THE STUDY OF THE EFFECTIVENESS OF MATHEMATICS AND SCIENCE TEACHERS ON STUDENTS' PERFORMANCE IN SOME SELECTED SECONDARY SCHOOLS IN MINNA, NIGER STATE.

BY

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CERTIFICATION

I UMARU USMAN, PGD/ITE/01/2000/2001, a postgraduate student of the Department of Industrial and Technology Education certify that the work embodied in this project is original and has not been submitted in part or full for any other diploma or degree of this or any other university.

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APPROVAL

This project has been read and approved as meeting the requirement for the award of Post-graduate Diploma in Technology Education of the Department of Industrial and Technology Education, School of Science and Science Education, Federal University of Technology, Minna.

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DEDICATION

This research project is dedicated to ALLAH, the most High and Owner of the Greatest throne, for keeping me alive and healthy during the period of this academic pursuit.

TO

My parents, Mal. S. Usman Ahmadu, the Village Head of Maikunkele and Malama Rahmat L. Usman; for standing by me during my health calamity while on this academic undertaking.

AND TO

My wife (Malama Halimat T.) and my children (Ahmadu and Zainab) who died in a kerosene explosion during the period of this study; and my son (Muhammad - Nasir) who survived the inferno.

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ABSTRACT

This research work is purely on the "effectiveness of Mathematics and Science teacher on students' performance in some selected Secondary Schools in Minna, Niger State". Students' performance in the West African Examination Council (W.A.E.C.) examination has been poor. Literatures were review to examine who teachers and professional teachers are; who Mathematics and Science teachers are; how Mathematics and Science teachers are to perform; examination of various teaching methods; and students' performance assessment. Research question was designed which contained six research questions and a total of twenty-nine statements, it was validated to have the variables curtained within the frame of this research. Seventy-five (75) respondents were sampled; five teachers and five students were sampled from the Schools and five officials each from the Secondary Education Monitoring agencies. Mean responses of 2.75, 2.94, 2.73 and 2.90 were recorded as accepted for research questions 1, 2, 3 and 4. But research question five was rejected at 2.43. For research question six, students' performances for the subjects and according to the years was recorded showing percentage passes only. Three hypotheses were made on research questions 1, 2, and 3 only. Tables 8, 9 and 10 showed the t-value for the hypotheses 1, 2 and 3 respectively. In the summary table, however, table 11, the t-table value of ± 1.96 (as accepted) was made for each hypothesis 1, 2 and 3. From the data and analysis done, discussions were made and references made to literatures. Summary, conclusions and recommendations were made to improve the teachers to enhance the students' performances.

CHAPTER ONE

INTRODUCTION

Knowledge is said to be transferred in the process of instruction or teaching, if the guiding principles of teaching and learning are effectively practiced or put in place.

For effective transfer of knowledge to take place between the instructor (teacher) and learner (student), the instructor must be one who has the knowledge of the subject matter. This includes the objective of the instruction to be achieved at the end of the instruction, the principles of teaching (or instruction) and must be able to use instructional material (or aids) to achieve the deserved goal.

BACKGROUND OF THE STUDY

Education has been viewed as that process through which knowledge is acquired by any individual to cause a change of attitude, leading to new attributes acquisition to change the individual for his/her own satisfaction, and the society at large. According to Abokede (1999), education can be described as the aggregate of all the processes by means of which a person develops abilities, attitudes, knowledge and other forms of behaviours of positive values in the society in which he lives. That is, the movement of individual from state of total ignorance and illiteracy to a state of awareness and literacy. Hence, to effectively cause the desired changes in the students the instructor/teacher needs to have the knowledge of the basic teaching principles, which could include:

i. What the teacher must be: This means those personality qualities and characteristics, such as physical appearance, good health, habits, traits and attributes;

ii. What the teacher must be able to do:- This means the teaching skills, such as the subject choice and analysis of it into suitable units of

instruction, the best methods of presentation to individuals or groups, and how to distinguish between proper methods for development of skills; and

iii. What the teacher must know:- This consists of those things the teacher must know in other to make a wise choice of means, and to perform successfully his duties as a teacher.

These are in order that the teacher/instructor performs his/her instructional functions perfectly and effectively, so as to enhance the desired change in the students. The process of transfer of knowledge involves certain psychology and philosophy to succeed. In the formal education process of an individual, the use of the major categories of educational philosophy which are metaphysics, epistemology, axiology and logic are taken into account (Akinseinde, 1998).

Mathematics (General, Pure and Applied), Basic sciences (Biology, Chemistry, Physics and Geography) and Applied/Vocational Sciences (Agricultural Sciences, Foods and Nutrition, and Home Management/Economics) are the basic subjects required to be passed with good grades by students in the ordinary level before gaining entry into a tertiary institution for further academic studies in the fields of Pure Sciences, Applied/Vocational Sciences, Technology or Engineering. In all the subjects listed above, practical and theoretical experience/knowledge of them are very important to enable a student perform in the final year examination. To achieve these entire goals therefore, the need for qualified teacher with adequate teaching experience cannot be over-emphasized or over-stressed. Consequently, these teachers are supposed or expected to be trained in their subject areas, have very good teacher training background in order to cope with both the process of teaching and learning and to cope with adolescent problem of the student that require character modelling

STATEMENT OF THE PROBLEM

The process of education starts within the childhood ages and gets eminent in the adolescent age brackets. During this period the mind gets pre-occupied with issues that could set the individual off and astray. It will be enough to ask the question are trained instructors/ teachers and particularly in these Mathematics and

Science subjects areas not right persons required to cause the desired change of attitudes of students? The problem of this study therefore was to investigate the effectiveness of Mathematics and Science teachers on students' performance in some selected Secondary Schools in Minna, Niger State.

PURPOSE OF THE STUDY

Having considered with great concern the inability of the students to perform well in Mathematics and Science subjects, given the caliber of teaching staff in the schools, the purpose of this study is to investigate the instructor/teacher with respect to his/her.

i. Professional competence;

ii. Ability to take into account the subjects goals and objectives;

iii. Good background knowledge of the subject, or as specialist in the subject;

iv. Knowledge of the requirement of the curriculum in respect of the subject he/she teaches;

v. Level of governments involvement in funding teacher education and teacher recruitment policy, and

vi. Performance level of the students in Mathematics and Science subjects for five years (from 1996/97 to 2000/2001 sessions') at the Senior Secondary Certificate Examination (SSCE).

SCOPE OF THE STUDY

As a result of time and limited financial constraints at the disposal of the researcher, this study was limited to about six (6) Secondary Schools in Minna offering Mathematics and Science subjects, and three (3) Secondary Education monitoring agencies, all in Minna. These Secondary Schools and monitoring agencies are:

i. Bosso Day Secondary School, Minna.

ii. Government Secondary School, Minna.

iii. Government Day Secondary School, Maikunkele.

iv. Government Day Secondary School, Maitumbi Minna.

v. Maryam Babangida Girls Science College, Minna.

vi. Zarumai Model School, Minna.

vii. Ministry of Education (M.O.E), Minna.

viii. Niger State Science and Technical Schools Board, (NSSTSB), Minna.

ix. Niger State Secondary Education Board, (N.S.S.E.B), Minna.

SIGNIFICANCE OF THE STUDY

The importance of identifying a teacher and teaching problem for improved students' performances in Mathematics and Science subjects cannot be over emphasized. These subjects are the backbone/bedrock of all Scientific, Technological and Engineering studies and professions for National development and self-reliance. To these effect therefore, qualified teachers are required to support these initiatives and drives for students' performance.

It will be expected that as a result of enhanced teaching from these qualified teachers, the performance of the students will be improved, which will lead to higher certificate acquisition. Hence, such drive will lead to National development and self reliance, which will discourage actions and acts detrimental to self and National development and encourage Scientific, Technological and Engineering competitions for a healthy economic growth.

Consequently, this study is such that it is made to proffer solution or cause a remedial effect or provision for the problems of students' failures or poor performance in ordinary level Mathematics and Science subject examinations. This will enable them gain entry into tertiary institutions, which will in future lead them to gainful employment. This will be successful only when the level of teachers' education is developed and their potentials improved to cause the desired effect on the students.

