
Experimental	21	4	25
Quasi Experimental	11	-	11
Correlational	10	2	12
Comparative	8	6	14
Historical	8	2	10
Evaluative	8	-	8
Content Analysis	6	4	10

Expost Facto	6	-	6
Investigative	5	-	5
Documentary	4	9	13
TOTAL	206	73	279

4.3 RESEARCH QUESTION 2

What is the frequency of research methods used in the postgraduate theses and dissertations in Education and Library and Information Science Department ?

TABLE 4.2: FREQUENCY OF RESEARCH METHOD USED IN THE POSTGRADUATE THESES AND DISSERTATIONS IN LIBRARY AND INFORMATION AND EDUCATION DEPARTMENTS: 1987 - 1997.

Research Method Adopted	Education Department		Library and Information Science		Both Departments	
Survey	69	33.5	35	47.99	104	37.3
Case study	50	24.3	11	15.1	61	21.9
Experimental	21	10.2	4	5.5	25	8.9
Comparative	8	3.9	6	8.2	14	5
Documentary	4	1.9	9	11	13	4.7
Correlational	10	4.9	2	4.1	12	4.3
Quasi-Experimental	11	5.3	-	-	11	3.9
Historical	8	3.9	2	2.7	10	3.6
Content analysis	6	2.9	4	5.5	10	3.6
Evaluative	8	3.9	-	-	8	2.9

Ex-post facto	6	2.9	-	-	6	2.2
Investigative	5	2.4	-	-	5	1.8
Total	206	100	73	100	279	100

Table 4.2 above shows that survey research method was highly used by the postgraduate students from both Departments with education having 69 (33.5%) postgraduate students using it and library and information science 35 (47.9%). This is followed by case study research method with Education students 50 (24.3%) and library and Information Science 11 (15.1%).

As stated above, survey method, case study and experimental research methods were the most commonly used research methods in the two departments. Perhaps, This could likely be that in developing nations, most researchers focus on developmental phenomena. This dictates the nature and trends of researches undertaken. Thus these three kinds of research methods are good instances which probably account for why they are commonly used by the student of the two departments under study. Quasi Experimental, Ex-post factor Investigative and Evaluative research methods were confined to Education Department, where it was further observed that their restriction are even more to the science education unit. That these type of research methods were found to be used by the postgraduate students of Science Education may represent the

scientific nature of their researches. By and large, there is a great overlap in the research methods adopted by the postgraduate students in the two departments. This may probably be because of the postgraduate research method class jointly attended by all the postgraduate students in the faculty of education.

4.4 RESEARCH QUESTION 3

What are the statistical methods used in the postgraduate theses and dissertations in library and Information science and Education Departments ?

TABLE 4.3: STATISTICAL METHODS USED IN POSTGRADUATE THESES AND DISSERTATIONS IN LIBRARY AND INFORMATION SCIENCE AND EDUCATION DEPARTMENTS FROM 1987 - 1997

Types of Statistical Method Adopted	Education Department		Library and Information Science		Both Departments	
	No	%	No	%	No	%
Descriptive	49	23.8	53	72.6	102	36.6
Inferential	141	68.5	11	15.1	152	54.5
No Statistics	16	7.7	9	12.3	25	8.9
Total	206	100	73	100	279	100

As indicated by table 4.3 above, the statistical methods employed by the postgraduate students of the two Departments

during the period of study are mainly descriptive and inferential statistical methods.

In Education Department, it is observed from table 4.3 that a total of 49 (23.8%) postgraduate students made use of descriptive statistics in their data analysis while the corresponding group from Library and Information Science Department numbering 53 (72.6%) also used it. This shows that more Library and Information Science postgraduate students made use of descriptive statistical method in their theses and dissertations during the period covered by this study than their counterparts from Education Department.

Table 4.3 above also reveals that a greater number of Education postgraduate students 141 (68.5%) adopted the inferential statistical method in their data analysis as against those from library and Information Science Department which is 11 (15.1%) who employed the same method during the period of study.

The researcher, however, attempted to identify the variety of statistics the postgraduate students of the two departments used in analysing their data irrespective of the statistical method they adopted. This ranges from frequency distribution, percentage, charts, means variance, standard deviation, Z score in the class of descriptive statistics to

ANOVA, P.P.M.C, T-Test, Chi square, Kruscal Wallis Mann Whitney, Wilcox Rank test, spermine rank test and multiple regression in the class of inferential statistics.

