A SURVEY OF FACTORS INFLUENCING TEACHING AND LEARNING OF MATHEMATICS IN SECONDARY SCHOOL IN NIGER STATE

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BEING

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CERTIFICATION

I certify that this thesis, entitled "A Survey of Factors Influencing Effective Teaching and Learning of Mathematics in Secondary Schools in Niger State, Nigeria" meets the regulations governing the award of the degree of Master of Technology (M. Tech.) Science Education (Mathematics) in the Department of Science Education, Federal University of Technology, Minna and is approved for its contribution to knowledge and literary presentation.

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DECLARATION

I hereby declare that this thesis has been written by me and that it is a record of my own research work. It has not been presented partially of wholly in any previous application for a higher degree. All quotations are indicated by quotation marks or indentation and the sources of information are specifically acknowledged by means of references.

YUSUF BAYO LAMEED *DATE*

DEDICATION

This research project is dedicated to:-

i) My Mother, Wife and Children

ii) And all lovers of mathematics

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ABSTRACT

This study was designed to identified the factors influencing Effective Teaching and Learning of Mathematics in Secondary School in Niger State. There had been a noticeable poor performance of students in Mathematics at senior school certificate examination (SSCE). This unique problem is a nationwide phenomena, which is of greater concern to parents, Governments, Educationists, Teachers and entire public. As a result of this, an enquiry was undertaken to find out the causes using fifteen (15) senior secondary schools in Niger State. The instrument of research used in this study included observation, interview and structured questionnaire. The structured questionnaire were administered to a sample of fifteen (15) principals; seventy (70) mathematics teachers and three hundred (300) students cutting across the selected schools. The data obtained were analysed using the descriptive statistical method viz: percentage and chi-square statistical method to test the research question at $P<0.01$ level of significance. The major findings of study show that:- majority of teachers teaching mathematics in school major in other subject or discipline and are not qualified; supply of mathematics teachers to schools is grossly inadequate and so teachers are over – loaded with work; population explosion and inadequate teaching materials in schools; unsatisfactory condition of service for teachers; lack of practical work in mathematics and poor teacher's methodology in mathematics teaching as affirmed in this study, ($X^2 = 128.5>11.34$ at $P<0.01$). Based on their findings, it is recommended that: There is need to employ sufficiently qualified mathematics teachers to teach the subject in schools; The general notion that any science or technical graduates can teach mathematics should be discarded; Mathematics teachers should endeavour to make their lesson more practical and interesting i.e. to link theory with practical, teachers should enforce a forum whereby every student must have his/her own textbook; teachers should be schorlastic and pursue vigorously all avenues to improve themselves on the job; There should be provision of

and financial encouragement to the mathematics teachers by all i.e. Government, Administrator, parents and society; Schools should provide good and functional guidance and counseling facilities to students on their academic work.

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CHAPTER ONE

INTRODUCTION

1.1 Preamble

The mathematics role toward realizing the nations scientific and technological aspiration is unquestionable. The importance of mathematics education in Nigeria's educational system and the nation's technological development has been recognized. It has been noted that there can be no real development technologically without a corresponding development in mathematics; Therefore mathematics is the celebrated key to knowledge, the queen, servant and midwife of the science.

Despite its importance, many problems seem to be-set mathematics education which resulted in consistent poor performance in Senior School Certificate Examination (SSCE) in mathematics; Hence the need to examine some of these problems.

1.2 Background To The Study

The historic importance of mathematics in science and technology could be traced even before the alphabet was invented. Man's first use of number was to correlate one set of objects against another e.g animals in flock. Since then the contributions of mathematics still continue to our present age of technological development.

The knowledge of science and technology is rooted in mathematics. Any nation that wants to develop technologically should not play with the teaching and learning of mathematics at all levels of education. These days mathematical methods are used not only in science and technology but also to an ever increasing extent in almost all fields of human endeavour.

In Nigeria today the role of science and technology advancement cannot be over-emphasized. The history of mankind has recorded the various roles that education has played in the development of a society, (Abolade, 1986). In the light

of the above statement. "The Federal Government, has adopted education as an instrument par excellence for effecting national development", (F. M. E. 1981). Thus it has always been used as an alchemy of achieving various goals and objectives. For instance, in Ancient Greece, education and training were synonymous with the over all development of citizen-try. Each city-state thus presented its individual objectives. The Spartans, for example constituted a minority who wanted to maintain their dominance over others. Consequently, the education and training doled out to their children were for the development of soldierly qualities and courage.

The National Policy on Education, (1981) suggest among other things mathematics as a core-subject in both primary and the two type of secondary (Junior and Senior) Schools, and was equally made compulsory for students.

> According to Setidisho (1961)-Probably, no other subject forms such a strong binding force among the various branches of sciences – Physical, Biological and Social as Mathematics, without it, knowledge of the science often remain superficial. (Setidisho 1961, P. 110)

It is worthy to note that, in Nigeria, Mathematics came into being in schools with the introduction of western education in 18th century in form of 4R's (Religion, Reading, Writing and Arithmetic) by the early missioners. This Arithmetic served as mathematics in primary schools as well as in most elementary teacher training colleges up to the time of independence, (Ohuche, 1989). The books in use then were only shillings and Larcombe Arithmetic Series.

One can therefore see the importance of mathematics considering the present scientific age, but related problems on curriculum, facilities, anxiety and aptitude of students, textbook etc have created some difficulties in the teaching and learning of mathematics.

Obi (1986) suggested that because mathematics underlies the whole build-up and fabrics of modern science and technology, there should be a desire to break away from the teaching of techniques and develop instead,

> According to Ormell (1979); In the last forty years, mathematics and science syllabi have grown in size to the point where they appear to be about two as weighty as those of previous era. The forces of curriculum innovation which have produce this result are very powerful, yet it is clear to the most causal observation that the increased weight syllabi has been purchase at the cost of less depth of coverage (Ormell 1979, P. 36).

Therefore, the proposed secondary school syllabus for Nigeria should be relevant to the social and economic problems and related to the agricultural environment.

Majority of teachers teach students only to pass examination i.e. S.S.C.E; G.C.E; etc alone, not minding whether or not the contents they have taught are well understood. To this, Momodu (1978) suggested that, no more emphasis should be placed on the teaching of mathematics or science for passing examination alone, the concepts must be practically approached which could be translated into reality, more so when Nigeria had reached a technological era.

Furthermore, effort should be made to overcome the anxiety or fear that the subject is believed to instill in the mind of learners, because according to Gainer and White (1965) "of all the classroom variables affecting learning, anxiety has played a role of primacy in the importance of investigations during the past few years".

1.3 Statement of The Problem

The most fundamental problem facing all the developing nations is how they can develop and advance technologically. Whatever amount of borrowing may be made from the advanced nations of the world, there will be no tap-root upon which further technological advancement and progress can be made. Therefore, we need to develop ourselves for scientific discoveries and technological break, through sound knowledge of mathematics.

Despite that, mathematics is made compulsory in our secondary school; the percentage of the result obtained from both internal (teacher's set examination) and external (WAEC, NECO, NBTE, NTI, JAMB etc) generally in Nigeria is not very encouraging. This leads to the fewer number of students who opted in pursuit of mathematics as well as mathematics Oriented cereers. For instance, Ekwo (1986) revealed that out of 304,683 candidates who sat for mathematics in 1982 G.C.E. O/L; the percentage failure was 86.75%, In 1983 the percentage failure for 306,591 candidates was 91.13%; while in 1984 a 90.55% failure was recorded for 405,726 candidates. Also Adeyemo (1999) gave the summary of the performance of students in the SSCE General Mathematics result as follows:- In 1990 only 10.6% passed were recorded; In 1991 it was 11.1% passed; while in 1992 21.9% were recorded passed.

Reasons adduced for the above performance are varied and numerous. For teachers; students are too allergic to mathematics, the students attitude and behaviour are lackadaisical toward learning mathematics (Akintayo, 1999). From the students point of view teachers' poor method of teaching and assessment are reasons behind their poor performance. However, lack of enough and qualified mathematics teacher; Lack of well equipped library and mathematics laboratory in schools; And lack of Audio-visual materials to stimulate the students interest in the subject (mathematics). This prompted the researcher for a survey of factors influencing Effective teaching and learning of Mathematics in Secondary Schools in Niger State.

1.4 Research Questions

The following research question were asked:

i) How did the teacher's method of teaching affect the students performance in mathematics?;

ii) In what way does the use of mathematics laboratory affect the students' performance in mathematics?

iii) Does any significant gender difference exist in students' attitude toward mathematics?

iv) Is there any significant difference between experience and attitude on the teaching profession?

v) Is there any significant difference on the performance of qualified and non-qualified teachers?

1.5 Hypotheses

The following hypotheses were formulated to guide the study:-

HO_1 There is no significant influence on the teacher's method of teaching on the students performance in mathematics.

HO_2 There is no significant gender difference on students' attitude toward mathematics.

HO_3 There is no significant difference between experience and attitude on the teaching profession.

HO_4 There is no significant difference on teaching between qualified and non-qualified teachers.

1.6 Purpose of Study

The main objective of this study is to look into the causes for the poor performance in mathematics. The areas that would be considered are:- Quality and Qualification of the mathematics teachers in the secondary schools in the area of study, Instructional problems that affect the successful teaching and learning of mathematics; And the problem of instructional (aids) to supplement teachers work in the classroom.

1.7 Scope of The Study

This study is restricted to the two threes of the 6-3-3-4 system, that is, the junior and the senior secondary schools. And the consideration will be given to the following:-

Teacher, Learner, Syllabus, Facilities and essential equipments, language and Attitudes as it affects students and teachers in the schools chosen.

The study is carried out in the three (3) educational zones of Niger state. Although there are one hundred and forty-three (143) secondary schools in the area under study, only fifteen (15) secondary schools were used for the study because of financial and time constraints. Therefore, the investigator does not claim that the findings from this study will serve as a panacea to all factors influencing the teaching and learning of mathematics; This is because the sampled schools represent fractional part of the total secondary schools in the area under study, also, the others (e.g students, teacher etc) are equally the fraction of the total population of the area under study, while Niger State itself is a fraction of the country (Nigeria).

1.8 Significance of The Study

The study is very significant because several researches had confirmed that one of the major problems that demand the attention of curriculum reform specialists is that a large majority of science and mathematics teachers in Nigerian secondary schools are unqualified. The effect of this on the school system can be very enormous and even disastrous academically. The percentage pass of students in mathematics in senior school certificate examination (SSCE) has not been encouraging. It is therefore necessary that the factors influencing effective teaching and learning of mathematics in our schools be identified would attract and retain more qualified teachers in our schools.

The study is also important because of the population of mathematics students and teachers a research of this nature could serve not only as a curative

measure, but more importantly as a preventive measure. Considering the government stand on the bid to accelerate the move toward technological advancement, it is crystal clear as in the words of Group Captain Ibrahim Alfa (Rtd) (1979) of Air force at the STAN Conference:-

> The richer and more advanced nations of the world have attained their affluence through the advancement, which they have made in science and technology. The younger nation, must therefore, direct their energies and resources towards achieving a balance economy, a stage which can only be reached through scientific advancement. We hope to do this through a well balanced educational system in which prominence should be given to science and mathematics teaching and learning.

A research work of this nature will also help to ease the suffering of the mathematics teachers in their effort to convey information during the teaching and learning by verbalism.

1.9 Operational Definition of Terms

Instructional Aid/materials:- The objects/Items used into teaching students for better and clear assimilation of the concept.

Learning – One who seeks /knowledge that are useful for a successful Life.

Learning – The act of assimilating knowledge that leads to permanent change in behaviour.

Mathematics – An acceptable global language that is based in numerical and logical reasoning.

Performance – The ability to solve mathematical problems/situations by the students.

Science – Knowledge obtained by observation and testing of facts that are arranged in orderly manner.

Teacher – An instructor / facilitator / model / producer; one who impart an acceptable knowledge directed toward improved behaviour of the learner.

Teaching – The process of imparting knowledge or information with the aims of modify the behaviour of the learner.

Technology – Study, mastery and utilization of manufacturing methods and industrial arts, systematic application of knowledge to practical tasks.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

In the past, various authors have at one time or the other carried out some studies into the teaching and learning of mathematics and its associated problems in our schools. This study tries to look critically at the factors influencing effective teaching and leaning of mathematics in the area under study. To establish a basis for the study, this chapter has therefore, been devoted mainly to reviewing and making references to some study that are relevant to the topic under consideration. thus the chapter has been organized along the pattern stated below;-

(i) Definitions of mathematics, teaching and leaning.