ASSUMPTION OF THE STUDY

The following assumptions were made for the study:

i. That respondents in this study will be sincere enough and knowledgeable to honestly respond to the questionnaire items raised.

ii. That responses from the respondents will provide a valid information for a realistic decision on adequacy of teacher education in Mathematics and Science subjects.

iii. That the location of the schools and education monitoring agencies will not affect the findings of this study. But help to generalize the result.

RESEARCH QUESTION

This study sought answers to the following questions;

i. How effective are the instructional process of the teachers to affect the performance of the students in Mathematics and Science subjects?

ii. Do teachers of Mathematics and Science subjects require special instructional methods to cause improved performance of the students?

iii. Are the teachers having good background knowledge of the teaching aids, and how good enough are teaching aids utilized with the abstract teaching?

iv. How effective does the teacher teach in relation to the curriculum content, subject goals and objectives?

v. How has the government responded to the teachers problems to cause a change in their attitudes for students to perform, and governments funding of teachers education with respect to desirable outcomes? And

vi. How have the students performed in their final year School Certificate Examination for the last five (5) years, 1996/97 to 2000/2001 in Mathematics and Science subjects?

RESEARCH HYPOTHESES

The following hypotheses were formulated to guide this study.

Ho_1. There will be no significant difference between the mean responses of the students and teachers in relation to whether the instructional processes of the teachers are adequate to affect the performance of students in Mathematics and Science subjects ($p < 0.05$)

Ho_2. There will be no significant difference between the mean responses of students and teachers with regards to special instructional methods required by teachers to cause improved performance of the students.

Ho_3. There will be no significant difference between the mean responses of students and teachers with regard to background knowledge of the subjects and utilization of teaching aids in teaching abstract concepts.

The confidence level at which these hypotheses will be tested is 0.05.

CHAPTER TWO

LITERATURE REVIEW

INTRODUCTION

In contemporary society, educational institutions exercise considerable influence on the socialization of the child, that is a process in which the teachers play crucial part (Datta, 1984). Fagbule (1972) indicated that in any formal human learning situation, a teacher is indispensable; by preparation and experience he is expected to be able to handle the various issues which arise in connection with learning, and generally, he is expected to guide the learner and give leadership examples as expected. It is difficult to think of a worthwhile school without competent teacher. In spite of recent advances in the technology of education, trained teachers will be required in the years ahead to cope with the serious business of educating the world's children to perform better in Mathematics and Science subjects.

Teaching as a profession therefore, is designed with the sole aim of causing a change in attitude, behaviours and skills from an ignorant child/individual which will in turn lead to a stage of awareness in the child/individual. For these to be achieved, Ryburn (1975) asserted that it was necessary that the teachers pay considerable attention to the matter of the ideals and purposes for life which are accepted by their pupils. The teachers roles are the manipulation of instructional materials such as textbooks, chalkboard and other available or improvised teaching aids to drive into their pupils the reasons and points for the lesson.

Literatures shall be reviewed on the teachers' education as it affects students' performance in Mathematics and Science subjects with particular reference to:

i. Teachers and professional teachers

ii. Who Mathematics and Science subject teachers are;

iii. How Mathematics and Science subject teachers are to perform;

v. Various methods of teaching; and

vi Students' performance assessment.

TEACHERS AND PROFESSIONAL TEACHERS

A teacher is that person/individual who possesses all those qualities, characteristics and charisma for instruction delivery to children/individuals. These instructions are intended to cause a change of attitude and behaviour and hence acquire new skills for functional development after appreciation of what has been taught. The teacher also should possess those leadership qualities, which are imparted into the children for future leadership roles in their communities and societies at large. Peacock (1990) said that the methods of teaching usually expected or put forward by a teacher is to first set realistic 'goals' of the subject matter, lesson and unit, then the methods of information/instruction delivery which involve:

i. Traditional directive or expository teaching, where the teacher normally works with the whole class;

ii. A discursive approach, which encourages discussion between pupil normally in pairs or small groups;

iii. An enquiry or problem solving approach, where a high level of responsibility is devolved to pupil to find out for themselves what is going on; and

iv. An approach toward exploiting pupils' activities and involving some degree of physical movement, improvisation or role-play.

However, professional teachers are those persons/individuals who have been particularly trained or developed:

i. To teach for the job of training other teachers, that is acquainting the teachers - to - be with the pedagogies of the profession for effective performance;

ii. As professional subject teachers, that is, as those trained

in the pedagogical areas of the occupation and also trained and equipped with the skills of teaching specialized subjects especially in Chemistry, Biology, Physics, Geography, Mathematics etc.

iii. As a professional technology and vocational teacher, that is, here skills acquisition is very important, with the teaching pedagogies to be able to effectively teach he technology/vocation based causes.

In all, Ali (1992) said that the professional teacher is that person/individual who has accepted teaching as a profession or an occupation and hence acquired, and have possessed those teaching qualities and characteristics designed to be able to execute the job of the teacher successfully. These qualities are very numerous to mention, but few most important ones are:

i. To posses the knowledge of the objectives of teaching, which shall include:
    a. Knowledge of subjects of instructions.
    b. Knowledge of instructional strategies.
    c. Knowledge of learners and learning processes, and
    d. Understanding of the processes, functions, structures and problems of the school and community.

ii. To posses the knowledge of the content of teacher – education, usually called teaching pedagogies, which shall include:
    a. Academically specialized in the teaching subjects.
    b. Learning theories and teaching methods with models.
    c. Educational foundations and ethics,
    d. Curriculum theories.
    e. Classroom management, and
    f. Leadership and school management theories and qualities.

MATHEMATICS AND SCIENCE TEACHERS

These teachers are those who have acquired the knowledge of Mathematics and Science, and have also acquired the pedagogies and other necessary requirements to be able to teach such subjects. Good (1977) defined Sciences as "what Scientists do", and this definition can be applied to Mathematics as "what Mathematicians do". The above definitions do not in anyway define what they are expected to define. Rather for the definition to contain facts, it should be noted that Mathematics which is the bedrock and cornerstone of sciences, and science being a process of investigation, manipulation and result acquiring activity can be best defined meaningfully as "an active 'process' of manipulating one's environment in order to find out more about its 'output' (products)". From this definition therefore, Science education includes the study of processes and product encountered.

However, the Science and Mathematics teachers are those teachers therefore who teach those processes involved in the investigations and manipulation of one's environment so as to find out about its contents and products. It will be interesting therefore to know that Mathematics and Science are bedrock and cornerstone for natural adjustment of human needs, in which the teachers play leading role to enforce the knowledge of the needed or desired adjustment.

PERFORMANCE ACTIVITIES OF MATHEMATICS AND SCIENCE SUBJECTS TEACHERS

The Mathematics and Science subjects' teachers must be trained to posses the teaching pedagogies, all necessary inputs and knowledge of the implications of the Science teachers. Good (1977) based his explanations on the last definition of Science, where he said learning science would be very different from learning

Science through an accumulation of previously identified 'facts' 'concepts' and 'principles'. Hence any consideration of the various roles of the teacher who is trying to help children learn Science must include a clear definition of Science, as indicated previously above. The condition of the definition leads to four (4) conditions below that could be assumed by the teacher who wants to help the children learn Science and Mathematics:

i. That there are wide variations in developmental levels among children in most classrooms and thus, equally wide variations in their conceptualising abilities.

ii. That conceptual learning is tied closely to developmental levels, and occurs primarily as a result of a child's internalising his/her own actions on objects.

iii. That it appears that direct verbal instructions has little effect in facilitating advancements of developmental levels and, thus, the ability of children to conceptualise problems beyond their current developmental abilities.

iv. That Science is an "attempt" to make more sense out of one's environment by manipulating portions of that environment at a difficulty level consistent with one's conceptual ability.

Having taken the above 'condition' of teaching Sciences, and Mathematics, as a foundation stone for the Science and Mathematics teachers to accomplish the required teaching for learning to take place and hence improve students' performance, constant referencing should be made to them in the periods of teaching and in order to assess appropriateness of Science and Mathematics teachers' effectiveness, too.