The differences in the above analysis could be due to the fact that postgraduate students of Education take extra statistical course at the Departmental level.

4.4 RESEARCH QUESTION 4

What is the frequency of statistical methods used in the postgraduate theses and dissertations in Education and Library and Information Science Departments ?

TABLE 4.4: FREQUENCY OF STATISTICAL METHODS USED IN POSTGRADUATE THESES AND DISSERTATION IN EDUCATION AND LIBRARY SCIENCE UNDER THE DESCRIPTIVE METHOD AS ADOPTED BY THE TWO GROUPS OF POSTGRADUATE STUDENTS 1987 TO 1997

Types of Descriptive Statistics used	P.G Theses Education Department		Library and Information Science		Both Departments	
Frequency	15	7.3	14	19.2	29	10.4
Percentage	20	9.7	32	43.8	52	18.6
Charts	2	0.9	1	1.4	3	1.1
Mean	3	1.5	3	4.1	6	2.2
Variance and Standard Deviation	6	2.9	3	4.1	9	3.2
Z-score	3	1.5	-	-	3	1.1
Total	49	23.8	53	72.6	102	36.6

The total number of theses and dissertations for postgraduates students from Education Department during the study period were 206 (table 4.1), out of which 49 students (23.8%) used descriptive statistics.

While in Library and Information Science postgraduate theses and dissertations, they were 73 in number (table 4.1) out of which 53 students (72.6%) used descriptive statistics. The breakdown of the distribution is shown on table 4.2.

From table 4.4, percentage was the most commonly used statistics by postgraduate students from the two Departments particularly the Library and Information Science students. This could be because percentage, reduces the different sets of numbers to a common base and any set of frequency can be transformed to percentage in order to facilitate statistical manipulation and interpretation. It could also be because it is easy and convenient to use.

TABLE 4.5: FREQUENCY OF STATISTICS USED IN POSTGRADUATE THESES AND DISSERTATION IN EDUCATION AND LIBRARY AND INFORMATION SCIENCE UNDER THE INFERENTIAL STATISTICAL METHOD ADOPTED BY THE TWO GROUPS OF POSTGRADUATE STUDENTS FROM 1987 TO 1997.

Types of Inferential Statistics used	P.G Theses Education Department		Library and Information Science		Both Departments	
ANOVA	34	16.5	3	4.1	37	13.3
P.P.M.C	22	10.7	1	1.4	23	8.2
T-TEST	16	7.7	-	-	16	5.7
CHI-SQUARE	36	17.5	6	8.2	42	15.1
KRUSCAL WALLIS	6	2.9	-	-	6	2.2
MANN WHITNEY	14	6.7	-	-	14	5
WILCOX RANK TEST	3	1.5	-	-	3	11
SPERMINE RANK TEST	9	4.4	1	1.4	10	3.5
Multiple Regression	1	0.5	-	-	1	0.4
Total	141	68.4	11	15.1	153	54.5

From table 4.3, out of the 206 postgraduate theses and dissertation from Education Department, 141 (68.4%) students used inferential statistical methods in the analysis of their data.

For Library and Information Science postgraduate theses and dissertations, out of 73 (table 4.1), Postgraduate students from the department, 11 (15.1%) of the students made

use of inferential statistics in their data analysis (table 4.5).

Table 4.5 also shows that Anova and Chi -square were the most commonly used statistics by the two Postgraduate students from the two Departments under study during the period covered.

Beside those who have used both descriptive and inferential statistical methods, there were some postgraduate students who did not use any type of statistical method at all in the analysis of their data. In the Library and Information Science Department for example, there were 9 (12.3%) such postgraduate students.

A close look at these research topics, one would have expected the researchers to adopt even the simplest descriptive statistics in their analysis.

In Education Department 16(7.8%) of the postgraduate students did not use any statistical method in the analysis of their data.

However, it was observed that some theses and dissertations of the postgraduate students from the two departments made used of the more than one type of statistical method in the analysis of their data.