(ii) Quality and Qualification of mathematics teachers,

(iii) The role of the teacher via his methodology in mathematics class;

(iv) Teachers' morale and attitude as a factor for students' performance in mathematics;

(v) Students' attitude and performance in mathematics;

(vi) Sex-differences in attitude and performance towards mathematics; And

(vii) Mathematics-laboratory and instructional materials, and how effective they have been used by teachers of mathematics.

2.2 Definition of Mathematics, Teaching and Learning

Mathematics cannot be given a precise definition, this is because, people give different meaning according to their perspectives. The dictionary meaning is "science of size and numbers of which Arithmetic, Algebra, Geometry and Trigonometry are branches". (Hornby, 1974).

According to Encyclopedia of Education (1985), "a natural science and realm of knowledge entirely into itself with a considerable scope".

Umar (1995) sees mathematics as language, which provide an indispensable means of investigating the nature of things,

particularly those, which are dealt with in the field of science, technology, engineering and industry. It is a branch of science that deals with numerical problems and logical reasoning. (Umar 1995, P. 120)

To Fakuade (1977) "a tool for use in Science, Technology and Industries". While to Gittleman (1975), "the term mathematics come from Greek word known as **MATHEMATA** – which means learning of subjects by instruction (Arithmetic, Algebra, Statistics, Geometry)".

Saliu (1999) quoting Fatunla sees it as a language used everyday, for the expression of the mind in quantifying size, shape and quantity, And to Aminu (1995) "it is not only the language of the sciences, it is the essential nutrient for thought, logic and reasoning, therefore, it is the bed-rock of modern development".

Teaching can be defined as the process of imparting knowledge or encoding information so that the decoder may be able to modify his behaviour (Abolade, 1976).

Oladosu (1976) quoting scheffier, an activity aimed at the achievement of learning and practiced in such a manner as to respect the students intellectual integrity and capacity for independent judgment. (Oladosu 1976, P. 106)

Fajemidagbe (1976) regards "teaching as a complex problem-solving activity". For Bruner (1966) Teaching: Consist of leading the learner through a sequence of statements and restatements of a problem or body of knowledge that increases the learners ability to grasp, transform and transfer what he is learning.

Gagne (1975) defines it as:
The set of events designed to initiate, activate and support learning in the human being, Gagne then goes on to define the teacher as the DESIGER, the MANAGER and the EVALUATOR of leaning. (Gagne 1975, P. 95)

While Hirst (1975) observes that: Teaching is ----------
a polymorphous activity it quite literally takes many forms and activities. The intention of all teaching activities is that of bringing about learning. (Hirst 1975, P. 170)

And for Gage (1970): Teaching is "the exertion of psychological force with the view of promoting learning".

There are many definitions of learning. However, the divergence in the definitional concept of learning have some similarities, learning involves mental processes, acquisition of some skills and competencies, these skills can be acquired consciously or unconsciously and may be in formal educational environment or in a non formal situation.

> According to Kelly (1965), learning is the mental activity by which knowledge and skills, habits and attitudes, virtues and ideals are acquired, retained and utilized, resulting in the progressive adaptation and modification of conduct and behaviour. (Kelly 1965, P. 109)

> While Oladosu (1976) quoting Hergehah says that it is a relatively permanent change in behaviour or in behavioural potentiality that result from experience and cannot be attributed to temporary body states induced by illness, fatigue or drugs. (Oladosu 1976, P. 65)

2.3 Quality/Quantity and Qualification of Mathematics Teachers:

Majority of the related researches have attributed poor performance in mathematics to acute shortage of qualified and competent mathematics teachers.

> As said by Bill (1977), the supply of mathematics graduates is a continuing problem, though universities have expanded; yet their turnout as regards mathematics is very minimal and the shortage in mathematics graduates in teaching continues. Although, the statement refers to England, all the same it equally applies to Nigeria. (Bill 1977, P. 48)

> Kalejaiye (1971) observes that, post-primary institutions in Nigeria are starved with mathematics teachers, very few graduates specializing in mathematics are produced every year by the universities consequently, majority of schools continue to rely heavily on teachers who lack sufficient understanding of mathematics to be able to ensure high student achievement both in the cognitive and aptitude domain (Kalejaiye 1971, P. 107)

Writing on the demand for primary and secondary level teacher in Kwara State, Fakuade (1980) quoting Adesina – What the state government need most in the area of manpower development is a programme of retraining the stock of its existing staff in the institution. Also the second National Development plan (1970-1974) in Fakuade (1980), the performance of the problems of the educational sector was analysed thus:

> One of the major constraints on the desirable development in primary and secondary educating in the country is the serious shortage of qualified and competent teacher staff.
> (Fakuade 1980, P. 24)

> On the same issue it was viewed by Fakuade (1980) that:
> Education authorities at all level-national, state and local, have not paid adequate attention to the training of the teachers on science and mathematics. In the same vein, most of the teachers who are now asked to teach mathematics in secondary schools are not qualified to handle the subject, as they lack the necessary professional training requires of a teacher.
> (Fakuade 1980, P. 28)

Mathematics can not be taught effectively without the teacher himself being well versed in the subject well above his students and should feel happy teacher, since you can not expect much from little. On mastery of subject contents by the teacher, Solaru (1964) says; if it is true that education is fundamentally, the dynamic impact of character, a teacher's training should equip him as an individual going out to influence other lives through personal relationship rather than as an exponent of the subject.

The role of the teacher in this aspect is very vital. There is need for effective and meaningful directed towards the development of mathematical power and understanding.

> Fakuade (1973) writes; For in the hands of poorly prepared teachers, the best educational reforms may turn round to be a negation, of the very ideals that they are meant to perpetuate. Many times, and in sundry places in parts of Africa, Mathematics materials have

simply been thrown at teachers who are ill-prepared for mathematics teaching and have been asked to teach it. (Fakuade 1973, P. 56)

This is true of the nature of mathematics teaching in Nigeria today. Majority of those who have been asked to handle the subject in our schools are ill-prepared for the task.

2.4 The Role of the Teacher via his Methodology in Mathematics Class

The teacher is regarded as the most single important element in the learning process (Nwaogu, 1990).

> Fakuade (1975) quoting crump, describes, "the role of the teacher is among those of participator, instructor and tester"; and quoting Perkin's view on teacher's role as "among other things tht of a supervisor and evaluator". (Fakuade 1975, P. 26)

While Skemp (1971) making reference to Piaget sees it as-less of a person who gives 'lesson' and is rather than of some-one who organizes situation that will give rise to curiosity and solution seeking in the child. The above, leads on to the teacher adopting lively ways of communicating effectively with students, a situation which borders on methodology.

> Fakuade (1973) quoting Baber asserts that: In the firm belief that better teaching of mathematics can dispel the false impression that the subject is difficult, mathematics teachers and students may look forward optimistically to the adoption of the modern syllabuses and method of teaching. (Fakuade 1973, P. 59)

Most teachers are not conversant with the use of modern skills and techniques of teaching. A teacher may enjoy academic mastery of his subject but may not be equally efficient in imparting such knowledge to students, a situation which borders on professionalism. Mathematics teachers must be knowledgeable in the content of the subject matter as well as have the techniques for teaching it effectively, i.e. possessing both professional and content mastery.

On this Fakuade (1975) quoting Butler and Wren writes: There are two equally important aspects of any profession, significant knowledge and effective technique. One cannot be efficiently professional if there is any distinct weakness in either aspect. A truly functional programme of professional preparation must, therefore, place emphases on the acquisition of knowledge significant to the chosen profession and also on the acquaintance with and use of the more efficient techniques of that profession.

> And Fakuade (1980) quoting Brookes: --- still to many teachers have to teach mathematics without knowing enough about the subject, or about the current ideas of teaching. There is need for enhanced in-service provision, which is only part of the large problem of enhancing the quality of the teachers' professional life. Teaching innovations fails unless the teacher are fully conversant with and convinced by the reasons underlying the innovation. In-service training must be directed above all to the development of the teacher's own capacity to make judgment. (Fakuade 1980, P. 25)

> Realising the importance of in-service training for teachers as a way of Helping them improve upon their methodology, the National policy on Education explicitly state that: No matter the efficiency of the pre- service training we give to teachers, there will necessary be areas of inadequacies. In-service education of teacher will continue to fill these gaps---, and will be systematically planned so that successful attendance at a number of such courses will attract incremental credits and, or count towards future advancement,

> According to Fakuade (1973); The poor performance recorded In mathematics at the secondary school level is at times attributed to poor teaching. For a teacher to be functional in the classroom, he has to assume mastery of some basic tenants in the area of classroom control and effective use of methodology. It is imperative that the teacher must know his students, the way they think and react to situations around them. (Fakuade 1972, P. 51)

Teacher should have the ability to identify students in accordance to their abilities, interests and needs. To be able to do this effectively; he must take courses

in methodology since by this he will be fully equipped to be able to perform the all-demanding task of captivating students' interest during teaching.

It is necessary for mathematics teacher to attempt to attempt to take mathematical skills into other subject areas and apply them. In addition they should accept the challenge to develop further mathematical skills when the existing ones are inadequate. In short, mathematics teacher must be dynamic and responsible in his methodology.

> On this Fakuade (1980) quoting Okorie says: The teacher can be instrumental in how a pupil react to a subject matter. In order to be effective, the teacher should prepare, Organize and present subject matter content; he should diagnose every learning problem and be prepared to assist in solving them. Furthermore, he should correct the confused, aroused the pupils' interest, motivate and challenge them and be able to up date and evaluate syllabus. (Fakuade 1980, P. 33)

For students to appreciate, develop interest and understand mathematics, teacher need to act as suggested above, and can only be possible when the right type of teachers are trained to do the job.

> According to Igboko (1973)- There is need for a remodeling and updating of the traditional method of teaching mathematics to make for realism and relevance.
> Igboko continues by enumerating four main things that methodology should aim at; That is:-
> i) emphasis understanding and meaning rather than mechanical skill;
> ii) encourage initiative and original thinking,
> iii) demonstrate the same thing in several different ways to heighten the learner's interest and deepen his insights; and
> iv) that the best result up-to-date researches on the psychology of human learning should be employed rather than building on out-model doctrines. The above summaries what is actually expected of teacher of mathematics via methodology. (Igboko 1973, P. 38)

2.5 Teacher's Attitude and morale and its influence on students' performance

It has been established through research that teachers' attitude and personality have great influence on their students. There is clearly a relationship between teacher morale and student achievement.

> Collier (1970) writes: In ascertaining the importance of teacher attitude toward mathematics, numerous educators have attempted to influence those attitudes by specific methods of courses. The general consensus is that the attitude of prospective teachers, relative to their pre-course attitudes or those of groups of students completing on such course improve as a result of a re-organize course. (Collier 1970, P. 660)

The effect of teacher's attitude and behaviour on student attitude varies greatly from teacher to teacher, (Starkey, 1971). A particular teacher's behaviour such as failing to announce examination may also have unanticipated effects on students' attitudes

> According to Aikens (1972)- The effects of teachers behaviour such as writing comments on returned papers varies from student to student. The implication then is that, while some students may react positively to such comments, some students' reaction may be negative. Consequently, their future attitude towards the teacher may be also be negative. Also such comments may have some psychological effects, which may dampen students' interest in the subject.

Aiken (1971) quoting Romey; "More important than the textbook as a key to creative thinking and success is the teacher himself. A creative teacher produces creative students".

Such a teacher by arranging the order in which the topics are taken-up possing problems, asking questions, encouraging discussion and providing opportunity for observing and exploring mathematics, creates an atmosphere that stimulate creative behaviour. In any mathematics class the teacher should act as stimulator and guide rather that merely as a tutor.

In Aikens (1971), Henderson and Pingry made a list of suggestions for developing the ability to solve problems, which will be valued to the mathematics teacher in working with both gifted and other students as well. These includes:- "encouraging questions, verbalization and hypothesis' testing constructing models, stressing relationships, being patient and friendly."

Patience, it is said, is necessity in teaching rather than a virtue and teachers need patience with themselves. Thus, the creative mathematics teacher uses experience oriented problems and encourages students to formulate hypothesis and think of solution for themselves. Unfortunately most of our secondary school teachers do not have such qualities. Most of them depend heavily on textbook examples some which have no bearing on students' life. Consequently, students are not able to relate what they are to do in mathematics class to their everyday life.