The roles or instructional strategies for the Science and Mathematics teachers' performance are listed according to Good (1977) as:

A. Lecturer and Question/Answer.

B. Activity Director and Evaluator.

C. Discussion Leader.

D. Activity Facilitator.

E. Co-investigator.

It is imperative therefore that the Science and Mathematics teachers of these days take into consideration again the conditions (above) and the roles of the teacher through which the child's learning is based. The roles of the teachers in instructional strategies help the teachers to find the most "appropriate" method of instruction or information delivery, however, by matching each of the five roles of the four conditions, and hence arriving at the best method to perform his functions which in turn makes the students' performance excellent in outcomes, outputs or products.

TEACHING METHODS RELEVANT TO SCIENCE AND MATHEMATICS TEACHER.

The Science and Mathematics teachers, having taken into account the 'roles' and 'conditions' for enhanced learning and teaching, need to also know the necessity of various teaching methods to enhance students' performance. Okoro (1993) and Akinseinde (1998) explained that the teaching methods are means of communicating with students, therefore for effective teaching to take place the teacher must have the knowledge of which method to use in a particular situation to meet specific goals. Hence, the teacher should analyse his subject into topics and each topic into units and plan the best communication method that will help the students to understand the units and hence the topics variously in the subjects. These methods include:

1 **DEMONSTRATION METHOD:** This is an instructional method that enables students to observe procedures and techniques that illustrate specific concepts, principles or skills. In Science and Mathematics instructions for examples, laboratories are equipped with machines and materials for developing competencies and skills needed for particular occupations, which will involve processing, construction, production, analysis, maintenance, observations, separation, assembling, etc. Here, the method of demonstration teaching plays vital roles which is very suitable for psychomotor objectives in learning.

Demonstration method of teaching involves showing and explaining how something is done and how that thing is used or operated. For example in a chemistry practical lesson in quantitative analysis (that is titration) experiment, where the apparatus are clamp, stand, burette, key, and pipette. The burette is first clamped on the stand and the key placed accurately to control flow of acid during the titration exercise, all of these are demonstrated step by step with explanations of every step on what is being performed. Consequently, demonstration method will be effective and efficient if the following steps are adopted.

a. Analysis of the process is made by breaking it into small sequential steps.
b. Having all the equipment in place.
c. Check the operations of the equipment before the demonstration starts.
d. Position all the working equipment or their models so that all learners/students can see all the parts all the time.
e. Have the goal of the demonstration explained at the beginning.
f. Now present the operations, one step at a time based on the task

analysis.

g. Allow the learners/students to, on their own and with their own equipments, carry out similar operations as demonstrated by the teacher or instructor, and

h. Have the student re-produce the operation in sequencial order to inforce performance try-out.

While it is necessary that the teacher plans and practices the skills that will be presented to avoid being confused during presentation or demonstration, the demonstration process should permit the learners or students to ask questions to enhance their knowledge and performance, consequently appropriate answers and reviews of any step that presented problem should be made. Below are some of the advantages of demonstration method of teaching.

i. The learner observes the process or procedure and learns it.

ii. The demonstration process is an appropriate method of teaching correct and safe procedures for accomplishing a task.

iii. Material wastage and equipment damage are minimized due to learners followership of the correct procedure as demonstrated, as this will conserve and preserve material and equipment, respectively, and

iv. Demonstration makes the lesson more concrete. It stimulates students to participate in the lesson, hence in practical lesson; it helps students to acquire the required skills.

2. **DISCUSSION METHOD:** This is an organized system of interaction between the teachers and learners for the purposes of achieving specific instructional objectives, it allows for full learners'/students' participation. Discussions are usually classified into three: class/large group discussion, small group discussion, and panel discussion.

i. In the "class/large group discussion", all the students may discuss a topic under the guidance of the teacher, he starts the discussion by stating the topic that is to be discussed, students are then stimulated to contribute by making relevant comments or providing solutions to the problems posed. As many students as possible should be allowed to participate or speak before the teacher summarizes the opinions expressed. This class/large group discussion could be formal, where it has been previously planned and has an extent of class seat rearrangement. It could be informal, where the grouping comes up adhoc in the course of lesson and especially during summary of a practical lesson that needs calculations, this is done as an assignment group for each group to have various collective group answers.

ii. The 'small discussion group' is helpful, as it is used to divide the class into small groups. In this aspect, the topic is usually divided into units for which one unit's activity ends for the other to begin, this type is therefore allocated to every group and numbered, where each summarizes its findings and presents same to the class through a representative. Such small group discussions are usually formal discussions since they are planned ahead of time and may involve a disruption of the usual classroom sitting arrangements.

iii. The 'panel discussion' entails using a panel of discussants made up of students. The panel sits in front of the class and discusses the topic at hand to the hearing of the entire class. Usually, the teacher decides on the size and length of time of the panel and discussion.

Discussion involves sharing of ideas, information, attitudes and experiences. This is often done in a relaxed atmosphere where there can be cross fertilization of ideas between the teachers and students and among students themselves. Here, flow

of ideas is from teachers to students, from students to students, and from students to teachers. This encourages everyone to get involved and participate in the learning.

Essential steps in planning a discussion is as follows:

a. Decide on the outcome you expect from the discussion. Keep your objectives in mind when planning and during the discussion.

b. Plan the introduction. This is similar to any type of lesson.

c. List the main headings of the content to be covered.

d. Under each heading, write challenging questions that will focus attention on the theme of the discussion.

e. Set time limit for each stage and write this in the merging of the plan, care should be taken to stay on schedule

f. List the main points to be covered on the summary of discussion.

3. **LECTURE METHOD:** This is the oldest method of teaching that sometimes involves some amount of bodily demonstration. This method of teaching however involves telling or explaining subject matter content. It is all talking affairs from previously prepared notes. It is always teacher - centred and lecture content determined by the teacher. It is always used for a large group of audience. Its method requires carefully planned presentation which centres around a single theme or topic. The strategy used in teaching is mostly autocratic in style, therefore the students are passive and mere listeners, as the teacher or the specialist presents his lesson. Under this condition some students tend to engage in note- taking, while others talk to each other in order to escape the boring lecture or look outside through the window or engage in unrelated activities.

Other methods of instruction not relevant in the teaching of

Science and Mathematics include.

i. ***PROJECT METHOD:*** - Which is mostly used by students in the tertiary institution for test of certain abilities.

ii. ***DISCOVERY METHOD:*** - This is not easily understood by students in the secondary schools, it is complex to their understanding and leads them to unrelated studies.

iii. ***QUESTIONING TECHNIQUE:*** – This is a situation where question are raised only as a means of teaching. It is not suitable as the student will not understand the value of the technique used.

iv. ***SIMULATION METHOD:*** - Student will look at this process of instruction as gesticulation, for not knowing its importance if practiced in isolation. But simulation method of teaching is widely practiced in practical oriented subjects in especially sciences.

v. ***FIELD TRIPS:*** - This method is practiced rarely in the secondary school due largely to lack of time, transport means and government will. It is most important in tertiary institutions for industrial visits.

vi ***INDIVIDUALIZED INSTRUCTION:-*** This is a student centred learning activity. In it, the student works at his pace with the guidance of a teacher and therefore mostly applicable to students of tertiary institutions. It is almost the same in technique with project method or guided discovery method of instruction.

In all, the three methods of learning and teaching namely demonstration, discussion and lecture are widely adopted for instruction in secondary schools.

PERFORMANCE ASSESSMENT OF STUDENTS.

Assessment which encompasses measurement and evaluation is described by Okoro (1993) as the process of determining how much knowledge and skill a student has acquired. In the secondary schools, this determination process will include the use of:

i. Objective tests.

ii. Essay tests.

iii. Performance tests.

iv. Assignments, and

v. Written report.

However, Akinseinde (1998), described assessment as an evaluation process for determining the value or worth of a thing (here teaching and learning), which includes obtaining information for use in judging the worth of a programme, product, procedures or objectives. Evaluation could be defined as the process of determining to which extents the educational objectives are actually realized. Hence in teaching and learning, evaluation is the process of determining the value, worth or quality of:

i Students performance, and

ii The instruction process.

Instance exist where students are said to have failed in a measurement activity: This may not be actually the fact that behind the measurement, but the student failed the teacher failed in his instruction process and the instrument of such measurement also lacks validity and reliability.