TABLE 4.6: SHOWING THE POSTGRADUATE STUDENTS WHO ADVANCED JUSTIFICATION FOR THE USE OF SELECTED STATISTICAL METHODS IN THEIR THESES AND DISSERTATIONS 1987 TO 1997

STATEMENT OF JUSTIFICATION	EDUCATION DEPARTMENT		LIB. & INFORMATION SCIENCE DEPT.		BOTH DEPARTMENTS	
	No	%	No	%	No.	%
With	85	41.3	16	22.0	101	36.2
Without	121	58.7	57	78	178	63.8
Total	206	100	73	100	279	100

The above table, 4.6 shows that in Education Department, 85(4.3%) of the 206 postgraduate theses and dissertation studied advanced statements justifying their use of a particular statistics in the analysis of the data while in the Department of Library and Information Science, 16(22%) of the 73 theses and dissertations studied by the researcher also give reasons to justify why they adopted a particular statistical method in their research.

The researcher further went through the chapters on methodology and data analysis and interpretation in most theses and dissertations from the two departments. That is, chapters 3 and 4. In the methodology chapter particular attention was paid to the Description of data analysis procedure, where the researcher normally states the type of

statistic adopted and why it was adopted. Variety of justifications were put forward by the individual students to justify the use of a selected or particular statistics. Most postgraduate students of the two departments cited authorities to justify why they used a particular or selected statistical methods in the analysis of their data. This shows that they did understood what they were doing.

There are also postgraduate students in both Departments under study who did not justify why they used a particular or selected statistical methods. This could be that they did not understand much of what they were doing or they felt that there was actually no need to explain why they are using such statistical methods. Perhaps it could also be that their supervisors did not bother to call their attention to this deficiency

The researcher also looked at the differences that exist between the Library and Information Science and Education Postgraduate theses and dissertations with regards to the frequency of inclusion of the statement of justification for using selected statistical method and observed that there is a difference between the number of postgraduate theses and dissertations from Education Department and Library and Information Science Department which have statements

justifying the use of selected statistical methods in their data analysis. It was found that 85 (41.3%) out of the 206 postgraduate theses and dissertations in Education Department as opposed to the 16 (21.9%) out of 73 postgraduate theses and dissertations from library science actually had statements justifying their use of selected statistical methods. Comparatively therefore, Education Department has more postgraduate theses and dissertation with statements of justification for using a particular statistical method than Library and Information Science Department.

This finding could imply that students with statements of justification understand the appropriate statistical methods they adopted in the conduct of their research. Those without it could be said to be careless or indifferent to it. Since both groups are taught by the same lecturers at the Faculty level, it could also be said to some extent, that, supervisors of such students shared some element of negligence or indifference for not drawing the attention of the students to the lapses.

HYPOTHESES TESTING

HYPOTHESES TESTING USING INFERENTIAL STATISTICS

Inferential statistical methods allows for the making of the inferences about the meaning of research outcome as well as their justification. It provides an objective basis for meaningful decision making.

4.6 HYPOTHESIS I

There are no significant differences between research methods used in the postgraduate theses and desertations in Education and Library and Information Science Departments.

To test this hypothesis, T-Test was used.

Education		Library & Information Science	
X_1	X_1^2	X_2	X_2^2
69	4761	35	1225
50	2500	11	121
21	441	4	16
8	64	6	36
4	16	9	81
10	100	2	4
11	121	2	4
8	64	4	16
6	36		
8	64		
6	36		
5	25		
$\sum$ = 206	8225	73	1503
n_1 = 12	$\bar{x}_1$ = 17.17	n_2 = 8	$\bar{x}_2$ = 9.13

Since n_1 # n_2 and variance are assumed to be equal, the standard error of the difference between means are:-

For Education ($\sum X_1^2$).

$$\sum x_1^2 = \sum X_1^2 - \frac{(\sum X_1)^2}{n_1}$$

$$= 8225 - \frac{(206)^2}{12}$$

$$= 8225 - \frac{42436}{12}$$

$$\sum X_1^2 = 8225 - 3536.3$$

$$= 4688.7$$

For Library & Information Science

$$\sum X_2^2 = \sum X_2^2 - \frac{(\sum X_2)^2}{n_2}$$

$$\sum X_2^2 = 1503 - \frac{(73)^2}{8}$$

$$\sum X_2^2 = 1503 - \frac{5329}{8}$$

$$\sum X_2^2 = 1503 - 666.13$$

$$\sum X_2^2 = 836.87$$

To test for the hypothesis above using t-test hence

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{(\sum X_1^2 + \sum X_2^2)}{n_1 + n_2 - 2} (1/n_1 + 1/n_2)}}$$

where $\mu_1 - \mu_2$ is assumed to be zero

$$t = \frac{(17.17 - 9.13) - (0)}{\sqrt{\frac{(4688.7 + 836.87)}{12 + 8 - 2}(1/12 + 1/8)}}$$

$$t = \frac{8.04}{\sqrt{(5525.57/18)(0.2083)}}$$

$$t = \frac{8.04}{\sqrt{(306.98(0.2083)}}$$

$$t = \frac{8.04}{\sqrt{63.94}}$$

$$t = \frac{8.04}{7.996}$$

$t = 1.005$ (calculated value)