> According to Coverdale (1973):- Morale concern the mental or emotional attitudes of teachers towards the components of their job. It takes into account the atmosphere or 'climate' in which they work and their individual orientation towards their task. It is essentially a reflection of how one feels about things and is therefore, a matter of subjective perception rather than objective fact. (Coverdale 1973, P.45)

Morale, therefore, implies some human quality which prompts a person to produce at maximum out-put, and without which he can –not perform at his best. It is usually associated with a forward looking, healthy and pride and can usually be increased by favourably modifying any condition that will increase job satisfaction.

In the conceptual analysis of instruction as a model for teaching plan; Babalola (1971) enumerates a number of reasons for the 'Fail' or 'lack of improvement' in the academic performance of secondary school students especially in mathematics. "Prominent among the reasons is the poor service conditions of teachers, which, it is believed has produced lowered morale and dedication among teachers"

> According to Coverdale (1973): One of the main problems affecting teachers' morale is condition of service, which transcends all other considerations. The lack of prestige and professional recognition is another issue, which affects the morale of teachers in Nigeria, unlike in USSR where teaching is a prestigious occupation and the teacher is important instrument of the party. (Coverdale 1973, P. 45)

In a largely materialistic society like Nigeria, the teacher is all too often thought as a mediocre practitioner of average intelligence but without initiative or drive to enter a more rewarding and demanding career.

> According to Azuka (1999): When teachers are attracted to the profession and retained, then the teaching and learning of mathematics would be improved upon. There should be incentives to attract teachers to mathematics teaching and retain them on the job. (Azuka 1999 P. 4)

The conditions of service of teachers is thus an area that should be looked into by the authorities if we are to succeed in the task of motivating students. A lot has been said about what the teacher need to do to be able to achieve success in his job, but while the teacher motivate his students; his own morale should be boosted so as to have the willingness to perform better. That is why one is tempted to agree with Babalola, (1971) who wrote that: "poor service conditions is bound to affect educational output adversely, particularly in a world that has become fiercely economically competitive".

> And Fakuade (1980) writes: if teachers' morale is dampened, obviously teachers' attitude to work will change and consequently, this will affect the students that they are supposed to tutor. Without boosting the morale and attitude of teachers their receptiveness, flexibility and general ability which are basic to the success of any mathematical innovation will be at a very low ebb. (Fakuade 1980, P. 35)

2.6 Students' Attitudes and Performance in Mathematics

The research work on attitudes of students in mathematics, suggests that students' performance in mathematics is influenced by non-intellective as well as intellective variables,(Aiken, 1970). The results of the research unanimously point out **'MATHEMAPHOBIA'** or pronounced anxiety and fear in the presence of mathematics and other negative attitude towards it; amongst secondary school students has been existing for many years, Such reactions result from experiences specific to the learning of mathematics, in particular, that the manner in which significant order, such as teachers and parents, instruct children in mathematics as the primary determinant of their attitudes toward this subject (Aiken, 1961). According to Webb (1972),- "attitude is the most important predicator, but usually secondary ability as a forecaster of success or achievement".

> Aiken (1970) again, in his studies found out that attitude towards mathematics and achievements in it are significantly related to a number of personality variables. A high sense of personal worth, a great sense of responsibility, high social standards, high academic achievement, high social standards, high academic achievement, greater freedom from withdrawing tendencies and motivation are some of these personality characteristics. Thus students who have positive attitudes toward mathematics tend to appreciate detailed work to perceive themselves as more persevering and self-confident. It has also been observed that students who do well in mathematics tend to be more conforming and obedient in school and the parents of such students are more possessive. (Aiken 1970 P. 18)

> In the opinion of Aiken (1977), the influence of parents of such students is demonstrated by the fact that students' attitudes and achievement are positively related to the attitudes of their parents in the subject. (Aiken 1977, P. 48)

Attitudes are functional to the dynamic of behaviour. They largely determine what students learn. Therefore, students need to develop a positive attitude towards studying mathematics. According to Ohuche (1990) "It is only when a child get

satisfaction from knowing mathematics ideas that he will find the subject activities rewarding".

> Anumudu (1999) states: thus, the development of a positive Attitude toward mathematics should be a fundamental concern Of both parents and teacher. the student with a positive attitude will enter whole heartedly into learning activities because he is sensitive to mathematics: he finds it and derive pleasure from his contact with it, it is a proved fact that children work most diligently and most effectively at tasks in which they are genuinely interested.

> According to Ezeilo (1981): In Nigeria, most children fear Mathematics. In an article titled 'the subject I fear most' from A nine year primary four pupil attested to this;- the subject I fear Most is mathematics. Because it is very difficult. Mathematics needs A lot of calculations and thinking. If one makes a single mistake he Or she fails it. Sometimes the method of working it is very long. It takes a long time to finish and it is very hard to understand. (Ezeilo 1981, P. 30)

> From the above statement one deduces that the child fears mathematics as a result of poor method. No wonder Polya quoted by Biggs (1969) advises that: Mathematics should be made tangible because of its abstractness. Our approach to mathematics, and the way we present this subject to our students at any academic level is very important.

2.7 Sex Differences and Performance in Mathematics

A lot of interest has been generated on the study of the relationship between gender and achievement in mathematics in Nigeria and the world over (Backmann, 1970; Armstrong, 1986 and Adeniyi, 1987). In most cases, it was reported that, "boys achieved significantly better than girls (Mclean, 1984 and Swafford, 1986)".

Some other studies, Marshall (1983), Fennema and Shermann (1984) and Fennema and Carpenter (1990):- "have observed no significant differences or approximately equal performance of boys and girls in mathematics".

> Hansen (1986) writes-performance of learners, irrespective of gender differences in any subject on content area, when critically examined, is a function of the teaching approach used by the teacher and some other classroom environment as well as students' variables. (Hansen 1986, P. 230)

> According to Badger (1981): The research for factors, which can account for sex-differences and performance in mathematics, has covered many areas of study from physiology to social psychology to educational practice. In the end it has not been possible to single out one factor as the prime cause for such differences. Instead, there seems to be a constellation of factors, which influence performance in varying degree. (Badger 1981, P. 60)

Some differences in both attitudes and achievement in mathematics has been found to favour males over females at the secondary school level and beyond. Such differences are at times attributed to a social climate that does not encourage female. To support the above, Nevin (1973) reported that, "Irish girls have a deeper interest in human relationships, a fact which he further interpretes as interfering with an interest in mathematics".

According to Behr (1973),: "the correlation between attitude and achievement varies not only with grade level but also with the sex of the students and is generally, some what higher for girls".

Also, Badger (1981) reports that Macoby and Jacking are of the view that girls' mark decline in mathematics achievement at adolescence is casually linked to difference in spartial ability; according to them:-

> Girls and boys shows little difference in performance on spartial tasks during childhood but at approximately 13-14 years old, boys beging to perform at a higher level than girls and they tend to increase the advantage throughout their adolescent period. (Badger 1981 P.63)

> It was said by Preece (1979) that: boys exhibits a greater degree of self-confidence in mathematics and a greater expectation of success, while girls claim a greater intrinsic interest in the subject, a greater need for teacher support and appear to be more conscientious

about their work; this then implies that girls' skill in mathematics does not appear to reflect their attitude to the subject in the same way that it does for the boys; and liking cannot, in general be predicted by success for the girls. (Preece 1979, P.43)

According to Aiken (1971): The seeming existence of sex differences in attitude and performance in mathematics has led to consideration speculation concerning the relative roles of heredity and environment in determine these abilities. Results from research have shown on average that girls tend to score higher than boys on tests of verbal fluency, arithmetic fundamentals and rote memory; whereas boys are superior in ability; arithmetic reasoning and problem solving. (Aiken 1971, P.77)

Thus, the keys to the whole problems lies in attitude e.g. attitude of girls towards mathematics, attitude of other people, especially parents and employers towards girls' mathematics. In fact females have as much mathematics ability and potential as males. According to Fennema and Shermann, (1984): changes in attitude towards mathematics involves a complex interaction among student and teacher characteristics, course contents, method of instruction, instructional materials, parental and peer support. It is the duty of teachers to develop good attitude in their students through proper adjustments to success and failure, create opportunities for success and, more, importantly endeavor to enhance and boost students' interest in mathematics.

2.8 Mathematics- Laboratory and Instructional Materials

A lot of studies have been carried out on the likely cause of poor performance in mathematics. Many recommendations have been given on how to improve mathematics education in Nigeria. Two of these recommendations are the provision of mathematics laboratory (Adegboye, 1979) and the use of instructional material (Adegboye, 1996). The call for the use of laboratory in teaching of mathematics is not new. Odili (1992) report that, Perry and Moore both called for a; "laboratory approach to mathematics instruction at the turn of 20th Century, He further claims that Piaget, Bruner and Dienes called for the use of the laboratory

approach in teaching mathematics in 1968". Sangoyomi (1983) stressed that "Mathematics laboratory is a necessity and not a luxury, in order to bring mathematics to students but not the students to mathematics".

> Odili (1990) also, emphasized that: every school should have a mathematics laboratory to make mathematics learning exciting, interesting and meaningful to students. He further reported that, the three-year longitudinal study by Califoma Miller mathematics improvement programme shows that the students achieved better and had improved attitudes when taught by teachers who had specific training in the use of mathematics laboratory.
> Swart (1967) claimed that:-
> i) Most fruitful instruction is based on meaningful experience:
> ii) Learning is best facilitated by proceeding from the concrete to the abstract; and
> iii) The easiest and longest lasting learning comes from doing. (Odili 1990, P.68)

> Davidson and Fair (1970) said that: students can learn mathematics, not only with paper and pencil, but also through the use of manipulative materials and mathematics laboratory approach, which involves active investigating, exploring, doing rather than being told or shown. (Davidson 1970, P.104)

Clarkson (1970) said that-"Mathematics laboratory is needed seriously for certain topic in mathematics. These include, graph, measurement, number pattern, Probability and reasoning".

> In his own view, Schaefar (1970) said that:-
> a promising approach to the teaching of problem- solving is the use of mathematics laboratory is to provide children with opportunities to discover mathematical concept through their active involvement in solving problem. He concluded by saying that the emphasis is on learning by doing. (Schaefar 1970, P.25)

> According to Biggs (1968): every child should experience the joy of discovery, and material use in the workshop and classroom should not be expensive, but they must be attractive.
> He then gave three aims of teaching mathematics in laboratory.
> These are-
> i) To let the children think for themselves,

> ii) To let them discover for themselves, some mathematical formulae; and iii) To give the children the skill they need. He concluded by referring to the emphasis from a film produced for Nuffield project which quoted the Chinese proverb saying-what I hear, I for get; what I see, I remember; and what I do, I understand. (Biggs 1968, P. 403)

And Adegboye (1979) pointed out that, "students will be easily convinced in the laboratory that mathematics has a direct application to human-life".

> Fakuade (1975) writes:- The secondary school mathematics teacher must be knowledgeable in secondary school educational technology to be able to function effectively in his task of the role, uses and sources of obtaining such materials. (Fakuade 1975, P.26)

> Quoting Butler and Wren to support his argument on the above, Fakuade (1975) writes: Masterful scholarship in a body of relevant knowledge is an absolute essential for effective teaching, but it must be supplemented by a proficiency in the use of effective techniques of instruction, neither should be emphasized to the exclusion of the other, but a roper balance should be maintained throughout the preparation programme. We do not want teachers of mathematics to be 'teachers who have nothing to teach', nor do we want them to be mere surveyors of knowledge and promoters of skills. (Fakuade 1975, P.29)

This summarises the importance that should be attached to instructional materials in the dissemination of mathematical knowledge. On the question of textbooks, Coles (1959) is of the view that:- West African teachers must not wait for their United Kingdom colleagues to produce the desired textbook for mathematics. And that textbooks are conceived without taking the cultural background or personal experiences of the learner into consideration and this often leads to a misguided purpose of studying science of which mathematics is a part.

2.9 Summary of literature review

The literature review has concentrated mainly on the issues of quality and qualification of the mathematics teacher in relation to its effect on students' overall performance in the subject. Attempts have also been made to look into research study as regards teacher's attitude and morale; and students' attitude as jointly affect performance in mathematics. Sex differences and performance has also been reviewed in addition to the importance of mathematics laboratory and instructional materials as the major key to learning and understanding mathematics.