Validity in many measurement instruments is a characteristic of measuring what it is supposed to measure, that is any test/examination should measure exactly

what has been taught. A test in Mathematics will be valid if in the process of instructions linear equations are taught and questions are directed in that vain and not linear inequality. Reliability is the extent to which a test (or instrument) consistently measures a given trait.

The Science and Mathematic . help them in determining the objectives for each unit of instruction. The educational taxonomy is classified into four (4) broad categories or domains, which are:

i. ***COGNITIVE DOMAIN:-*** The objective in this domain emphasizes recall or recognition of knowledge and the development of intellectual abilities. All that matters in this domain is the development of the ability to recall what has been taught or learnt that have been in memory, through terminology, actions, facts, figures, etc.

ii. ***AFFECTIVE DOMAIN:-*** The objectives in this domain deals with attitude, appreciation, values, interest, social relations and emotional adjustment. Verbs of action in this domain include: like, love, hate, dislike and appreciate. Affective domain is an aspect of putting appreciations and values to what has been learnt in the cognitive domain.

iii. ***PSYCHOMOTOR DOMAIN:-*** This domain is of the manipulative or motor-skill development area. Here, the aspect of imitation, manipulation, precision, articulation and naturalization (or internalisation) are acquired, all of the above are practical skills developed in the cause of learning.

Knowledge of the educational objectives for the Science and Mathematics teachers should be made mandatory that is, by training skilled teachers in these areas of instruction in order to achieve the desired educational goal, as expected or

enshrined in the subject curricula in our schools. A teacher who has no knowledge of the above taxonomy of educational objectives, no knowledge of the three types of evaluation processes (i.e. formative, summative and ultimate evaluations) and also do not know how to apply norm referenced and criterion referenced evaluation, will only leave the students to the mercy of final examination. This should not be, therefore, the performance of students in Science and Mathematics will depend heavily on the teaching ability of the instructors who must be trained to teach or give instruction in these subject areas.

CONTINUOUS ASSESSMENT.

Akinseinde (1998), defined continuous assessment as a mechanism whereby the final grading of a students in the cognitive, affective and psychomotor domains of behaviour systematically takes account of all his performances during a given period of schooling. However, such an assessment involves the use of a great variety of modes of evaluation for the purpose of guiding and improving the learning and performance of the student (Federal Ministry of Education, Science and Technology, 1985).

The quality of any good and efficient teacher from whom learning/teaching experience is to be achieved demands that continuous assessment most be his/her foremost means of students' performance record keeping. This is a continuous means of students' evaluation or measurement in the cause of instruction or teaching to check the level of understating of the course, the level of instruction assimilation, utilization, internalisation and reproduction upon request.

The final terminal examination does not assess the total instructional process and outcomes, nor takes into account the total experience of the student throughout his schooling period.

CHAPTER THREE

METHODOLOGY

3.0 INTRODUCTION

The purpose of this research study was to find out problems of effectiveness of teacher for improved performance of students in Mathematics and Science subjects in some selected Secondary Schools in Minna, Niger State. This research work examined the teacher - education problems and how this affect the students' output, and how the students have viewed the teachers' level of education in respect to the experiences put forward by the teachers.

It is evident that in the Secondary Schools in Niger State, before the advent of National Examination Council (NECO), no single student was able to pass out with five (5) good and admittable credits or even pass JAMB examination for entry into tertiary institutions. Therefore, the need to examine the knowledgeability of the Mathematics and Science subject teachers became very necessary. In like manner, the level of teacher – education attained by the teacher which is expected to be responsible for improved students' performance was examined.

The teachers' knowledge of the curriculum requirements of the subjects, and goals and objectives was investigated. How the governments' funding of teacher – education has affected the teaching job was studied, and how the students have performed in the past five (5) years in these subjects was also investigated.

RESEARCH DESIGN

This study was expected to provide solution to an existing practical problem. This problem is "how the teacher – education has affected the performance of students in Mathematics and Science subjects." Hence, this study is an APPLIED

RESEARCH. The research study was carried out using questionnaire, which was administered to the respondents and collected immediately for onward assessing and generalization after having been inferenced with respect to the statement of the study. The questionnaire consisted of questions and statement to be responded to according to a given principles. These were interpreted along given lines of thoughts that are linked or concerned with true investigation of issues or events of contemporary concern.

AREA OF STUDY

As a result of time and financial constraints, this study was restricted to these few senior secondary schools in Minna only:

i. Bosso Day Secondary School, Minna.

ii. Government Secondary School, (G.S.S.) Minna.

iii. Government Day Secondary School, Maikunkele.

iv. Government Day Secondary School, Maitumbi Minna.

v. Maryam Babangida Girls Science College, Minna.

vi. Zarumai Model School, Minna.

vii. Ministry of Education (M.O.E), Minna.

viii. Niger State Science and Technical Schools Board, (NSSTSB), Minna.

ix. Niger State Secondary Education Board, (N.S.S.E.B), Minna

POPULATION OF THE STUDY

The population of the respondents used in this study are from selected schools in Minna and officials of the three Secondary Education monitoring agencies. (As indicated in the area of the study above). There are a total of seventy five (75)

respondents. They are classified into students, Mathematics and Science subjects teachers, official of Ministry of Education, Niger State Science and Technical Schools Board and Niger State Secondary Education Board, all concerned with students learning and the teaching policies of Mathematics and Science subjects in Niger State Schools.

SAMPLE AND SAMPLING TECHNIQUES.

A total number of seventy five (75) respondents were sampled. A set of five (5) students and five (5) teachers each from the six (6) senior secondary schools and five (5) officials from the three (3) other Ministries / Parastatals. The students were randomly selected. From the SS (III) students, to form a total of thirty (30) students. This is because of their knowledge of the teachers and teaching experiences they have acquired in the past three (3) years.

Five (5) teachers each from the above listed senior secondary schools were selected randomly from their Mathematics and Science teachers. Which made up a total of thirty (30) teachers. Also, five (5) officials each from M.O.E, N.S.S.T.S.B. and N.S.S.E.B. were sampled because of their direct involvement in staff recruitment, implementation and supervision of educational policies at various positions.

INSTRUMENT FOR DATA COLLECTION

The instrument for information gathering in this study was Questionnaire which consisted of parts A and B. Part A concerned personal data, while past B concerned instructions and items raised to cover this study.

The respondents were requested to indicate their opinions by marking a tick (√) in the opinions they considered most appropriate to each of the questionnaire

items. Refer to Appendix I for the questionnaire.

Also, to properly study the various rise or fall in students' performance in each of these six (6) schools selected for this study, sessional WAEC result percentage analysis per subject list is attached for filling. The sheet has eight (8) recognized Mathematics and Sciences subjects listed. There are also columns in sessions, under years, where each subject's percentage score will be written for that session. See Appendix II for the result-filling sheet.

VALIDATION OF INSTRUMENT

The draft questionnaire was given to the supervisor for necessary correction, advice and approval before being administered to the respondents.

ADMINISTRATION OF INSTRUMENT

In this research, the need for proper handling of materials cannot be left aside, as time and money were the major constraints of the researcher. The questionnaires were administered directly by the researcher on the respondents. The process of administration especially in the schools involved the school management selecting the required number of students randomly and sending them to the researcher, who in turn administered to them the questionnaires. After they had finished responding, the questionnaires were collected immediately. The method of administration of instrument differed slightly. The teachers are matured adults and expected to behave themselves and respond appropriately unguided to the questionnaire and return them immediately. The officials of the Ministry/Parastatals were given a grace of two days to respond to the instrument, after which they returned the questionnaires to the researcher on a return visit to collect them.

Consequently, these questionnaires were personally distributed and collected immediately after all responses had been completed.

METHOD OF DATA ANALYSIS

In the analysis of the data collected, frequencies of each of the responses of the questionnaire item were found and the corresponding mean were computed. A four (4) point LIKERT SCALE like was used in calculating the scores as follows:

Strongly Agreed = S.A. = 4.0

Agreed = A. = 3.0

Disagreed = D. = 2.0

Strongly Disagreed = S.D. = 1.0

The mean value for judgement was computed using the formular:

$$\bar{x} = \frac{\Sigma X}{n}$$

Where Σ = Sum of

$\bar{x}$ = Mean

X = Normal value of options

n = Number of response options.