Taken $\propto = 0.05$ and

$df = n_1 + n_2 - 2$

$= 12 + 8 - 2 = 18$

:. Critical Value of t = 2.101

Decision: Since the obtained t value (1.005) is < the critical value of t (2.101), we reject H_1, and accept H_0.

Interpretation: Since obtained t value did not fall within the critical region (that is)(>=2.101 and >= 2.101), it shows that there is no significant difference between the research methods used.

Hypothesis 2

The same procedure as that of 1 was used and the result is the same.

Hypothesis 3

There is no significant difference between the statistical methods used in Education and Library theses and dissertation.

Education		Library & Information Science	
X_1	X_1^2	X_2	X_2^2
49	2401	53	2809
141	22201	11	121
$\sum$ = 190	$\sum$ = 24602	$\sum$ = 64	$\sum$ = 2930
n_1 = 2		n_2 = 2	
$\bar{x}_1$ = 95		$\bar{x}_2$ = 32	

To obtain the estimated standard error of the difference between the means, hence

For education ($\sum X_1^2$) =

$$\sum X_1^2 = \sum X_1^2 - \frac{(\sum X_1)^2}{n_1}$$

$$\sum X_1^2 = 24602 - \frac{88804}{2}$$

$$\sum X_1^2 = 24602 - 44402$$

$$\sum X_1^2 = -19800$$

Similarly the sum of squares for Library($\sum X_2^2$):

$$\sum X_2^2 = \sum X_2^2 - \frac{(\sum X_2)^2}{n_2}$$

$$\sum X_2^2 = 2930 - \frac{(64)^2}{2}$$

$$\sum X_2^2 = 2930 - \frac{4096}{2}$$

$$\sum X_2^2 = 2930 - 2048$$

$$\sum X_2^2 = 882$$

The value of t in this case is given by:

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{(\sum X_1^2 + \sum X_2^2)}{n_1 + n_2 - 2}(1/n_1 + 1/n_2)}}$$

where $(\mu_1 - \mu_2) = 0$ (assumed)

$$t = \frac{(95 - 32) - (0)}{\sqrt{\frac{(-19800 + 882)}{2 + 2 - 2}(\frac{1}{2} + \frac{1}{2})}}$$

$$t = \frac{63}{\sqrt{(-18918/2)(1)}}$$

$$t = \frac{63}{\sqrt{-9459}}$$

$$t = \frac{63}{-97.25}$$

$$\therefore \quad t = -0.6478$$

Given 0.05 level of confidence at df = $n_1 + n_2 - 2 = 2$,

Critical value of t is = 4.303.

Decision: Since the obtained value of t(ie -0.6478) fall below the critical value of t (4.303), hence, we reject H_1 and accept H_0.

Interpretation: The calculated value of t falling outside the critical t region (t =< 4.303 and t => 4.303) implies that there is no difference in the statistical methods in postgraduate theses and dissertations of Education and Library.

Hypothesis 4

There are no significant differences in the frequency of statistical methods used in postgraduate theses and dissertations in education and library.

Descriptive Method				Inferential Method			
Education		Library		Education		Library	
X_1	X_1^2	X_2	X_2^2	Y_1	Y_1^2	Y_2	Y_2^2
15	225	14	196	34	1156	3	9
20	400	32	1024	22	484	1	1
2	4	1	1	16	256	6	36
3	9	3	9	36	1296	1	1
6	36	3	9	6	36		
3	9			14	196		
				3	9		
				9	81		
				1	1		
∑49	683	53	1239	∑141	3515	11	47
$n_1 = 6$		$n_2 = 5$		$n_{y1} = 9$		$n_{y2} = 4$	
$\bar{x}_1 = 8.167$		$\bar{x}_2 = 10.6$		$\bar{x}_{Y2} = 15.67$		$\bar{x}_{Y2} = 2.75$	
$\sum X_1^2 = 282.83$		$\sum X_2^2 = 677.2$		$\sum X_{y1}^2 = 1306$		$\sum X_{y2}^2 = 16.75$	