Since the importance of the subject to the individual, community and the nation as a whole for national development can not be over-emphasized; it is therefore necessary that investigations which would unveil the factors influencing effective teaching and learning of mathematics be carried out. It is along this line that the investigator hopes to carry on his study in the area chosen.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter is concerned with the descriptions of the study sample; the questionnaire used, and the data collection and analysis employed in the study.

3.2 Research Design

The descriptive research of the survey type was used. This is because they are directed towards determining the nature of a situation as it exists at the time of the study. It was asserted that descriptive research of the survey type is often used in this type of research as it describes, interprets and is concerned with conditions or relationships that exist, opinions that are held, processes that are going on, effects that are evident or trends that are developing.

Therefore, to carry out the study, the researcher focused on a sample cutting across principals, mathematics-teachers and students randomly selected. To collect or gather the data, the researcher made use of both the primary and the secondary data. The secondary data were collected from literatures which was reviewed in chapter two as literature review. The primary data were collected through the research questionnaires administered on the sample. On the analysis, the researcher uses both quantitative and statistical with chi-square (X^2) calculation to check the research questions.

3.3 Populations and Sample

The targeted population for the study was the Principals, Mathematics Teachers and Students in secondary schools in Niger State; while the sample (subject) of this study are Senior Secondary Two (S.S. 2) and Senior Secondary Three (S.S. 3) students of the schools chosen for the study. In addition to this Subjects are Mathematics Teachers in the schools as well as each school's

Principal; There were One hundred and forty three (143) post-primary schools in Niger State at the time of study but the sampled schools used were fifteen (15); five (5) each from the three (3) educational zone, because most of these schools were junior secondary schools.

3.4 Rationale for Choosing the Sample

Students in Senior Secondary Two (S.S. 2) and Senior Secondary Three (S.S. 3) were selected as the sample on the assumption that these groups of students were matured enough to form independent opinion about mathematics as a subject in relation to how their teachers teach them. It was also assumed that they could form their attitude to and indicate their performance in the subject. It was also felt that the students at these classes had worked progressively in mathematics from the junior secondary one up to their present level and as such would serve as good sources of information to the researcher on the problem of mathematics teaching and learning in our schools.

3.5 Instrumentation

Questionnaire were used, since the researcher is dealing with principals, mathematics teachers and students. Only teachers responsible for the teaching of mathematics were given the questionnaire to answer on the simple assumption that since they were directly involved in teaching mathematics, they were in a better position to give useful information as regards the reasons for students' poor performance in the subject.

The principal of each of the selected schools was also required to furnish the researcher with very vital information as regards students' enrolment, number of mathematics teacher in the school and the Senior School Certificate Examination (SSCE) result of students in Mathematics; in each school over a period of three (3) years: i.e. 1998/99; 1999/2000 and 2000/2001 academic year. Also given were the students in the S.S. 2 and S.S. 3.

Altogether, fifteen (15) – principals' questionnaires, seventy (70)-teachers questionnaires and three hundred (300)-students' questionnaires, that is twenty (20) questionnaires per school, ten (10) for senior secondary two and ten (10) for senior secondary three were distributed, making a total of three hundred and eighty –five (385) questionnaires, and which were returned and use for the analysis.

Other sources of information in addition to the questionnaire used were:

i) Interview/Observation- (interview of vice-principals, examination officers and observation of teachers and students at work). And

ii) Records (SSCE results in Mathematics as well as students enrolment).

3.6 Data Collected

The Data on Senior School Certificate Examination results for the past three (3) years beginning from 1998/99 to 2000/2001 academic year were collected.

3.7 Description of Questionnaire

Three (3) separate questionnaires were administered under the heading:-

3.7.1 Principals' Questionnaire

This questionnaire had ten (10) items which aimed among other things, at getting general information on the number of class-stream (arms) in the school, total number of students from Junior Secondary One (J.S. 1) to Senior Secondary three (S.S. 3), and students past performance in Senior School Certificate Examination (SSCE) in mathematics.

3.7.2 Teachers Questionnaire

Items on the teachers' questionnaire dealt with qualification, year of teaching experience, condition of Service, availability of instructional materials cum mathematics laboratory and relevant textbooks.

3.7.3 Students Questionnaire

Items on this questionnaire dealt with learning problems, materials problems and personal information.

3.8 Administration of Questionnaire

The questionnaires were administered to the respondents directly by the investigator. This is done by direct distribution of the questionnaires to the respondents, and supervised the processing and returns after the questionnaires completion.

3.9 Sampling Technique

To ensure that each school out of the one hundred and fourty- three (143) state owned secondary schools are given equal chance of being selected. A simple sampling technique was adopted, that is, three (3) educational zones, namely: Minna Zone, Bida Zone and Kontagora Zone. Thus five (5) schools were selected from each zone and the choice of each school in the zone is by the method of simple random sampling (SRS). Also, the choice of students from each of the school used is by the method of simple random sampling.

3.10 Validity of the Instrument

The research instruments i.e. (questionnaires) used were validated by the researcher's supervisor, personnel in the planning and research department of the state Ministry of Education and two lecturers from Education Department in Niger State College of Education after been tested for validity and reliability. The pilot study was conducted in Minna at G.S.S Minna and D.S.S. Minna. Twenty (20) students and ten (10) teachers; ten (10) student and five (5) teachers each from each of the schools were used. The results obtained was analyzed using Spearman Rank correlation coefficient statistics (see Appendix VI) this to ascertain the validity of the instrument used (Questionnaire).

3.11 Reliability of the Instrument

As stated in (3.10) above, the obtained result was correlated using Spearman's Rank correlation co-efficient formula. The table value for the Spearman's Rank Correlation Coefficient was 0.46 while the calculated values were 0.997 and 0.989 respectively which shows that the instrument is highly reliable.

3.12 Method of Data Collection

The data for the research was collected through Primary and Secondary sources in addition to other research instruments used in the data collection.

3.12.1 The Primary Data – This is made up of structured questionnaires for the Principals, Mathematics Teachers and Students.

The questionnaires were structured in such a way that a respondent can easily respond by ticking (√) from alternatives provided to each question item or fill-in the gaps and yes or no where necessary and applicable.

3.12.2 The Secondary Data – These were sourced from textbooks, Thesis, Journals, Seminar Papers, Newspapers, reports, Niger State Ministry of Education Test and Measurement Department, Discussion with Teachers, Students and educationist that were found or accrossed during the research process. The data were sourced and reviewed in chapter two as literature review before the collection of the primary data.

3.13 Method of Data Analysis

The procedure for the analysis of data in this study is both quantitative as well as statistical. Percentages were employed in areas where straightforward information is required from the sample. It has been used to analyze the results of some of the items on the questionnaire and then drawing conclusion on them. Descriptive statistics have been used to describe the characteristics of the sample;

in doing this measures of central tendency and variability such as mean and standard deviation has been computed. Inferential Statistics which deal with testing of hypothesis on which basis, inferences relating to the sample can be made, have been used in analyzing the data in the study.

CHAPTER FOUR

ANALYSIS OF DATA

4.1 Introduction

This chapter deals with analysis of results obtained from the study. It will be recalled that the questionnaires were patterned along three main heading namely:

i) Principals' questionnaire;

ii) Teachers' questionnaire; and

iii) Students' questionnaire

Consequently, the analysis of the responses to the various items on the questionnaire was done starting with those of the principals, followed by the teachers' and finally by the students'.

In all fifteen (15) schools out of a total of seventy (70) Senior Secondary Schools in the State (Niger)chosen for the study were covered. A total of three hundred and eighty-five (385) questionnaires were given out as follows:-

Principles' questionnaires	15
Teachers' questionnaires	70
Students' questionnaires	300

And all the questionnaires were returned.

4.2 Principals' Questionnaire

The items on the this questionnaire sought among other things, to know the teacher-student ratio in a mathematics class, the number of arms or stream in each school (see table 4.1) the numbers of mathematics teachers as well as the average number of periods allotted to each mathematics teacher every week (see table 4.6).

The researcher also sought to find out whether the supply of mathematics teachers to the school had been stable for the past three (3) years (see table 4.2).
The principal's opinions were sought whether there had been some remarkable improvement on students' performance in the Senior Schools' Certificate

Examination (SSCE) in mathematics (see table 4.3) and the factors responsible for such performance.

The tables 4.1 to 4.7 summarize the result obtained from the principal's questionnaires.

Table 4.1 Student Population and Teacher Student Ratio per School

	Name of School	No. of Arm	No. of Student Enrolment	No. of Maths Teacher	Teacher Student Ration	Average no. of Std. Per Arm
A	G.C. Bida	6	1268	5	1:254	211
B	G.G.S.S Bida	4	962	5	1:241	241
C	G.D.S.S Bida	4	878	6	1:146	220
D	G.S.S Kontagora	5	1246	4	1:312	249
E	G.D.S.S Kontagora	4	915	5	1:183	229
F	G.D.S.S Kpege Mokwa	4	1078	5	1:216	270
G	G.G.S.S Minna	10	2117	9	1:235	212
H	A.B.S.S Minna	5	1779	6	1:297	356
I	D.S.S Kata Eregi	1	355	3	1:118	355
J	D.S.S Maikonkele	1	750	3	1:250	750
K	G.D.S.S Minna	10	4999	10	1:500	500
L	G.S.S New Bussa	3	642	1	1:642	214
M	A.D.S.S Paiko	6	2390	6	1:398	398
N	D.S.S Zungeru	2	240	1	1:240	120
O	G.S.S Wushishi	2	360	1	1:360	180
TOTAL		67	19979	70	1:285	298

From the table 4.1, it would be observed that the fifteen (15) schools had a total number of sixty-seven (67) arms/streams with a total student population of Nineteen thousand, nine hundred and seventy-nine (19979). On the average, each school had about five (5) arms or streams with each arm/stream having a student population of two hundred and ninety-eight (298). In all, there were seventy (70) mathematics teachers; this included both the qualified and the unqualified teachers of mathematics. A glance through the ratio column reveals that the teacher-student ratio ranges from 1:118 to 1:642 with an over all average ratio of 1:285. the

implication here is that every one mathematics teacher in each school would have to deal with as many as two hundred and eighty-five (285) students. Considering the nature of mathematics, which calls for constant practice for good mastery of subject matter, this number is too large for a single teacher to handle. Dealing with such a number will obviously result in inefficiency on the part of teachers and consequently poor performance by the students. If computation of teacher with teaching qualification is made, definitely the ratio will be greater, such a situation will not permit for effectiveness on the part of the teacher nor for adequate mastery of subjects on the part of the students, since a teacher has to be allowed enough time for adequate preparation as well as effect a detailed study of the students he is supposed to be teaching.

Table 4.2 Stability of Mathematics Teachers to Schools

Response	Number	%	Remarks
YES	8	53.3	Stable
NO	7	46.7	Unstable
TOTAL	15	100	

Item 6 on the questionnaires sought to find out whether or not the supply of mathematics teachers to each of the schools was stable for the past three (3) years. The response on this item is shown in table 4.2. Fifty-three (53%) percent of the principals indicated that the supply of mathematics teachers to their schools was stable for the past three (3) years, while, Fourty-seven (47%) percent indicated that the supply was not stable. However, mathematics teachers' stability should not be taken to mean that the actual staff strength in relation to mathematics teaching for such schools had been met. On the contrary it may mean that the movement of mathematics teachers had been dormant in terms of transfer and other allied factors.

Item 7 to 10 on the questionnaire sought to know whether there was any remarkable improvement in the performance of students in the Senior School Certificate Examination (SSCE) in recent years and the factors responsible for such improvement or otherwise.

Table 4.3 Student Performances in Mathematics

Response	Number	%	Remarks
YES	10	66.7	Improvement
NO	7	33.3	No improvement
TOTAL	15	100	

The responses by the principals indicated that there are remarkable improvements on students' performance in mathematics in recent years as shown on table 4.3. Among reasons given for this improvement in performance are, availability of some well-qualified teachers; good mathematics textbooks and some generated interest by students on the subject.

However, students' result in the SSCE in Mathematics over the past three (3) years from 1998/99 to 2000/2001 collated and summarized in table 4.4 reveals that students have performed poorly. Besides, the number of students enrolment meant for SSCE increases every year without corresponding increase in number of teachers. The overall performance for the fifteen (15) schools combined is further summarized in table 4.5 for each interpretation.