The mean value therefore $= \frac{4+3+2+1}{4} = \frac{10}{4}$

$= 2.5$

DECISION RULE:

To determine acceptance, a mean score of 2.5 was chosen as a decision point between AGEED and DISAGREED. Consequently, any response with a mean score of 2.5 and above was considered Agreed, while responses with a mean score below 2.5 was regarded as disagreed.

HYPOTHESIS TESTING

The hypothesis was tested using a t – test. Its computational formula is

$$t = \frac{X_i - X_{ii}}{\sqrt{\frac{N_i S_i^2 + N_{ii} S_{ii}^2}{N_i + N_{ii} - 2} \left\{ \frac{(Ni + Nii)}{N_i N_{ii}} \right\}}}$$

Where $\overline{X}_i$ = Mean score of 1st group of samples

$\overline{X}_{ii}$ = Mean score of 2nd group of samples

S_i = Standard Deviation of 1st group of samples

S_{ii} = Standard Deviation of 2nd group of samples

N_i = Total population of 1st group of samples

N_{ii} = Total population of 2nd group of samples

$N_i + N_{ii} - 2$ = Degree of freedom (df)

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF DATA

4.0 INTRODUCTION

This chapter is concerned with the presentation of the analysed data based on findings in respect of the research questions asked.

TABLE 1: DISTRIBUTION AND RETURN OF COMPLETED QUESTIONNAIRE .

		Students		Teachers		Education Officials	
S/N	**AREA OF STUDY**	**D**	**R**	**D**	**R**	**D**	**R**
1	Bosso Sec. Sch, Minna	5	3	5	5	-	-
2	Gov't Sec. Sch, Minna.	5	5	5	3	-	-
3	Gov't Day Sec. Sch, Maikunkele.	5	5	5	5	-	-
4	Gov't Day Sec. Sch, Maitumbi - Minna	5	5	5	5	-	-
5	Maryam Babangida Girls Sci. Coll, Minna	5	5	5	4	-	-
6	Zarumai Model Sec. Sch, Minna	5	5	5	5	-	-
7	Ministry of Education, Minna	-	-	-	-	5	5
8	Nig. State Sci. & Tech. Sch Board, Minna	-	-	-	-	5	5
9	Nig. State Sec. Edu Board, Minna	-	-	-	-	5	3
	TOTAL	30	28	30	27	15	13
	Percentage Return		93.3%		90%		86.7%

D = Number of Questionnaires distributed.

R = Number of Questionnaire returned.

RESEARCH QUESTION 1:

How effective are the instructional process of the teachers to affect the performance of the students in Mathematics and Science Subjects?

TABLE 2: MEAN RESPONSES OF STUDENTS, TEACHERS AND OFFICIALS ON EFFECTIVENESS OF INSTRUCTIONAL PROCESS.

ITEM	*STATEMENT*	X_1	X_2	X_3	*AVE. MEAN*	*REMARKS*
1	The teachers have adequate teaching skills.	3.14	2.26	2.46	2.62	Agreed
2	The teachers are trained teachers	2.10	2.93	2.31	2.45	Disagreed
3	The teachers can effectively use teaching aids.	2.45	2.85	2.15	2.48	Disagreed
4	The teacher is very good at his work.	2.31	3.04	2.13	2.49	Disagreed
5	The teacher knows how to handle students and their problems.	3.29	2.93	2.54	2.92	Agreed
6	The teachers require improved instructional procedures.	3.04	3.93	3.69	3.55	Agreed
GRAND MEAN = X = 2.75						Agreed.

Where X_1 = Mean response of students,

X_2= Mean response of Mathematics and Science teachers,

X_3= Mean response of Education Monitoring Officials,

X = Grand mean response,

= Average Mean of $(X_1 + X_2 + X_3) \div 3$.

From the above table, it is shown that the respondents have disagreed upon items/statements 2, 3, and 4. Items/statements 1, 5 and 6 have been agreed upon; all with a mean response of 2.75 which indicates that the teachers have adequate knowledge of the instructional process required to affect the performance of the students in Mathematics and Science subjects.

RESEARCH QUESTION 2:

Do teachers of Mathematics and Science subjects require special instructional methods to cause the improved performance of the students?

TABLE 3: MEAN RESPONSES OF STUDENTS, TEACHERS AND OFFICIALS ON SPECIAL INSTRUCTIONAL METHODS REQUIRED.

ITEM	*STATEMENT*	X_1	X_2	X_3	*AVE. MEAN*	*REMARKS*
7	Improved performance of the students in these subjects depends on the teachers.	3.39	3.11	3.00	3.17	Agreed
8	Teachers of these subjects require special instructional skills to teach.	3.32	3.67	3.23	3.41	Agreed
9	Improved teacher education will ease teaching of Mathematics and modern Science.	3.39	3.74	3.39	3.51	Agreed
10	These teachers make adequate use of time allocation.	2.41	2.54	2.05	2.33	Disagreed
11	The periods of instruction for these subjects are adequate for both teachers and students.	2.45	2.22	2.15	2.27	Disagreed
GRAND MEAN = X = 2.94						Agreed.

The table above shows items/statements 10 and 11 mostly being disagreed upon, while items/statements 7, 8, and 9 have been agreed upon. In this vain the students cannot on their own know their deficiencies except through the teachers. The grand mean of 2.94 shows that the teacher require special instructional methods to enhance their teaching.

RESEARCH QUESTION 3

Are the teachers having good background knowledge of the teaching aid, and how good enough are teaching aids utilized with the abstract teaching?

TABLE 4: MEAN RESPONSES OF STUDENTS, TEACHERS AND OFFICIALS ON WHETHER THE TEACHERS HAVE GOOD BACKGROUND KNOWLEDGE OF THE SUBJECTS, AND ABILITY TO USE TEACHING AIDS IN ABSTRACT TEACHING

ITEM	*STATEMENT*	X_1	X_2	X_3	*AVE. MEAN*	*REMARKS*
12	The teachers have adequate background knowledge of the teaching aids.	3.11	3.04	2.77	2.97	Agreed
13	The teachers make good use of teaching aids.	2.28	2.52	2.39	2.40	Disagreed
14	Practical tools are effectively used to improve learning.	2.32	3.00	2.15	2.49	Disagreed
15	Students understand both practical and abstract instruction.	2.38	2.11	2.00	2.16	Disagreed
16	The teachers have good classroom management skills.	2.49	2.67	2.46	2.54	Agreed
17	Schools should have modern Mathematics and Science subject teaching tools and models.	3.64	3.82	3.82	3.76	Agreed
GRAND MEAN = X = 2.73						Agreed.

Given figures from Average Mean in table 4 above, items/statements 13, 14 and 15 were disagreed upon, but items/statements 12, 16 and 17 and even the Grand Mean are agreed upon. This means that though the teachers have adequate knowledge of their subjects, have good class management skills and that the schools should strongly have Mathematics and Science subjects teaching tools and models; the teaches are lacking due to none teacher training skills to improve their ability in the use of teaching aids, adequate use of practical tools to improve learning for students to understand better both practical and abstract learning.

RESEARCH QUESTION 4

How effective do the teachers teach in relation to the curriculum content, subject goals and objectives?

TABLE 5: MEAN RESPONSES OF STUDENTS, TEACHERS AND OFFICIALS ON EFFECTIVENESS OF TEACHING IN RELATION TO THE CURRICULUM CONTENT, SUBJECT GOALS AND OBJECTIVES.

ITEM	*STATEMENTS*	X_1	X_2	X_3	*AVE. MEAN*	*REMARKS*
18	The teachers have good knowledge of the syllabus requirement and teach accordingly.	2.32	3.00	2.38	2.57	Agreed
19	The curriculum content of Mathematics and Science syllabus are strictly followed.	2.82	2.56	2.46	2.61	Agreed
20	Teachers take time to split topic into units to ease instruction.	3.18	3.00	3.85	3.34	Agreed
21	The subject goals are critically taken up as a teaching challenge.	3.14	2.82	2.77	2.91	Agreed
22	The goals of the topics and sub-topics are objectively achieved	2.71	2.67	2.46	2.61	Agreed
23	Mathematics and Science subject curriculum should enter woven to ease learning and instruction	3.43	3.59	3.08	3.37	Agreed
GRAND MEAN = X = 2.90						Agreed.