For Descriptive statistical method adopted in education and library or thesis and dissertation, the t-test is as follows:

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{(\sum X_1^2 + \sum X_2^2)}{n_1 + n_2 - 2}(1/n_1 + 1/n_2)}}$$

where $(\mu_1 - \mu_2) = 0$ (assumed)

$$t = \frac{(8.167 - 10.6) - (0)}{\sqrt{\frac{(282.83 + 677.2)}{6 + 5 - 2}(1/6 + 1/5)}}$$

$$t = \frac{-2.433}{(106.67)(0.367)}$$

$$t = \frac{-2.433}{39.15}$$

$$t = \mathbf{-0.0621}$$

But df $= n_1 + n_2 - 2$

$= 6 + 5 - 2$

$= 11 - 2$

$= 9$

and $\propto = 0.05$.

Decision: Since the critical value (2.262) is greater than the calculated t value (-0.0621), and the calculated t value did not fall within the critical region (i.e. $t \geq 2.262$ and $t \leq 2.262$), we reject H_1 and accept H_0.

Interpretation: The test reveal that there is no significant difference between the frequency of descriptive method used in education and library and information theses and dissertation.

* The negative t value (ie obtained value implies that the Mean is library users is greater than those in education.

For Inferential Method:

The t-test is as follows:

from

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{(\sum X_1^2 + \sum X_2^2)}{n_1 + n_2 - 2}(1/n_1 + 1/n_2)}}$$

where $(\mu_1 - \mu_2) = 0$ (assumed)

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\frac{(\sum X_1^2 + \sum X_2^2)}{n_1 + n_2 - 2}(1/n_1 + 1/n_2)}}$$

Parameters substituted are from the table above.

$$t = \frac{15.67 - 2.75}{\sqrt{\frac{(1306 + 16.75)}{9 + 4 - 2}(1/9 + 1/4)}}$$

$$t = \frac{12.92}{\sqrt{(1322.75/11)(13/36)}}$$

$$t = \frac{12.92}{\sqrt{(120.25)(0.3611)}}$$

$$t = \frac{12.92}{\sqrt{4.424}}$$

$$t = \frac{12.92}{2.103}$$

$$t = \mathbf{6.144}$$

Given α = 0.05 at

df = $n_1 + n_2 - 2$

= 9 + 4 - 2 = 11

:. Critical value of t = 2.201 (from the t table)

Decision: The t value obtained (6.144) is greater than the critical value of t(2.201) from the table, hence, we reject H0 and accept H1.

Interpretation: The result shows that there is statistically significant difference between the frequency of Inferential Method used in education and library theses and dissertations.

Hypothesis 5

There are no significant differences in research and statistical methods used in the postgraduate theses and dissertation in education and library.

Education		Library	
X_1	X_1^2	X_2	X_2^2
206	42436	73	5329
190	36100	64	4096
$\sum$ = 396	78536	$\sum$ = 137	9425
n_1 = 2 $\bar{x}_1$ = 198		n_2 = 2 $\bar{x}_2$ = 68.5	

To estimate the standard error of the difference means, the sum of squares for the variables are taken. Hence

For education ($\sum X_1^2$):

$$\sum X_1^2 = \sum X_1^2 - \frac{(\sum X_1)^2}{n_1}$$

$$\sum X_1^2 = 78536 - \frac{(396)^2}{2}$$

$$\sum X_1^2 = 78536 - \frac{156816}{2}$$

$$\sum X_1^2 = \frac{78536 - 156816}{2}$$

$$\sum X_1^2 = \frac{256}{2}$$

$$\sum X_1^2 = 128$$

Similarly for the Library Users ($\sum X_2^2$):

$$\sum X_2^2 = \sum X_2^2 - \frac{(\sum X_2)^2}{n}$$

$$\sum X_2^2 = 9425 - \frac{(137)^2}{2}$$

$$\sum X_2^2 = 9425 - \frac{18769}{2}$$

$$\sum X_2^2 = 9425 - 9384.5$$

$$\sum X_2^2 = 40.5$$

To test for this assumption using t-test at 0.05 confidence level, hence

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{(\sum X_1^2 + \sum X_2^2)}{n_1 + n_2 - 2}(1/n_1 + 1/n_2)}}$$