Table 4.4 S.S.C.E Results in Mathematics

	NAME OF SCHOOL	1998 / 1999					1999 / 2000					2000 / 2001				
		N.E	P	%	F	%	N.E	P	%	F	%	N.E	P	%	F	%
A	G.C. Bida	191	1	0.5	190	99.5	88	11	125	77	87.5	365	8	2.2	357	97.8
B	G.G.S.S Bida	105	5	4.7	100	95.3	97	67	69.1	30	30.9	163	162	99.4	1	0.6
C	G.D.S.S Bida	80	0	0	80	100	61	52	85.2	9	14.8	62	0	0	62	100
D	G.S.S Kontagora	77	1	1.3	76	98.7	102	98	96.1	4	3.9	111	43	38.7	68	61.3
E	G.D.S.S Kontagora	133	13	9.8	120	90.2	154	23	14.9	131	85.1	219	37	16.9	182	83.1
F	G.D.S.S Kpege Mokwa	80	15	18.8	65	81.2	160	30	18.8	130	81.2	110	20	18.2	90	81.8
G	G.G.S.S Minna	109	2	1.8	107	98.2	243	5	2.1	238	97.9	197	2	1	192	99
H	ABSS Minna	382	16	4.2	362	95.8	473	18	3.8	458	96.2	603	50	8.3	553	91.7
I	DSS Kata Eregi	48	3	6.0	45	98.7	48	6	125	42	87.5	47	5	10.6	42	89.4
J	DSS Maikonkele	67	17	25.4	50	74.6	88	21	23.9	67	76.1	84	10	11.9	74	82.1
K	GDSS Minna	658	100	15.2	558	84.8	839	325	38.7	514	61.3	754	150	19.9	604	80.1
L	GSS New Bussa	84	11	13	73	87	90	9	10	81	90	67	18	26.9	49	33.1
M	ADSS Paiko	77	10	13	67	87	209	11	5.3	198	94.7	128	24	18.8	104	81.2
N	DSS Zungeru	30	20	66.7	10	33.3	29	21	72.4	8	27.6	35	29	82.9	6	17.1
O	DSS Wushishi	40	20	50	20	50	39	20	51.3	19	46.7	35	19	54.3	16	45.7
		2161	234	10.8	1927	89.2	2720	721	26.5	1999	73.5	2970	577	19.4	2403	80.6

N.E = Number of Enrolment, P = Number Passed

F = Number Failed, % = Percentage

Table 4.5 Overall SSCE Result in Mathematics

YEAR	N.E	P	%	F	%
1998/1999	2070	183	9	1887	91
1999/2000	2369	716	30	1653	70
2000/2001	2373	577	24	1796	76
TOTAL	6812	1476	22	5336	78

N.E = Number of Enrolment P = Pass F = Fail

Whilst a total of the thousand and seventy (2070) students were registered for the fifteen (15) schools in the 1998/1999 academic season; a total of two thousand, three hundred and sixty – nine (2369) students registered for the 1999/2000 representing fourteen (14%) percent increase over that of 1998/1999, and the 2000/2001 gives a total of two thousand, three hundred and seventy – three (2373) students registered, representing 0.02% increase over the previous year.

From table 4.5 it would be observed that a total of six thousand, eight hundred and twelve (6812) students registered for mathematics between the period i.e 1998/1999 to 2000/2001 academic seasons. Out of this number only one thousand, four hundred and seventy- six (1476) passed representing 22% while a total number of five thousand, three hundred and thirsty six (5336) failed, this represent 78%. A look at the yearly performance does not show appreciable improvement either. While only 9% of the students that registered passed in the 1998/1999 academic year, 91% failed. The performance in this year was better than the previous year. In the 2000/2001 24% passed while 76% failed this shows a drop in student's performance compare to the year.

The table 4.3 to 4.5 on the students' performance clearly reveals the researcher's earlier assertion that the problem of mathematics and mathematics education is a major concern in the Nigeria Education Scene. Among the factors advanced for such poor performance as opined by the various principals are:

inadequate supply of well qualified mathematics teachers, poor instructional strategy by existing teachers of mathematics; lack of adequate teaching materials; and students' lack of interest in the subject.

Teachers' mathematics periods per week can be seen on table 4.6

Table 4.6 Number of Period Per Week Per Teacher

Sch. Code	Name of Sch	No of Class	Total Nos period per wk	No of Teacher per week	Average No Period per wk
A	G.C. Bida	36	180	5	36
B	GGSS Bida	24	120	5	24
C	GDSS Bida	24	120	6	20
D	GSS Kontagora	30	150	4	38
E	GDSS Kontagora	24	120	5	24
F	GDSS Kpege Mokwa	24	120	5	24
G	GGSS Minna	48	240	9	27
H	ABSS Minna	30	150	6	25
I	DSS Kata Eregi	6	30	3	10
J	DSS Maikonkele	6	30	3	10
K	GDSS Minna	60	300	10	30
L	GSS New Bussa	18	90	1	90
M	ADSS Paiko	36	180	6	30
N	DSS Zungeru	12	60	1	60
O	DSS Wushishi	12	60	1	60
		390	1950	70	25

For the purpose of analysis it is assumed that each class is officially allotted five (5) mathematics periods of 40 minutes every week. From column 6 on table 4.6, it would be observed that average number of periods per teacher per week

ranges between 10 and 90. On the average 25 periods a week is expected to be allotted to each mathematics teacher, which can also be taken as the official period allotment. Going by this it is clear that most schools were inadequately staffed with the mathematics teachers. It was necessary therefore to use this to analyze number of teachers that were required in each school. And this has been done on table 4.7

Table 4.7: Required Number of Mathematics Teacher

School Code	No of Class	Total Period Per Week	Require No of Maths Tr.	Average Nos of Period Per Week
A	36	180	9	20
B	24	120	6	20
C	24	120	6	20
D	30	150	7	21
E	24	120	6	20
F	24	120	6	20
G	18	240	12	20
H	30	150	7	21
I	6	30	2	15
J	6	30	2	15
K	60	300	15	20
L	18	90	4	22
M	36	180	9	20
N	12	60	3	20
O	12	60	3	20
TOTAL	390	1950	97	20

Table 4.7, shows on the average the required number of mathematics teachers for each school, going by the fact that each teacher should, on the average bases of 20 periods a week. A comparison of column 4 of table 4.6 and 4.7 clearly reveals that the staff strength in each school was inadequate. In all 97 teachers

were required for the schools, but only 70 were available leaving 27 vacancies to be filled. Even, if the 97 teachers were all available, the ratio of students to teacher is also of concern. This situation emphasizes the fact that our schools are poorly staffed with mathematics teachers and the few available were over loaded with work and this leads to inefficiency. Infact, in some schools, some schools, some classes are left without mathematics teachers fro almost a whole session. In an attempt to ameliorate such as urgly situation less qualified personnel are, at times, converted to teach mathematics and this further worsens the situation.

For the effective teaching and learning of mathematics therefore, it will pay more for the teacher to have at most 20 – periods or at least 15 – periods per week.

4.3 Teachers' Questionnaire

The teachers' questionnaire contain 30 items grouped into two (2) main sections:-

A Personal Information

B Instructional and Material problems

Items in section A sought to find out the quality and qualification of mathematics teachers. Section B sought to find out whether there are enough materials for teaching mathematics.

Table 4.8 shows a summary of the quality of teachers. This number includes teachers that read mathematics at the University or College of Education level either as a minor or major subject, as well as those who read other science related subjects such as Chemistry, Physics, Statistics, Geography, etc. It also includes holders of other Certificates who have found themselves teaching mathematics.

Table 4.8: Qualification of Mathematics Teachers

Qualification	Number	Percentage	
N.C.E, Diploma (Education)	9	13	
B. A, B.SC (Education)	18	26	44
M. A., M.SC, And (Education)	4	5	
B.A, B.SC, And M.A., M.SC & other	39	56	
TOTAL	70	100	

From table 4.8, it would be observed that, of the 70 teachers interviewed only 31 of them representing 44% possessed qualification in mathematics education. They are said to be actual professional mathematics teachers. While 39 of the lot representing 56% were graduates who were not professional mathematics teachers but had found themselves teaching mathematics because they could not get another job. The implication is that most of these graduates will not be committed to teaching, since they are ignorant of the various learning theories as well as child psychology, to be able to appreciate students' need and interest. Nine (9) of the teachers interviewed representing 13% were N.C.E and Diploma in Mathematics Education's graduates. Although these were professionals yet they need some more training, given the fact that such teachers were trained purposely for the lower classes of the secondary schools (i.e. J.S.S.)

Table 4.9 Analysis of Teachers Qualification and Experience

	Years Of Experience			
	Above 5 Yrs		Below 5 Yrs	
	O	E	O	E
Professional Qualified Teacher	25	21	5	9
Non Professional Qualified Teacher	25	29	15	11
Total	50	50	20	20

$X^2 = 4.55$, df $= 2$, $P < 0.01$ critical value 9.21

Where O = observed Frequency E = Expected Frequency

On the question of experience as a basis for effective teaching, table 4.9a shows that twenty (20) out of Seventy (70) teachers had experience of less than five (5) years. Out of this, one can find fifteen (15) graduates who can leave the teaching for a more lucrative job at the least opportunity. Thus 28.6% had less than five (5) years teaching experience; Whilst 71.4% had been in the job for five (5) years and more, of which twenty-five (25) out of fifty (50) teachers were unqualified; (That is, 35.7% of the 71.4%) and could leave the teaching at least opportunity also.

Therefore, from table 4.9 the analysis show that the chi-squared X^2-Calculated value 4.55 is less than the X^2-Critical value (i.e. table value) 9.21 at a degree of freedom (df) of 2 and 0.01 significance level indicating that the HO_4 (null hypothesis four) is not rejected. Hence, there is no significant difference on the teaching between qualified and non-qualified teachers.

Item 8 sought to find out whether teacher(s) consider their stay in teaching profession as either permanent, temporary or whether they were undecided. Twenty-three (23) out of 70 teachers considered their stay as permanent, 30 as

temporary while 17 out of 70 were undecided. On whether teachers still had interest in the teaching profession majority of the teachers agreed, but 28.6% of them disagreed. A breakdown of the responses are shown below in terms of teachers' interest in the teaching profession.

Table 4.10 Interest in the Teaching Profession

Experience	Agree	Disagree	Neutral	Total
5- Years or More	43	2	5	50
Less Than 5- Years	14	2	4	20
	57	4	9	70

On teacher's attitude from Table 4.11 to the teaching profession, a chi-square (X^2) has been computed to find relationship between experienced (5-years and above) and less experienced (below 5-years) teachers. The computation attempts to find out whether attitude to the teaching profession is independent of experience.

Table 4.11:- Analysis of Teachers' Attitude in Teaching Profession in Terms of Experience

	Experienced 5-Yrs and Above		Less Experienced Below 5-Yrs.	
	O	E	O	E
Agree	43	41	14	16
Disagree	2	3	2	1
Neutral	5	6	4	3
Total	50	50	20	20

$X^2 = 2.28$, df = 2, $P < 0.01$ critical value 9.21

Where O = observed Frequency E = Expected Frequency

At a degree of freedom (df) of 2 and 0.01 significance level, the X^2-Critical (table) value is 9.21 and X^2-calculated value 2.281, indicating that the HO_3 (null hypothesis three) is not rejected. Hence, there is no significant difference between experience and attitude to the teaching profession.

Responses to item 4 of section B from table 4.12 shows that the condition of service of teachers generally do not commensurate with the load of classroom work. Forty (40) out 70 teachers disagreed with the statement representing 57% Twenty (20) representing 29% agree while Ten (10) represent 14% were neutral.

Table 4.12 Condition of Service

Item	Agree	%	Disagree	%	Neutral	%
4	20	29	40	57	10	14
14	43	62	19	27	8	11
16	46	66	22	31	2	3
17	32	46	30	43	8	11
18	23	33	35	50	12	17
19	66	94	3	4	1	2
20	18	26	44	63	8	11

Table 4.12 shows that the present condition of service, though improved is not good enough and therefore not satisfactory. The implication is that teachers' attitude to work is negative and their output affected. For better output of teaching mathematics there should be some form of incentives to boost the teachers' morale. Equally, it has been opined that provision for in-service training is not satisfactory and this contribute to low qualify staff strength (see Appendix 11-Teachers questionnaire). Further analysis of other items reveals the following results

Table 4.13 Effect of Materials on Teaching/Learning

Item	Agree	%	Disagree	%	Neutral	%
5	64	91	2	3	4	6
6	10	14	44	61	16	23
7	8	11	48	69	14	20
8	16	23	50	71	4	6
9	54	77	10	14	6	9
10	50	71	12	17	8	11
11	39	56	23	33	8	11
12	13	19	45	64	12	17
13	6	9	57	81	7	10
15	25	36	29	41	16	23

From table 4.13, it would be observed that the absence of Mathematics laboratory in schools has resulted in lack of teaching aid, since the existence of a mathematics laboratory is an incentive for acquiring the teaching/instructional aid for students' use. Also, it was opined that practical work in mathematics was very useful.