As revealed from the data in the table above, the statements raised to the question have been agreed upon. In this respect there was no item disagreed upon. Consequently, grand mean was found to be agreeing upon, that the teachers of Mathematics and Science subjects teach according to the curriculum content, subject goals and objective.

RESEARCH QUESTION 5

How have the government responded to the teachers' teaching problems to cause a change in their attitudes for students to improve, and governments funding of teachers' education with respect to desirable outcomes?

TABLE 6: MEAN RESPONSES OF STUDENTS, TEACHERS AND OFFICIALS ON TEACHERS' TEACHING PROBLEMS, AND GOVERNMENT'S FUNDING TEACHER'S EDUCATION.

ITEM	*STATEMENTS*	X_1	X_2	X_3	*AVE. MEAN*	*REMARKS*
24	Adequate teaching materials and aids are provided to improve learning	2.57	1.74	1.85	2.05	Disagreed
25	Regular government supervision of schools to regulate mode of teaching are done.	2.82	2.67	2.31	2.60	Agreed
26	Libraries are equipped with standard books for both students and teachers to use.	2.39	1.52	1.46	1.79	Disagreed
27	Teachers are allowed and sponsored to school to improve their knowledge and skills.	2.75	2.63	2.39	2.59	Agreed
28	Teachers are adequately remunerated and rewarded where necessary	2.46	1.44	1.69	1.86	Disagreed
29	Government should encourage professionalism and pay teachers based on professional acquisition.	3.68	3.93	3.39	3.67	Agreed
GRAND MEAN = X = 2.43						Disagreed

From the table above, items 25, 27 and 29 were agreed upon to mean that, these aspects should be taken seriously and taken care of. Items/statements 24, 26 and 28 are disagreed upon and hence rejected, to mean there are great inadequacies in government policies there. These in all have given rise to a disagreeing Grand mean value of 2.43, that is to say that government has not or does not respond to both teachers' teaching and social problems which will in effect translate to change of attitudes and character to improve students performance. Government has also refused to fund teachers' education programmes which are expected to bring desirable outcomes from the students.

RESEARCH QUESTION 6

How are the students' performance in their final year School Certificate Examination for the last five (5) years, 1996/97 to 2000/01 in Mathematics and Science subjects?

PRESENTATION AND ANALYSIS OF W.A.E.C. EXAMINATIONS RESULTS FROM 1996/97 TO 2000/01.

Presented below are the percentage passes at ***CREDIT*** level ***W.A.E.C.*** examinations recorded from the schools.

TABLE 7: PERCENTAGE PASSES IN WAEC EXAMINATIONS FROM 1996 / 1997 TO 2000/2001

S/N	*SUBJECTS*	*1996/97*	*1997/98*	*1998/99*	*1999/00*	*2000/01*
1.	Mathematics.	14.1%	14.3%	9.8%	10.8%	18.8%
2.	Biology.	46.35%	38.2%	30.5%	24.4%	40.0%
3.	Chemistry.	37.1%	32.2%	42.0%	24.0%	34.2%
4.	Physics.	41.5%	18.9%	24.7%	27.3%	26.2%
5.	Geography.	27.1%	19.1%	20.3%	40.4%	29.9%
6.	Agric. Science.	30.6%	29.0%	31.8%	39.2%	41.6%
7.	H/Management.	88.%	81.6%	40.7%	48.2%	43.6%
8.	Foods and Nut.	79.%.	39.5%	44.5%	57.5%	86.5%

From the data it was revealed that some schools performed well and are still performing better than other schools. Most schools where the performances were below (30%) thirty percent in all the sessions and in all the subjects attribute such performance to non-concentration and lack of seriousness from the students. Hence, the students are eventually the causes of their failures. However, most of the students reacted to poor practical facilities and insufficient items for practical lessons/instruction.

Generally, table 7 shows the performances of students in, Mathematics were less than twenty percent (20%) throughout the period of the study. The reason for this has been attributed to the believe by students that it is not easily understood, and no enough teaching aid and time allocation.

Other subjects like Biology, Chemistry and Physics had high performances in the data analysed above from some schools. However, in the percentage passes

recorded for the sessions, the performance in these subjects were less than (50%) fifty percent, except in the 1996/97, session where Biology alone had a score of 46.35%. All these failures were recorded as a result of government's ill – preparedness for the examinations. This is due largely to lack of adequate and timely funding of practical examination, lack of enough practical materials for practice and examination, and schools inadequate preparation.

However, the vocational sciences aspects were more better in performances than the others, according to the teachers and students, it is due to the usual practical orientation and relating it to what they do in their homes. Consequently, practical materials are readily available and are purchased by the students for use.

HYPOTHESES TESTING.

HYPOTHESIS 1: There is no significant difference between the mean responses of the Students and teachers; in relation to whether the instructional processes of the teachers are effective to affect the performance of students in Mathematics and Science subjects ($P< 0.05$).

Table 8, shows t-test values of the Group Responses in relation to whether "the instructional processes of the teachers are effective, to affect the performance of the students in Mathematics and Science subjects".

TABLE 8: t -TEST ANALYSIS OF RESPONDENTS ON THE ADEQUACY OF INSTRUCTIONAL PROCESSES USED BY THE TEACHERS.

ITEM	*STATEMENTS*	X_1	X_2	SD_1	SD_2	t_1	*Remark*
1.	The teachers have adequate teaching skills	3.14	2.26	1.07	1.62	0.76	Accepted
2.	The teachers are trained teachers	2.10	2.93	1.18	1.31	- 7.54	Accepted
3.	The teachers can effectively use teaching aids	2.45	2.85	1.27	1.23	-3.33	Accepted
4.	The teacher is very good at his work.	2.31	3.04	1.19	0.88	- 9.13	Accepted
5.	The teacher knows how to handle students and their problems.	3.29	2.93	1.33	1.14	3.27	Accepted
6.	The teachers require improved instructional procedures.	3.04	3.93	1.33	0.45	-12.71	Accepted

$N_1 = 28$; $N_2 = 27$

Key: X_1 = Mean of students; X_2 = Mean of teachers

N_1 = Numbers of students; N_2 = Numbers of teachers;

SD_1 = Standard deviation of teachers;

SD_2 = Standard Deviations for Students;

t = t – test calculated.

HYPOTHESIS 2: There is no significant difference between the mean responses of students and teachers with regard to special instructional methods required by teachers to cause improved performance of the students.

Table 9: shows t - test values of the Group responses in relation to whether "the teachers of Mathematics and Science subjects required special instructional methods to cause the improved performance of the students".

TABLE 9: t - TEST ANALYSIS OF RESPONDENTS ON THE SPECIAL INSTRUCTIONAL METHODS REQUIRED BY TEACHERS TO CAUSE IMPROVED PERFORMANCE OF THE STUDENTS.

ITEMS	*STATEMENTS*	X_1	X_2	SD_1	SD_2	t_1	*Remark*
7.	Improved performance of the students in these subjects depends on the teachers	3.39	3.11	1.08	1.36	2.55	Accepted
8.	Teachers of these subjects require special instructional skills to teach.	3.32	3.67	1.17	0.79	1.04	Accepted
9.	Improved teacher education will ease teaching of Mathematics and modern Science.	3.39	3.74	0.99	0.69	- 7.00	Accepted
10.	These teachers make adequate use of time allocation.	2.41	2.54	1.29	1.13	- 1.18	Accepted
11.	The period of instruction for these subjects are adequate for both teachers and students.	2.45	2.22	1.72	1.44	1.28	Accepted

$N_1 = 28$; $N_2 = 27$

Key: X_1 = Mean of students; X_2 = Mean of teachers

N_1 = Numbers of students; N_2 = Numbers of teachers

SD_1 = Standard deviation of students; SD_2 = Standard deviation of teachers

t = t - test calculated.

HYPOTHESIS 3: There is no significant difference between the mean responses with regards to background knowledge of the teaching aids and the utilization of teaching aids in teaching abstract concept.

Table 10 shows t-test values analysis of the respondents on teachers background knowledge of teaching aid and utilization of teaching aids in teaching abstract concepts.