where $(\mu_1 - \mu_2) = 0$ (assumed)

$$t = \frac{(198 - 68.5) - (0)}{\sqrt{\frac{(128 + 40.5)}{2 + 2 - 2}(\frac{1}{2} + \frac{1}{2})}}$$

$$t = \frac{129.5}{\sqrt{(168.5/2)(1)}}$$

$$t = \frac{129.5}{\sqrt{168.5/2}}$$

$$t = \frac{129.5}{\sqrt{84.25}}$$

$$t = \frac{129.5}{9.179}$$

$$t = 14.11$$

But df $= n_1 + n_2 - 2$

$= 2 + 2 - 2$

$= 2$

Therefore, critical value of t = 4.303 (from the table).

Decision: The obtained t value (14.11) is greater than the critical t value (4.303); hence we reject H_0

Interpretation: The values obtained reveal that there is statistical significant difference between the research and statistical methods in the postgraduate theses and dissertations of education and library.

The fact that there is no significant difference between the frequency of the statistical methods used by the postgraduate students of both departments under study can be attributed to the fact that both students of the two departments attend the same research methods class at the faculty level. Further more from the result of the t-test, there was also no significant difference in the statistical methods. Statistics unlike the inferential statistics where there was significant difference was due to the fact that Education department postgraduate students have extra statistical method class at Departmental level. This could also be why they use more of inferential statistics in their theses and dissertations than their library and information science counterparts. (Appendix VI for the working). Since the research went further to look for the statements justifying the use of selected statistical methods, it was also necessary to test the hypothesis in this regards.

4.11 SUMMARY

This chapter has presented the analysis and interpretation of the data collected during the course of the study as well as the results of the research hypothesis tested. The study found that postgraduate students from the department of Education use more of inference statistics in their theses and dissertations than those from Library and Information Science department. However there is no significant difference in the use of research methods in the theses and dissertations by the postgraduate students of from the two departments.

The two Department had survey and case study ranking high.

CHAPTER FIVE

5.1 SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS.

The purpose of this chapter is to summarize, conclude and make recommendations based on the findings in chapter four. It is organised according to the following subheadings namely: summary of findings, conclusions and recommendations.

5.2 SUMMARY OF FINDINGS

Based on the analysis carried out in the chapter 4 the summary of the findings of this study are hereby presented as follows:

i. There are two categories of statistical methods employed in the theses and dissertations of postgraduate students of library and information science and Education Departments of Ahmadu Bello University, Zaria from 1987 to 1997. They are the descriptive and inferential statistical methods. However in testing hypothesis number 1, it was found that there are no significant difference between the statistical methods used in the theses and dissertations by the postgraduate students of the two departments studied.

ii. More theses and dissertations from the Education department had statements justifying the use of a particular statistical method in the conduct of their research than those in library and information science department. The postgraduate students of library and information science were found to be few in number in this regard. That is in terms of statements justifying their choice of selected statistical methods in the analysis of data in their theses and dissertations. After testing the necessary hypothesis, it was discovered that there was no significant difference between the statements justifying the use of selected statistical methods in the theses and dissertations of postgraduate students from the two Departments under study.

iii. There is a great difference in the frequency of statistical methods used in the postgraduate theses and dissertations from the two departments. Hypothesis number two tested revealed that there was no difference in their frequency of statistical method used.

iv. A number of research methods were employed by the postgraduate students of the two Departments ranging from survey, case study, experimental to evaluative research methods.

The case study and survey methods were the most commonly used by the postgraduate students from the two Departments. The expos facto, investigative, quasi experimental and evaluative methods were said to be particular to some sections of education department. The relevant hypothesis was tested and found that there are no significant differences between the research methods used by postgraduate students of Library and Information Science and Education in their theses and dissertations.

5.3 CONCLUSION

Arising from the summary of findings above, it can be concluded that the use of statistical methods in research undertaken by postgraduate students of Departments of library and information science and Education as stated in this theses and dissertations differ significantly . This may be due to the general believe that the use of relevant and appropriate statistical methods enhance the quality and sophistication of researches.