On the question of textbooks it would be observed that mathematics textbooks in use in the schools are relevant. It can also be asserted that the language of the textbooks was easy to comprehend, but student's performance in mathematics usually resulted from their performance in English language. This is evident from the results as shown in the table 4.13.

Finally, to conclude this analysis it is necessary to state here that, 20 out of 70 teachers are female this represents 29%. This number naturally poses some problems. The first problem to be posed here is that, the consistency and regularity in attendance of these teachers is not guaranteed. This is borne out of the fact that majority of them are married and will obviously have to go on maternity leave at

least once in a while. Consequently, their classes would have to bear the brunt of such absence. Another problem is that of continuity and quality as helping teachers that are normally assigned to such classes were always over-loaded with extra periods at the expense of efficiency.

4.4 Students' Questionnaire

The items on the students' questionnaire sought among other things on finding out student's interest on mathematics, the importance attached to the study of mathematics as well as other related problems that are in one way or the other hinder their study of the subject. It also sought for mathematics teachers, instructional/teaching aids and the sex of the respondents.

Table 4.14 Students' Attitude Toward Mathematics

Item	Agree			Disagree			Neutral			Total
	M	F	T	M	F	T	M	F	T	
1	186	92	278	10	5	15	4	3	7	300
2	197	96	293	-	-	-	3	4	7	300
3	120	40	160	70	55	125	10	5	15	300
4	107	28	135	90	68	158	3	4	7	300
5	136	1	137	60	96	156	4	3	7	300

The results obtained from table 4.14, show that students had a positive attitude towards mathematics and were interested in studying it. However, it appears that their poor performance in the subject resulted from contributory factors other than likeness. Out of a total of 300 respondents, 293 hold the view that they very much like mathematics. This number represents 97.7%, whilst 7 students representing 2.3% expressed dislike to the subject. Such a result clearly shows that majority of the students do have interest in studying mathematics. This is contradicting the statement of the teachers and principals. However, positive

attitude is expected, considering the fact that mathematics is a compulsory subject for all students at the secondary school level.

To determine whether attitude of students towards mathematics is independent of sex, the chi-square (X^2) was used.

Table 4.15: Analysis of Students' Attitude Towards Mathematics in Term of Sex

Response	Male		Female	
	O	E	O	E
Agree	186	185	92	93
Disagree	10	10	5	5
Neutral	4	5	3	2
Total	200	200	100	100

$X^2 = 0.72$, df = 2, $P < 0.05$ critical value 5.99

Where O = observed Frequency E = Expected Frequency

At a degree of freedom (df) of 2 and significance level of 0.05, the X^2-the critical (i.e table) value is 5.991. The X^2-calculated value is 0.716 since the calculated value 0.716 is less than the critical value 5.991 then the HO_2 (null hypothesis two) is not rejected. Hence, there is no significant gender difference on students attitude toward mathematics. With the awareness of the utility of mathematics in everyday life. It is striking to note that 293 respondents representing 97.7% supported the view that mathematics was relevant to their future study of other science-based subject, while 7 respondents have contrary view.

Responses on item 3,4 and 5 indicated an almost positive response by the students. This shows that the factors for students poor performance is not only the abstract nature of mathematics but combined with other factors (see appendix 111-students' questionnaire)

Further analysis reveals some other results as shown in table 4.16

Table 4.16 Effect of Material and other Factors on Students Learning

Item	Agree	%	Disagree	%	Neutral	%
6	82	27	188	63	30	10
7	188	63	74	24	38	13
8	173	58	68	23	59	19
9	194	65	106	35	-	-
10	165	55	105	35	30	10
11	165	55	105	35	30	10
12	165	55	105	35	30	10
13	38	13	232	77	30	10
14	23	8	270	90	7	2
15	7	2	286	96	7	2
16	210	70	83	28	7	2
17	250	83	25	8.5	25	8.5
18	240	80	15	5	45	15
19	30	10	225	75	45	15
20	278	93	7	2	15	5

On whether games were employed by the teacher in a mathematics class, the response is negative as it could be seen from table 4.16, that is, 27% agreed for the use of game in teaching mathematics; This means that teaching is only done the old fashion of talk and chalkboard method. This further affects understanding since students would have to grapple with the problem of getting what the teacher is saying and have to think in the abstract way since no reference is actually made to students' real life. However results shows that 63% of the respondents opined that mathematics lessons are presented in very clear and plain language, which greatly

help students in the learning of mathematics; Also, the teacher-student relationship is found to be very cordial.

Furthermore, to determine whether teacher's method of teaching affect students performance in mathematics, a chi-squared method was employed and item 4 and 5 of table 4.15 and item 6 and 7 of table 4.16 were computed for the analysis.

Table 4.17 Analysis of Methodology on Students Performance in Mathematics

Item	Agree		Disagree		Neutral	
	O	E	O	E	O	E
4 Class Handling	135	135.5	158	144	7	20.5
5 Use of Cane	137	135.5	156	144	7	20.5
6 Use of Maths-Game	82	135.5	188	144	30	20.5
7 Use of Simple And Clear Lang.	188	135.5	74	144	38	20.5
Total	542	542	576	576	82	82

$X^2 = 128.5$, df = 3, $P < 0.01$ critical value 11.34

Where O = observed Frequency E = Expected Frequency

At a degree of freedom (df) of 3 and significance level of 0.01, the critical (i.e. table) value is 11.341. The calculated value is 128.5. Since the calculated values 128.5 is greater than the critical value 11.341, then the HO_1 (the null hypothesis one) is rejected. Hence, there is significant influence on the teacher's method of teaching students' mathematics.

Other factors responsible for the poor performance in mathematics could be the fact that, the schools did not have enough mathematics teachers; this is evident from the responses by the students. Out of a total number of 300 students 194 disagreed. This shows that inadequate supply of mathematics teachers is a factor

that contributes to the poor performance in mathematics, since it was opined that the period allotted for mathematics was enough. The responses with regard to the class size indicated that the classes were too large and this affected the effective learning of mathematics as 55% disagreed and 10% stay neutral, this could also be a contributory factor to the student's performance in the subject.

On whether the school had sufficient mathematics textbooks for the students, item. 13 on table 4.16 reveals that there were no sufficient mathematics textbooks for the students 77% of the number of students interviewed disagreed to the statement that, their schools had enough mathematics textbooks, 13% agree and 10% remained neutral. Item 14,15 and 18 of table 4.16 reveals the importance of mathematics laboratory and its effect on learning materials, 80% of the respondents agreed that practical lesson in mathematics is the best way of learning the subject Item 16 and 17 buttressed the importance and effectiveness of a good mathematics textbooks, this is the more reason why students were forced to have their own copy as shown on the table 4.16. Also membership of a functional mathematics club is considered to be a factor in the improvement of learning mathematics in our schools and the responses was in affirmative.

The major finding of this chapter can be summoned up as follows:-

1. The supply of qualified mathematics teacher to our secondary schools is inadequate and unstable and this resulted in saddling the available teacher with too many mathematics lesson periods per week.
2. Most of the schools are staffed with unqualified and less experienced mathematics teachers who are ignorant of the learning theories. As a result students' needs, interest and desires are not easily identified and catered for.
3. Textbooks in use by the students have been found to be insufficient. Majority of the students do not have the opportunity of practicing on their own. This is an important factor, which impede their progress since it is always said that 'practice makes perfection.'

4. Mathematics laboratories are non-existence in schools, their absence results in most of the schools not having instructional aid which should help to bring about efficiency on the part of the teacher.

5. The teacher student ratio in the schools is too large. On the average, this stands at 1:285. Such a large ratio results in inefficiency on the part of the teacher.

All the above findings have shown that there are serious problems as regards learning of mathematics in our secondary schools. The implications of these findings and other findings will be seen in the next chapter.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter discusses the main findings of the study and this is followed by necessary recommendations, the study was aimed at delving into various instructional, learning and material problems that impede the learning of mathematics at the secondary schools. It has been observed that many students perform very poorly in mathematics both at the School's Terminal Examinations as well as in the Senior School Certificate Examinations (SSCE). Consequently, this study aimed at looking into the main factors militating against students' learning of the subject.

5.2 Major Findings

After a careful and comprehensive analysis of the data, it was found among other things, that one of the major factors responsible for students' continued poor performance in mathematics is the shortage of well qualified and experience mathematics teachers in our secondary schools. Most of the secondary schools have been found to be staffed with unqualified and less experienced mathematics teachers who themselves are not well versed in subject. Consequently, students' needs, interests and desires are not easily identified and catered for. This shortage of well-qualified mathematics teacher lends credence to what Bill (1977) said; "that the supply of mathematics teacher is a continuing problem; through universities and colleges of education have expanded in the country, the production of specialists in mathematics is very minimal and shortage in mathematics graduates in teaching continued unabated."

The study revealed that the teacher student ratio in the secondary schools is too large. The overall average from the area covered stand at 1:285. This large ratio is not unconnected with the inadequate staff strength in the schools.

Since the required number of teachers is not available, obviously the few teachers around would have to deal with so many students. The resultant effect in such a situation is inefficiency on the part of the teacher.

Another very important result from the study is that mathematics teacher have been found to be saddled with too many mathematics-lesson periods per teacher per week. On the average, each mathematics teacher is expected to teach twenty five (25) periods per week. The implication of this is that, going by the fact that each class of secondary schools is allotted five periods of mathematics lesson per week, then each teacher has to teach five classes every week. If one consider the number of student per class which is at times about fifty students, the five classes for each teacher is too much to cope with, especially, if one considers the fact that much attention should be given to the students by the teacher so as to allow for proper understanding of the subject.

It was also found during this study that the conditions of service of teacher did not generally commensurate with the load of classroom work. Besides, it has specifically been observed that conditions of service in teaching in Niger State are poor and unsatisfactory. According to Coverdale (1973) "one of the main problems affecting teachers' morale is condition of service which transcends all other considerations." The lack of prestige and professional recognition also affects the morale of teachers. Thus poor conditions of services of teachers are bound to affect educational output adversely on the part of the teacher.

Further more; it was found that more experienced teachers of mathematics tended to have a more positive attitude to teaching than did their less experienced colleagues. Out of seventy (70) teachers interviewed, twenty (20) of them have teaching experienced below five (5) years (i.e. 28.5%), fifteen (15) out of this number were degree holders without any professional training. These categories of teachers can leave the teaching line for a more lucrative job at the least opportunity. However fifty (50, i.e. 71.5%) of the seventy (70)

have to share a textbook and some students may be playing when any task inform of assignment of exercise(s) is given from the text books. This also lead to inability of the students without these textbook to practice on their own or fail to do assignment given to them by the teacher.

Coupled with the problem of textbook is the revelation that majority of the schools do not have mathematics laboratory. This has resulted in lack of instructional aid, since the existence of a mathematics laboratory is an incentive for acquiring teaching or instructional aid for student's use. In fact a mathematics laboratory is some form of resources center where students can be encouraged to make some of the materials themselves. They are places where students can easily go to have a practical experience of certain mathematics concepts or objects instead of always having to picture these in abstract.

Consequently, most schools do not have any appreciable teaching/ instructional aids for teaching and learning of mathematics and students are not afforded the opportunity of the practical experience of mathematics.

5.3 Recommendations

For mathematics to be meaningful to students and students to really perform well in the subject, it is recommended in the first place that our secondary schools should be staffed with well-qualified mathematics teachers who in the course of their training must have learnt human psychology and methodology. It has always been said that the quality, of education of a nation generally depends on the quality of her teachers and quality, of education of a nation generally depends on the quality of her teachers and quality of teachers depend largely on the kind of training that the teacher received both at the academic and professional levels.