TABLE 10: t – TEST ANALYSIS OF THE RESPONDENTS ON TEACHERS BACKGROUND KNOWLEDGE OF TEACHING AIDS AND UTILIZATION OF TEACHING AIDS IN TEACHING ABSTRACT CONCEPTS

ITEMS	*STATEMENTS*	X_1	X_2	SD_1	SD_2	t_1	*Remark*
12.	The teachers have adequate background knowledge of the teaching aids.	3.11	3.04	1.240	1.200	0.64	Accepted
13.	The teachers make good use of teaching aids	2.28	2.52	1.264	1.365	- 1.85	Accepted
14.	Practical tools are effectively used to improve learning.	2.32	3.00	2.249	1.294	- 3.12	Accepted
15.	Students understand both practical and abstract instruction.	2.38	2.11	1.343	0.972	2.70	Accepted
16.	The teachers have good classroom management skills.	2.49	2.67	1.217	0.915	- 2.25	Accepted
17.	Schools should have modern Mathematics and Science subjects teaching tools and models.	3.64	3.82	1.019	0.812	3.00	Accepted

$N_1 = 28$; $N_2 = 27$

Key: X_1 = Mean of students, X_2 = Mean of teachers

N_1 = Numbers of students; N_2 = Numbers of teachers

SD_1 = Standard deviation of students; SD_2 = Standard deviation of teachers

t = t - test calculated.

SUMMARY OF HYPOTHESIS TESTED IN STUDY.

The summarized data relevant for answering the null hypothesis at 0.05 level of significance are tabulated in Table 11 with reference to tables 8, 9 and 10.

Table 11: Summarised t-test data for hypothesis 1,2 and 3

R.QS/No	X_1	X_2	SD_1	SD_2	t -Value	t - table	Remark
1	2.72	2.99	1.23	1.11	- 2.2	± 1.96	Accepted
2	2.99	3.06	1.25	1.08	- 0.7	± 1.96	Accepted
3	2.70	2.86	1.38	1.09	1.45	± 1.96	Accepted

Key: R.Q.S/No = Research question serial number

$\overline{x_1}$ and $\overline{x_2}$ in table 11are average of x_1 and x_2 in tables 8, 9 and 10 respectively. Likewise SD_1 and SD_2 were calculated using relevant formular (See Appendix III). The analysis revealed that there was no significant difference between students and teachers with regard to their perception on effectiveness of instructional processes used by the teachers, special instructional methods required by teachers to cause improved performance of the students and teachers background knowledge of subjects and utilization of teaching aids in teaching abstract concepts respectively. Consequently, null hypotheses 1, 2 and 3 were accepted at 0.05 level of confidence.

DISCUSSION OF FINDINGS

The analysis of the results revealed that the Mathematics and Science subject teachers are not trained enough to teach. That they are seriously lacking in those teaching techniques required for imparting knowledge to the students/learners in these subjects, which already are regarded as too difficult to understand. It has been disagreed that the teachers can effectively use teaching aids and that the teachers are very good at their work.

Consequently, it was agreed that the teachers require improved instructional procedures to enhance their competence. According to Houston (1987), the type of "teacher education' should be called Competency Based Teachers Education (C.B.T.E.); where the teacher is trained to get from his/her students/trainees those actions of observable verbs, such as Use, Organize, Sequence Learning, etc, while avoiding non – observable verbs such as UNDERSTAND and PERCEIVE etc.

It was also observed that the teachers have adequate teaching skills. This is undeniable, these are acquired by the teachers due to long teaching experiences. In this regard Landshere (1987), observed that the need for in- service Teacher Education for improving the education of the teachers during teacher's entire career can not be overlooked. He also pointed out that for teachers who have enjoyed an education – based training of good quality, further education can only be limited to a situation where the previous training has practically no application to the changes in the teacher's teaching subject. But have been deemed important for their job; for example, a situation may exist where a Mathematics teacher is confronted with a new Mathematics curriculum which has some topics that the teacher has not studied himself/herself.

The need to also train the teachers in the use of teaching aids are of great concern, so as to be better at work and to be able to handle the students and their

problems better. Improved instructional procedures are required for the teachers to affect the students' performance in Mathematics and Science subjects.

Mathematics and Science subjects require enough time allocation and period of learning on the school time – table. Unfortunately, the time allocated for them are insufficient. The teachers and students too, contribute greatly to inadequacy of the time allocation. The study revealed that these time allocation and teacher's use of time and period were inadequate.

Consequently, it was also observed that the students improved performances depend on the teachers this is because ineffective teacher – education will not lead to this success. The curriculum content for teacher education need to be re – addressed to include special instructional skills in Mathematics and Science Education as advocated by the respondents that this will ease the teaching of Mathematics and modern Science.

The respondents to research question on teachers background knowledge agreed that the teachers have adequate background knowledge of their teaching subjects, they also have good classroom management skills and that schools should have modern Mathematics and Science subjects teaching tools and models. But very disappointingly are that the teachers are not good enough in the use of teaching aids, their manipulations, and application of practical tools are not adequately put in place. Hence these have affected students' understanding of both practical and abstract concepts. In the light of the above, there are some trained teachers though, they don't posses the teaching qualities required to deliver the expected instruction, hence the untrained teachers too have similar problems and even worst. The need for urgent recognition of teachers based on job competencies is very crucial to forestall the depreciation in learning arising from teacher – education fall – out, which is as a result of its inadequacies. However, if the teachers teach effectively in relation to the curriculum content, subject goals and objective as advocated by respondents in

research question four, then, the problem must be the issues of inadequacy of the teachers – education.

In research question five however, it is gathered that adequate teaching materials are not provided, libraries for continuous learning and instructional research are not or are poorly equipped, and that teachers are not adequately remunerated. All of the above are serious hindrances to learning and teaching processes. Where the teachers are not remunerated as developers of today for better tomorrow, the future will be oblique. Consequently, the supervisor's activities has no impact on teaching and learning processes. One unfortunate trend is where teachers are sponsored to go to school to improve on their educational background and some, end up leaving the teaching job in the secondary schools to tertiary/research institutions or private organizations. All in search of better salaries, living condition, job security and a lot of others.

On the whole, it has been agreed upon that government has been responsible for both the teachers teaching problems and social problems, so as to cause a desired change which will in turn be expected to improve learning as a result of improved teaching.

Tables 8, 9, and 10 showed the t – test values of the Group Responses to hypothesis 1, 2 and 3 respectively. The summarised data for hypothesis tested, (table 11) shows that there was no significant difference between the respondents with regard to their perception on effectiveness of instructional processes used by the teachers, special instructional methods required by teachers to cause improved performance of students and teachers background knowledge of subjects and utilization of teaching aids in teaching abstract concepts respectively. Consequently null hypothesis 1, 2 and 3 tested, using a two - tail test were accepted at 0.05 level of confidence.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.

SUMMARY

This research was carried out solely for the purpose of seeing to the effectiveness of teachers of Mathematics and Science subjects. Selected Secondary Schools were chosen for the population area so that when the results are collated, analysed and interpreted, it could be generalised for the reasons which it was designed for.

The questionnaire was made of five (5) questions, and overall of 29 questionnaire statements. A Likert-like four points analyses scoring process was used to score all the statements in the questionnaire concerning the effectiveness of teachers on performance of students in Mathematics and Science subjects. A total of 75 respondents were selected randomly from six Secondary Schools, made up of five (5) students and teachers each from these schools teaching Mathematics and Science subjects. There were also five (5) officials each from Ministry of Education, Niger State Secondary Education Board and Niger State Science and Technical Schools Board. From these schools, students overall WAEC performances for some selected subjects were requested for further analysis and inferencing. The results were compared between Students (x_1), Mathematics and Science subject teachers (x_2) and Education Monitoring officers (x_3).

From each question in the questionnaire, comparative means were calculated using appropriate formulae (See Appendix 3) for the three groups of respondence which were used to draw conclusions after all study. In research question one, there was an overall grand mean of $x = 2.75$, which mean that the teachers have no effective instructional process that would affect the positive performance of the student in Mathematics and Science subject. Here, there were also differences between x_1, x_2

and x_3, where x_1 and x_3 were agreeing and x_2 was disagreeing. While research question two was about teachers of Mathematics and science subjects requiring special instructional methods to improve performance of students, all agreed at a grand mean of $x = 2.94$, indicating that such was necessary. The third research question was also agreed on a grand mean of $x = 2.73$ that teachers have good background knowledge of the subject, and make good use of teaching aids during abstract teaching. Research question four asked the question: How effective do the teachers teach in relation to the curriculum contents, subject goals and objectives? To answer this question, a grand mean of $x = 2.90$ was reached and agreed, that the teachers teach in the orders listed. However, in research question five, it was disagreed completely on grand mean of $x = 2.43$ that government responds to both the teachers problems, the teaching problems and other social problems to cause a change in the attitudes for students to improve, government action on teachers' education is inadequate.