5.4 RECOMMENDATION.

Based on the findings and conclusion of this study, the following recommendations are made:

i. There is the need to ensure that postgraduate students of library science and education are firmly grounded in their knowledge of statistic as a good foundation for a quality research. This call is as a result of the low count of postgraduate theses and dissertation submitted to the two departments which have employed standard statistical method in general, in comparison with those lacking in this regards.

ii. There is a need for postgraduate students in library and information science department in particular to commence the application of advances statistical methods in the conduct of their researches for higher degrees to enhance quality. The postgraduate students should move from using more of descriptive to more of inferential statistics. This is because the society is moving towards technology and most fields depend heavily on quantitative techniques it will justify that the causes they pursue elements of science.

iii. The department of library and information science and other sections of education department which do not apply any form statistics should not just depend on the general statistical methods taught at the faculty level. Like other departments, they should teach it at the sectional

and departmental levels.

iv. The department of library and information science should encourage its postgraduate students to look into other research methods other than the ones commonly used (e.g survey method) in the department.

V. It is recommended that for further study, the comparison should be done between the faculty of Education and any other faculty in the University.

BIBLIOGRAPHY

Abdullahi, L.S. and Korau, Y. (1994); The application of statistics in Library and Information Science: Postgraduate thesis/dissertations in A.B.U., Library School from 1971 - 1991". Proceedings of 7th National Conference of Nigerian Association of Library and Information Science (NALISE June 29 - July 1, 1994.

ADETORO, S.A (1997); Research technique for project, proposals, report Thesis and dissertation (revised ed.) A.B.U. Press Nigeria. P.27-36

AFOLABI M. (1986); Introduction to research methods for writing proposals, project and thesis. Ahmadu Bello University, Zaria. P. 19-22.

Albert, K.K. and Samuel, T.M. (1979) Statistical Methods in Education and Psychology. Winter Pat Florida U.S.A. p. 9-10 .

AKUEZUILO, E.O.(1990); Research Methodology and Statistics Christon Printing and Publishing Co. Enugu - Nigeria. P. 25-26.

BABBIE, E.R (1986); The practice of social research 4th ed. Balmont C.A. Wadsworth p. 15.

BECKER, L.B(1981); "Secondary analysis in G.H. Stepel and B.H Westley (eds) Research Methods in Mass Communication. Prentice Hill Engle Wood Cliffs. N.Y. p. 29-30.

BLACK, J.A and CHAMPION, O.J. (1976) Methods and issues in Social research. New York. John Wily and Son Inc. p. 15118.

BOMAN, D.D. (1994) Accessibility to Research work in library and information Science in Nigeria. Proceedings of the 7th National conference of Nigerian Association of Library and Information Science (NALISE) June 29th - July 1st 1994.

BRETT, S. (1993) Statistics London Mitchel Beazley Publish p.15.

BRUCE, W. TUCHMAN (1988): Conducting Educational Research, 3rd ed San Diego. Harcourt, Bruce Javanovich Publishers

P.52

BUSHA, C.N and HARTER S.P.; Research methods in Librarianship: Techniques and Internations New York Press p.18.

CHRISTENSEN, L.B. (1980) Experimental Methodology Boston, Massachusetts Allyn and Bacon, Inc. p.34-5

DIPEOLU, J.O (1973); Library statistics Library standard and library development. Nigerian Libraries 9(1 and 2) April and August, p.57.

DOUGLAS, M.M (1976) Statistics for the Teachers 2nd ed. Pengamous

Press Ltd., Headinton Hill Hall N.I. P. 69-75

DROTT, M..C. (1969); Random sampling: A tool or Library Research.College and Research Library P. 55

Encyclopedia Britanica (1974) vol II P. 19-20 P.225

FREDERICK, E.C. et al (1967); Applied general statistics. Sir Isaac Pitman and Son Ltd. London p. 35-37.

GROTZINER, L. (1970) ; "Characteristic of research courses in Master's level curricula. Journal of Education For Librarianship P. 14

HANNAGEN,T.J(1982): Mastering Statistics. Macmillian Press Ltd. Hong Kong p. 1-15

JOHN, M. (1978); The emergence of future research in handbook *of feature research edited by* I. *Fowles, Greenwood press* London p. 22- 25

KERLINGER, F.N. (1973); Foundation of behavioural research. Holt, Rine Hat and Winston, New York p.16.

KLEIN, S. (1975); "A note on Statistical technique in Commu nist China" The American Statistics Vol. 2 No. 5 p. 18-21.