Since the students in a secondary school is for a short time and is malleable, it is recommended that the best teacher of mathematics should always be assigned to handle form one (i.e. new entrants), since this will yield a better dividends in the long run; if a strong foundation is laid form the early stage and interest is

developed in the subject right from the beginning there is every hope that the students will continue to enjoy mathematics and will perform well in it. It is also recommended that the supply of well-qualified mathematics teachers should be of priority so as to offset the problem of large teachers student ratio. The continued increase students enrolment implies a corresponding increase in the number of mathematics teachers in the schools. There is, therefore, the need to step-up the training of more N.C.E and Graduates teacher in mathematics education. In order to do this, prospective mathematics teachers should be encouraged to read mathematics education at the already expanded Colleges of Education and Faculties of Education at the various Colleges and Universities. Such encouragement may be in the form of providing financial help to teachers who want to read for a higher qualification in Mathematics. This is very necessary since through such incentives more prospective students may take to reading Mathematics. As at present, the supply of mathematics graduates is a continuing problem. Also, graduates teachers without teaching qualification, to acquire professional qualification by way of in-service training with pay. This will make them more functional in the schools since by acquiring the necessary methodology and hence stay in the service.

The question of organizing in-service programmes for teachers with a view to up-dating mathematics teacher's knowledge should also be considered. Teacher education is a life long and continuous affair, which requires constant on-the-job-in-service re-appraisals of knowledge and skills. In-service training is, therefore, necessary for mathematics teachers whether in the subject matter or in the instructional strategies or even in the methods of developing, producing, using and repairs of audio-visual materials for facilitating student learning. As Adaralegbe (1975) put it, "In-service and on-the-job training is a sine-qua-non of the effective teachers". Mathematics teachers should be given in-service training so as to help them to retrieve, since ideas tends to become inert and therefore need renovation. It is also recommended that a functional Teachers' Resource Center be established as

centers where they can acquaint themselves with new ideas and therefore need renovation. It is also recommended that a functional Teachers' Resource Center be established as centers where they can acquaint themselves with new ideas and development in teaching methods.

For students to enjoy mathematics, it is recommended that a little imagination is brought to bear and student should have a lively awareness of the part played by mathematics in their own live, and its importance to human welfare. Students should be motivated to develop a positive attitude towards mathematics. Mathematics contents, attitude towards problem-solving, attitude towards the perception of the mathematics teacher, self concept in mathematics, enjoyment of mathematics as well as proper motivation are particularly very important to the development of positive attitude towards mathematics.

On the textbooks, it is recommended that, every student be made to have his/her own textbook, In cases where textbooks examples are irrelevant to students' real life situation the teacher should endeavour to find ways and means of using examples that will have some bearing on students' life. This will pave way for a proper understanding of the subject and enhance better performance. Other associated textbooks should also be made available in the school library. Exercises for the students should always be to their abilities. The teacher should also respect the personality of the student and should minimize occasions of frustration in failure in mathematics. Praise and re-proof should be used judiciously.

Finally it is recommended that each school be provided with a well-equipped modern library, such library must have among their other things various books on mathematics and mathematical games and puzzles. In addition, each school should also be provided with a mathematical laboratory. Among the various instructional aids to be stored in the laboratory are various mathematical shapes, games and puzzles, charts, maps, television and video set as well as mathematics books. With these, students would be afforded opportunity of constructing their own teaching aids under the direction of the teacher. This will further improve students

understanding of mathematics since they will no longer think of the subject as being abstract.

It is belief and hoped that once, all the above recommendations are strictly considered, students would come to enjoy mathematics and consequently improve their performance in the subject at the various examinations.

5.4 Contribution to Knowledge

The knowledge of mathematics will be increasingly important for individuals who have options for careers and higher education. Almost all careers require a background in mathematics, even any kind of business activities including selling by stark illiterates still require a measure of mathematics however simple it may be.

Therefore, the results of the analysis, suggestions and recommendations of this study will contribute in no small way to a better mathematics education. The contribution of the study to education include identifying problems with suggestions and recommendations to the stake holders in education to:-

i) Encourage the formation of mathematics clubs and societies, which will generate and sustain the student's interest in mathematics.

ii) Introduce mathematics-laboratories in schools which will provide the teachers and students with adequate teaching facilities and materials required for the effective teaching and learning of mathematics more practical and interesting, this help to wipe the negative attitude of the students towards the subject.

iii) Make sure that there is enough qualified mathematics teachers, a functional guidance and counseling unit and good condition of learning environment for students.

iv) Encourage the use of mathematics games in teaching; And

v) Encourage mathematics teachers to attend and participate in the organized refresher courses, seminars, workshops and conferences so as to be more productive.

5.5 Conclusion

In this study an attempt has been made to look into the instructional, learning and material problems affecting the effective learning of mathematics in Secondary Schools in Niger State. Among such problems are:-

i) In-adequate supply of well qualified mathematics teachers to the schools.

ii) Low staff strength in the schools resulting on large teacher-student ratio.

iii) Mathematics teachers are saddled with too many mathematics lesson periods per teacher per week resulting in inefficiency on the part of the teacher.

iv) Poor and unsatisfactory condition of service of teachers, which affect their morale.

v) Poor and out-moded instructional strategy by teachers of mathematics, which lead to rote learning of mathematics.

vi) Inadequate supply of mathematics textbooks to the students.

vii) Non-availability of mathematics laboratory in schools, which lead to none or inadequate availability of instructional aids, since a mathematics laboratory is where such aids could be developed and stored. And

viii) In-service training, which aims at offering a wide variety of opportunities for professional growth, is inadequate.

Finally, I would like to suggest to the mathematics teachers to associate themselves with the following purpose of teaching mathematics in the secondary schools. These are in two folds, one, for its social and utility value to mankind and secondly for laying the foundation of the future endeavour. Because the ways in which mathematics teachers have taught this subject have produced in general, a kind of apathy, a low level of competence, a low level of motivation and a general conception that mathematics is intractable and relevant to only person embarking on some scientific career.

5.6 Suggestions for Further Study

In view of the limitations of the study (earlier mentioned in chapter one), it is suggested for further study that:-

Investigation should be carried out to examine:

i) The effect of poor service condition on the performance of mathematics teachers in terms of their productivity, And

ii) The effect of the use of mathematics Laboratory on the teaching and learning of mathematics in secondary schools.

Research on problems and prospects of teaching and learning should also be carried out in other states of the Federation. These would help us to identify the problems and prospects at national level.

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APPENDIX I

PRINCIPAL'S QUESIONNAIRE

A SURVEY OF FACTORS INFLUENCING EFFECTIVE TEACHING AND LEARNING OF MATHEMATICS IN SECONDARY SCHOOLS IN NIGER STATE

This questionnaire is strictly meant for the above study. It is hoped that, you help make the study succeed by responding to the contents of this questionnaire honestly.

Your responses will be treated confidentially.

INSTRUCTION – Please fill-in the space(s) provided with the appropriate statement(s) or word(s).

1. My school has a total number of _____ students on roll.
2. The class-streams are as follow:

   _____ _____ JSS 1; _____ JSS 2; _____ JSS 3

   _____ _____ SS 1; _____ SS 2 And _____ SS 3.
3. There are _____ mathematics teacher in this school
4. On the average, _____ periods a week are allocated to each mathematics teacher
5. On the average _____ periods, a week are allocated to the teacher of other subject
6. Has the supply of mathematics teachers to the school been stable for the past three years? Yes _____ or No _____
7. Is there any remarkable improvement in the performance of your students in the SSCE in mathematics in recent years? YES _____ or NO _____

8. If the answer to no. 7 above, is Yes what factors do you feel account for this?_____

_____

_____

9. If the answer to no. 7 above is No, what in your opinion is responsible?_____

_____

_____

10. Please, supply details of the SSCE results in mathematics over the past three years (1998/99 to 2000/2001)

YEAR	NO. OF STUDENT THAT TOOK MATHEMATICS	PASSED		FAILED	
1998/99		NO	%	NO	%
1999/2000					
2000/2001					

11. The name of my school is_____

_____

_____

12. The school was established in the year_____

APPENDIX II

TEACHER'S QUESTIONNAIRE

A SURVEY OF FACTORS INFLUENCING EFFECTIVE TEACHING AND LEARNING OF MATHEMATICS IN SECONDARY SCHOOLS IN NIGER STATE

Dear Colleague,

The present study is an attempt to determine the factors influencing effective teaching and learning of mathematics in secondary schools in Niger State.

Since the study is an essential requirement, I would be grateful if you kindly assist in completing this questionnaire. All responses will be treated in confidence.

SECTION A

INSTRUCTION: - Kindly read each item and fill-in the blank/ spaces provided; or check appropriate options (s) acceptable to you.

1. Name of the school_____

_____

2. Sex: Male ( ) or Female ( ) (tick the most suitable)
3. Nationality: _____
4. Education qualification(s) (Tick ✓your choice)
   a) M. Ed; M. Sc (Ed); M.A. (Ed);
   b) B. Ed; B. Sc (Ed); B.A. (Ed); NCE & Diploma (Ed).
   c) M. A; M. Sc;
   d) B. A; B. Sc; HND & Diploma
   e) None of the above.

5. Area of specialization

   a) Mathematics (Major), Physics (Minor).

   b) Mathematics (Major); Chemistry (Minor)

   c) Mathematics (Major); Geog./Statistic (Minor)

   d) None of the above

6. My mathematics periods in the school, per week is:_____

   a) 10 – 20 periods

   b) 21 – 30 periods

   c) above 30 periods

7. I have been teaching mathematics for :

   a) Less than 5 years

   b) Between 5 years to 11 years

   c) For 12 years or more.

8. I consider my stay in teaching as:

   a) Temporary

   b) Permanent

   c) Undecided

9. Do you have library in your school?

   Yes/No_____

10. My school is:

   a) Single stream per class

   b) Double streams per class

   c) Triple streams per class

   d) Quadrupled Streams per class

   e) None of the above.

SECTION B

INSTRUCTION – Please tick in the appropriate box indicating your attitude to each of the following statements.

Use the keys:

(1) Agree

(2) Disagree

(3) Neutral

Statement	1	2	3
1. I am a professionally trained teacher of mathematics			
2. I still have interest in the teaching of mathematics			
3. The teaching periods for mathematics is not enough			
4. The condition of service for teachers commensurate with the load of classroom work in my school.			
5. There is a need for mathematics laboratory in secondary schools			
6. The principal of my school is not ready to provide a mathematics laboratory on request.			
7. The mathematics laboratory in this school is well equipped with the necessary instructional materials.			
8. This has sufficient mathematics textbooks for the students.			
9. The language of the textbooks we use in this school is easy to understand for students and teachers.			
10. Mathematics course contents demands much from the students, in a very short a time			

11. The poor performance of students in Mathematics results from their poor performances in English Language			
12. The mathematics syllabus is based on materials and criteria that are examinable and not necessarily useful for the individual or the society. 13. The practical work in mathematics is not very useful in the understanding of mathematical concepts.			
14. There is provision for in- service training for mathematics teachers.			
15. A student who does well in mathematics is usually a member of mathematics class.			
16. In this school Mathematics classes are too large for effective teaching or learning situation.			
17. This has shortage of experienced or trained mathematics teachers.			
18. Present conditions of service in teaching are good and satisfactory.			
19. Good condition of work of teachers have positive effects on student performance in the classroom.			
20. Mathematics teachers do not mark or corrects most of the class- work or assignment given, in good time.			

APPENDIX III

STUDENTS QUESTIONNAIRE

A SURVEY OF FACTORS INFLUENCING EFFECTIVE TEACHING AND LEARNING OF MATHEMATICS IN SECONDARY SCHOOLS IN NIGER STATE

Dear Student,

The purpose of this questionnaire is to collect information, which can be used to solve the factors influencing effective teaching and learning of mathematics in secondary schools in Niger State.

Please, respond to the following statements honestly. Every response will be treated confidentially.

SECTION A

INSTRUCTION: - Fill-in the gap provided with suitable response(s)

1. Name of the school_____
2. Sex: Male ( ) or Female ( ) (tick (✓) where applicable)
3. Class:_____
4. My best subject is:_____
5. The subject in which I use to score the least mark is_____

_____

SECTION B

INSTRUCTION – Please tick in the appropriate box indicating your attitude to each of the following statements.

Use the keys:

(1) Agree

(2) Disagree

(3) Neutral

Statement	1	2	3
1. I have much interest in learning mathematics			
2. I like to study mathematics because, I know it can help me in the study of other sciences and the likes.			
3. Mathematics is too abstract a subject and therefore difficult for me to study			
4. Our teacher makes mathematics very difficult by the way he handles it in the classroom.			
5. Our teacher uses cane or abusive language, whenever a student provides a wrong response to his question(s).			
6. Our teacher uses mathematical games when teaching and this make the lesson(s) very interesting.			
7. Our teacher always present his mathematics lesson(s) in a very clear and plain language.			
8. The relationship between the mathematics teacher and the student is very cordial.			
9. We do not have enough mathematics teachers in our school.			
10. The number of periods allocated for mathematics per week is not enough.			