KOJUSOLA, E.B. (1986) "Nature and application of Statistics": A Paper presentation in a workshop in capacity binding organised by the department of planning, Research and Statistics MFCT - Abuja.

LEMU, M.I (1995): Descriptive Statistics. Fembo books and graphic

Kaduna-Nigeria. P. 3-10

LEONARD, J.M. (1974) Understanding Statistics. EUP Ltd. London P. 19-20

LEVIS (1979) "Sources of statistics on the European Economic Community Statistics and Market Intelligence Library". In Sources of Information on European Community edited by Doris M. Palmer. Mansell, London p. 2 -12.

LINE, M.B.(1990): Research Policy in Librarianship and Information Science. British Library Research and Development. Taylor Graham Press Ltd. Oxford p. 8 - 9.

MARTIN, E.T. and FIRTH, J.R. (1983), Statistics Beazky Publisher. London. p.30

McMillian, J. H and SCHUMACHAR, S. (1984) Research in Education A conceptual introduction. Little, Brown and Company Boston p. 1 - 30.

MOORE, O.S. (1979). Statistics; Concepts and Controversies: MacGraw Hill Book Co. London p. 18-25.

MURRAY, S. (1992) Theory and problems of statistics 2nd ed. Sied MacGraw Hill book Co. London p. 16 - 20.

NKEREUMEN, E.S. and UWEM, E. (1994) "The application of operations research in Library Management Library Review Vol. 43 No. 6p. 19-20.

NWORGU, B.G. (1991) "Education Research: Basic Issues and Methodology Wisdom Publishers Lt. Ibadan Nigeria. p.20-25.

NWOSU, C.A. (1992) "Construction relidation and reliability determination of statistics skill test for Library/Information Science in Nigeria Library School." An experimental investigation. Information Sciences Digest Vol. 1. No.2 p 44-50.

OBIOMA, G. O. et al (1987) Research Methods Edited by G.O. Obioma, Heinemann education books (Nig) Ltd P. 1- 7

POPHAM W.J. and SIROTNIK, K.A. (1973): Educational Statistics: Use and Interpretation 2nd ed Harper and Row New York p. 21-24.

RUBIN,R.B. RUBIN,A.M. and PIELE, L.J. (1985): Communication Research strategies and Sources Belmont, CA Wordswordth P. 21-24.

SALVERSON, C.A. (1969);"The relevance of statistics. Library evaluation College and Research Library P. 45 -50.

SCHICK, F.L. (1972);"The International Standardization of Library statistics. UNESCO Bulletin Library 25(1) Jan - Feb p. 2 -11.

SHAIBU, M.J. (197): lECTURER NOTES.

SHERE, J.H (1979): The foundation of education for Librarianship,New York: Becker and Hges. p.72

SIMPSON, J.S. (1988): Basic Statistics for Librarianship. 3rd ed. Clive Bingley. London P. 1-12.

STEEL, R.C.D. and TORRIE, J.H. (1981): Principles and Procedures of Statistics Biometrical approach wnd ed. MacGraw Hill. London. p. 19-23.

STEPHEN, P. AND HORNBY, S. (1995): "The joys of statistics". Library review vol 44 No 8. p. 56-62

THOMAS, J.R and NELSON, J.K (1985): Introduction to research in health physical Education Recreation and dance. Human Kinetics Publisher Illinois. p. 33-44

THORNTON, E. (1963): Research in a College Library in the place of a research Library in liberal Art College. Brunsmick, Maine Bowdown College. p. 16-19.

TRIVEDI, K.S. (1988): Probability and Statistics with reliability Queuing and Computer Science Application. McGraw Hill London p. 30-38.

WEAVER, R.M. (1953): The ethics of Rhetric Henry Regney Chicago. p. 16-20.

WIBUR, W.J. (1994): "Non perametrik significance tests of retrieval performance comparism". Journal of Information Science Vol. 20. No. 4, P. 270

WIMMER, R.D. and DOMINICK, J.R. (1985): Communication research; Strategies and Sources. Belmont C.A. Wadswtch P. 25-30.

WOLMEN, B.B. (1973) Dictionary of Behavioural Science, New York:Van Nostrand Reinhod Company P. 53-5

VON DATAN, D.B (1973): Understand Educational Research: An Introduction (3rd. ed) New York: GcGraw Hill Book Company p. 65-6