11. The mathematics classes are too large for the effective teaching and learning of the subject.			
12. In my opinion the government encourages the learning of mathematics.			
14. There is a well-equipped mathematics laboratory in my school.			
15. In my school there is enough provision for teaching and learning materials.			
16. All students were forced to have the recommended textbook(s) in my school.			
17. The textbook(s) we use in mathematics is easy to understand and very suitable.			
18. The practical lesson in mathematics is the best way of learning the subject.			
19. There is a functional mathematics club in my school.			
20. In my opinion every students should be member of the mathematics club.			

APPENDIX IV

LIST OF POST PRIMÀRY SCHOOLS (PUBLIC)

Bida Zone

LGA	SENIOR		JUNIOR
	BOARDING	DAY	
AGAIE	GGSS Agaie	DSS Baro	JSS Etsu gaie
BIDA	Dendo S.S. Agaie * GGSS Bida	* GDSS Bida	
	* GC. Bida	NDSS Bida	
	GSS Bida (BTC)	DSS E/Bida	
	GTC Eyagi-Bida	MODEL Bida	
EDATI		DSS Enagi	JSS K/Bologi
GBAKO	GSS Lemu	DSS Edozhigi	JSS Sommajiko
KATCHA	GWVTC Katcha	IEC Katcha	JSS Gabi
		* DSS Kataeregi	JSS Bakeko
		DSS Badeggi	JSS Yinti
		DSS Katcha	JSS Batati
LAVUN	GSS Doko	ADSS Bida	JSS W/Kede
	GSC Kutigi	DSS Jima	JSS Muregi
		DSS Dabban	
		DSS Gaba	
		DSS Kutigi	
LAPAI	GGSS Gulu	DSS Ebbo	JSS Evuti
	MKSS Lapai	GDSS Lapai	JSS Gupe
		DSS Gulu	JSS Yelwa
		DSS Muye	
MOKWA	GSS Kpaki	* DSS K/Mokwa	JSS Kudu
	GSS Bokani		JSS Ja' agi
	GSS Mokwa		JSS Muwo
	GVTC Jebba-North		JSS Jebba North

* The school used.

Kontagora Zone

LGA	SENIOR		JUNIOR
	BOARDING	DAY	
AGWARA		DSS Agwara	
BORGU	* GSS N/Bussa	DSS Wawa	
	GSC N/Bussa	DSS Babanna	
	GTC N/Bussa	ADSS Wawa	
	CAILS N/Bussa	DSS Shagunnu	
		DSS Karabonde	
KONTAGORA	GTC K/Gora	DSS G/Boka	
	MICSS K/Gora	DSS K/Gora	
	* GSS K/Gora	* GDSS K/Gora	
	GGC K/Gora	Model K/Gora	
MAGAMA	GSS N/Kanji	DSS Salka	JSS Kura
	CSS Ibeto	DSS Auna	
	GSS Nasko		
MARIGA		DSS Bangi	JSS Mariga
		DSS Bobi	
MASHEGU	GSS S/Rami		JSS Ibbi
RIJAU	GVTC Rijau	DSS Dukku	
	GGSS T/Magajiya		
	GSS Rijau		
WUSHISHI	* GSS Wushishi	* DSS Zungeru	

* The school used

Minna Zone

LGA	SENIOR		JUNIOR
	BOARDING	DAY	
BOSSO	MBGSC Minna	HTMS Minna	JSS Chanchaga
	GTC Minna	DSS Maitumbi	JSS Beji
	CAILS Minna	ADSS Minna	
		* DSS Maikonkele	
		Bosso Sec. Sch. Minna	
CHANCHAGA	* ABSS Minna	Zarmai Model Minna	
	GSS Minna	* DSS Minna	
	*GGSS Minna	DSS Tunga	
	GVTC Minna	WDC Minna	
	NSSH Minna		
GURARA	GASS Dikko	DSS Dikko	JSS Kabo
	GSC Izom	DSS G/Babangida	
MUNYA			JSS S/Pawa
			JSS Guni
PAIKORO	* ADSS Paiko	DSS Kafinkoro	JSS Kwakuti
	GGSS Kafin-Koro	DSS Adunu	JSS Ishau
RAFI	GSS Tegina	AASS Kagara	JSS T/Bako
	GSC Kagara		
	MKTC Pandogari		
SHIRORO	GSS Kuta	DSS Tum-Tum	JSS Gurumana
	GSS Alawa	GDSS Kuta	JSS Shakwatu
		DSS Gwada	
		DSS Erena	
		DSS Shiroro NEPA	
SULEJA	SBTC Suleja	Model Suleja	
	GSS Suleja	DSS Suleja	
		GDSS Suleja	
TAFA	GVTC N/Bwari		JSS I/Gwari
	GGSS S/Wuse		JSS Garam

* The school used

APPENDIX V

CALCULATION OF CONTINGENCY TABLE

Calculation of Table 4.9

Where

$$E = \frac{row\ total\ of\ table\ 'a'\ (rij)\ X\ column\ total\ of\ age\ (cij)}{the\ grand\ total\ of\ table\ 'a'\ (r + c) = gij}$$

$$= \frac{rij\ x\ cij}{gij}$$

Then

$$X^2 = \sum_{I=i,j}^{n} \frac{(oij - Eij)^2}{Eij}$$

$$= \frac{(25-21)^2}{21} + \frac{(5-9)^2}{9} + \frac{(25-29)^2}{29} + \frac{(15-11)^2}{11}$$

$$= 0.762 + 1.778 + 0.552 + 1.455s$$

$$= 4.547$$

$$\approx 4.5\ (1dp).$$

Calculation of Table 4.11

Where

$$E = \frac{row\ total\ of\ table\ 'a'\ (rij)\ X\ column\ total\ of\ age\ (cij)}{the\ grand\ total\ of\ table\ 'a'\ (r + c) = gij}$$

$$= \frac{rij\ x\ cij}{gij}$$

Then

$$X^2 = \sum_{i\ j=I}^{n} \frac{(oij - Eij)^2}{Eij}$$

$$= \frac{(43-41)^2}{41} + \frac{(14-16)^2}{16} + \frac{(2-3)^2}{23} + \frac{(2-1)^2}{1} + \frac{(5-6)}{6} + \frac{(4-3)}{3}$$

$$= 0.098 + 0.250 + 0.333 + 1.00 + 0.167$$

$$= 0.333$$

$$= 2.281$$

Calculation of Table 4.15

Where

$$E = \frac{row\ total\ of\ 'a'\ (r)\ x\ column\ total\ 'a'\ (c)}{sum\ total\ of\ row\ (r)\ and\ column\ (c) = g}$$

$$= \frac{rij\ x\ cij}{gij}$$

Then

$$X^2 = \frac{\sum_{I=i,j}^{n}(Oij - Eij)^2}{Eij}$$

$$= \frac{(186-185)^2}{185} + \frac{(92-93)^2}{93} + \frac{(10-10)^2}{10} + \frac{(5-5)^2}{5} + \frac{(4-5)^2}{5} + \frac{(3-2)^2}{2}$$

$$= 0.005 + 0.011 + 0 + 0 + 0.2 + 0.5$$
$$= 0.716$$

Calculation of Table 4.17

Where

$$E = \frac{row\ total\ of\ 'a'\ (rij)\ X\ column\ total\ 'a'\ (cij)}{sum\ total\ of\ row\ (r)\ and\ column\ (c) = g}$$

$$= \frac{rxc}{g}$$

Then,

$$X^2 = \frac{\sum_{ij=i}^{n}(oij - Eij)^2}{Eij}$$

$$= \frac{(135-135.5)}{135.5} + \frac{(158-144)^2}{144} + \frac{(7-20.5)^2}{20.5}$$
$$+ \frac{(137-135.5)^2}{135.5} + \frac{(158-144)^2}{144} + \frac{(7-20.5)^2}{20.5}$$
$$+ \frac{(82-135.5)^2}{135.5} + \frac{(188-144)^2}{144} + \frac{(30-20.5)^2}{20.5}$$
$$+ \frac{(188-135.5)^2}{135.5} + \frac{(74-144)^2}{144} + \frac{(38-20.5)^2}{20.5}$$

$$= 0.0018 + 1.361 + 8.890 + 0.0166 + 1.000$$
$$+ 8.890 + 21.124 + 13.444 + 4.402$$
$$= 128.5\ (Idp)$$

APPENDIX VI

The result of the pilot study conducted

Question items	Teacher Questionnaires						Students Questionnaires					
	School X			School Y			School X			School Y		
	A	D	N	A	D	N	A	D	N	A	D	N
1	3	1	1	2	3	0	6	2	2	5	3	2
2	2	2	1	2	3	0	7	2	1	5	2	3
3	3	1	1	4	1	0	5	4	1	5	2	3
4	1	2	2	2	1	2	4	3	3	6	2	2
5	4	0	1	3	1	0	3	5	2	5	3	2
6	1	2	2	2	1	2	4	3	3	2	1	7
7	0	5	0	1	3	1	5	2	3	3	6	1
8	3	1	1	1	3	1	4	3	3	4	3	3
9	4	0	1	3	1	1	5	3	2	3	5	2
10	2	1	2	2	2	1	4	3	3	3	4	3
11	3	1	1	4	0	1	7	1	2	6	2	2
12	1	3	1	2	3	0	3	4	3	4	3	3
13	2	2	1	3	1	1	8	1	1	2	6	6
14	1	3	1	2	2	1	0	9	1	1	8	1
15	3	2	0	3	0	2	1	8	1	3	4	3
16	4	1	0	3	1	1	6	2	2	5	3	2
17	3	1	1	3	1	1	4	4	2	6	2	2
18	1	3	1	0	3	2	4	2	4	4	4	2
19	3	1	1	3	0	2	1	2	0	2	4	4
20	2	3	0	1	3	1	7	1	2	5	3	2

A = Agree D = Disagree N = Neutral

APPENDIX VI a

Using the spearman's Rank correlation on the teachers' questionnaire

X	Y	Rx	Ry	D	D^2
3	2	4	4	0	0
2	2	4	4	0	0
3	4	4	3	1	1
1	2	3	3	0	0
4	3	3	3	0	0
1	2	3	3	0	0
0	1	3	3	0	0
3	1	3	3	0	0
4	3	3	3	0	0
2	2	3	2	1	1
3	4	2	2	0	0
1	2	2	2	0	0
2	3	2	2	0	0
1	2	2	2	0	0
3	3	1	2	-1	1
4	3	1	2	-1	1
3	3	1	1	0	0
1	0	1	1	0	0
1	3	1	1	0	0
2	1	0	0	0	0
				0	4

$$R_{XY} = 1 - \frac{6\sum d^2}{N\left(N^2 - 1\right)} = 1 - \frac{6(4)}{20(399)}$$

$$= 1 - \frac{24}{7980}$$

$$= 0.997$$

Where

X = Teachers Response in school X

Y = Teacher's response in school Y

Rx = Ranking of the response in school X

Ry = Ranking of the response in school Y

D = Difference between Rx and Ry

D^2 = Square of the differences

APPENDIX VI b

Using the spearman's Rank correlation coefficient on the students' questionnaire.

X	Y	Rx	Ry	D	D^2
6	5	8	6	2	4
7	5	7	6	1	1
5	5	7	6	1	1
4	6	7	5	2	4
3	5	6	5	1	1
4	2	6	5	1	1
5	3	5	5	0	0
4	4	5	5	0	0
5	3	5	5	0	0
4	3	4	4	0	0
7	6	4	4	0	0
3	4	4	4	0	0
8	2	4	3	1	1
0	1	4	3	1	1
1	3	4	3	1	1
6	5	3	3	0	0
4	6	3	3	1	1
4	4	1	2	-1	1
1	2	1	2	-1	1
2	5	0	1	-1	1
				9	15

$$Rxy = 1 - \frac{6\sum d^2}{N(N^2-1)} = 1 - \frac{6(15)}{20(399)}$$

$$= 1 - \frac{90}{7980}$$

$$= 0.989$$

Where

X = Student's Response in school X

Y = Student's response in school Y

Rx = Ranking of the response in school X

Ry = Ranking of the response in school Y

D = Difference between Rx and Ry

D^2 = Square of the differences