In appendix II, results were collected from schools where questionnaires were served, in 1996/97, WAEC results in Biology, Foods and Nutrition and Home Management were the subjects that had above 45% overall pass at credit level. Mathematics, Chemistry, Physics, Geography and Agric Science were failed. In 1997/98 WAEC, Home Management recorded only 81.6%. Indeed, serious failures were and are recorded in the four science subjects e.g. Mathematics, Biology, Chemistry, Physics, Geography and Agric Science.

On the whole, three hypothesis questions were taken, analysed, calculated and examined at a null of $p < 0.05$ confidence level between students and teachers. All were accepted and the t – value and t – table marks are given at accepted.

Consequently, this research project was designed to be used to address these problems underlined.

CONCLUSION

The rate or degree of failure by students in Mathematics and Science subjects is seen to be a very serious problem not only, to the parents, students and teachers, but also to government too. In general, from the foregoing discussion, factors responsible for students' failure in Mathematics and Science subjects will be well addressed if the teacher's – education is given premium, based on the fact that teaching profession requires able hands and persons to accomplish them.

In the cause of this study therefore, it revealed that the issue of teachers – effectiveness in Nigeria or any part of the world will have a great hindrance to the ability of the students to pursue further programmes in higher institutions in Engineering, Technology and Science. As in Nigeria, any student that scores less than 40% is regarded as having failed, while 40% and above are regarded as passed.

RECOMMENDATIONS

After a careful study of the problems associated with effectiveness of Mathematics and Science teachers on students performance in some selected Secondary schools in Minna, and in order to address the identified causes and cases, below are some recommendations expected to cause a change.

1. Teachers should be allowed to update their knowledge since education is not static and particularly in Mathematics and Science subjects teaching using modern methods of instruction.
2. More qualified teachers with the appropriate teaching skills and effective and adequate knowledge in Mathematics and Science subjects should be employed to teach these subjects.
3. The teaching and learning infrastructures in schools should be properly maintained and effectively utilized and protected against damaging.

4. Government should fund public schools adequately by making available practical instructional materials/aids, and equipping the libraries with up – to – date textbook and subject syllabuses.
5. The directorate/inspectorate divisions of Ministry of Education, Niger State Secondary Education Board (N.S.S.E.B.) and Niger State Science and Technical Schools Board (N.S.S.T.S.B.) should be adequately funded. This will encourage them to pay very regular visit to schools for effective implementation of curriculum. While parent should be encouraged during Parents – Teacher Association meetings to pay regular visits to the schools of their children/wards to see for themselves their educational progress.
6. Schools should use the guidance and counselling departments/units to dis - abuse the minds of the students about the difficulties of Mathematics and Science subjects.
7. Double periods (of 90 minutes) should be made compulsory for the teaching of Mathematics and Science subject.
8. Teacher - education programmes in our colleges of education and universities should be Competency – Based, where teaching practice should be given adequate priority.

SUGGESTION FOR FURTHER STUDIES

This study examined the problems of effectiveness of Mathematics and Science teachers on students performance in some selected Secondary Schools in Minna. In the light of the above therefore, the researcher hereby suggests that further studies could be carried out in other zones of the State, as well as other States in the Federation, so as to identify other ways of addressing the issue of the effectiveness

of teacher education for improved performance of students in Mathematics and Science subjects

The suggested topics for further studies are as follows:

1. Strategies for improving teachers – education curriculum in tertiary institutions for improved students performance in Mathematics and Science subjects.
2. The need for Government to incorporate both co-operative involvement of voluntary organizations and Government in funding competitions and learning of Mathematics and Science subjects in Nigeria.

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APPENDIX I

DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGER STATE.

QUESTIONNAIRE FOR STUDENTS, TEACHERS AND EDUCATIONAL OFFICIALS ON THE ISSUES OF

THE EFFECTIVENESS OF MATHEMATICS AND SCIENCE TEACHERS ON STUDENTS' PERFORMANCE IN SOME SELECTED SECONDARY SCHOOLS IN MINNA, NIGER STATE

INTRODUCTION AND REQUEST

Presented before you is a research questionnaire, you are please requested to read it carefully and act appropriately. The questionnaire composed of parts A and B. You are required to fill the part A accordingly, and respond to questions and items raised in part B, appropriately.

PART A

Personal Data:

Name of school/Ministry/Parastatal:_____

Status [tick (√) the appropriate one]

(i) Educational official [ ]

(ii) Mathematics/Science teacher [ ]

(iii) Student [ ]

(iv) Sex: Male [] Female [ ]

QUALIFICATION: _____

YEARS OF TEACHING EXPERIENCE (STAFF): _____

YEARS OF LEARNING EXPERIENCE (STUDENTS):_____

PART B.

INSTRUCTIONS:

Please, it is very important to note that your objective responses to these items in the instructions will enable the researcher to arrive at a rational conclusion. Kindly tick (√) below the response categories you think is most appropriate for each item below.

Thanks

UMARU USMAN

Response categories are:

S.A = Strongly Agreed,

A. = Agreed,

D. = Disagreed,

S.D. = Strongly Disagreed.

ITEMS	*STATEMENTS*	***RESPONSES***			
	RESEARCH QUESTION 1.	***S.A***	***A***	***D***	***S.D***
	How effective are the instructional processes of the teachers to affect the performance of the students in Mathematics and Science subjects?				
1	The teachers have adequate teaching skills.				
2	The teachers are trained teachers.				
3	The teacher can effectively use teaching aids.				
4	The teacher is very good at his work.				
5	The teacher knows how to handle students and their problems				
6	The teachers require improved instructional procedures.				

ITEMS	*STATEMENTS*	*RESPONSES*			
	RESEARCH QUESTION 2.	*S.A*	*A*	*D*	*S.D*
	Do teachers of Mathematics and Science subjects require special instructional methods to cause the improved performance of the students?				
7	Improved performance of the students in these subjects depend on the teachers.				
8	Teachers of Mathematics and Science require special instructional skills to teach.				
9	Improved teacher education will ease teaching of Mathematics and modern Science.				
10	These teachers make adequate use of time allocation.				
11	The period of instruction for these subjects are adequate for both teachers and students.				

ITEMS	*STATEMENTS*	***RESPONSES***			
	RESEARCH QUESTION 3	***S.A***	***A***	***D***	***S.D***
	Are the teachers having good background knowledge of the teaching aids, and how good enough are teaching aids utilized with the abstract teaching?				
12	The teachers have adequate background knowledge of the teaching aid.				
13	The teachers make good use of the teaching aids				
14	Practical tools are effectively used to improve learning.				
15	Students understand both practical and abstract instruction				
16	The teachers have good classroom management skills.				
17	Schools should have modern Mathematics and Science teaching tools and models.				

ITEMS	*STATEMENTS*	*RESPONSES*			
	RESEARCH QUESTION 4	***S.A***	***A***	***D***	***S.D***
	How effective do the teachers teach in relation to the curriculum content, subject goals and objectives?				
18	The teachers have good knowledge of the syllabus requirement and teach accordingly.				
19	The curriculum content of Mathematics and Science syllabus are strictly followed.				
20	The teachers take time to split topics into units for ease of instruction.				
21	The subject goals are critically taken up as a teaching challenge.				
22	The unit goals of the topics and sub-topics are objectively achieved.				
23	Mathematics and Science subjects' curriculum should enter woven to ease learning and instruction.				

ITEMS	*STATEMENTS*	*RESPONSES*			
	RESEARCH QUESTION 5	***S.A***	***A***	***D***	***S.D***
	How have the government responded to the teachers teaching problems to cause a change in their attitudes for students to improve, and government's funding of teachers education with respect to desirable outcomes?				
24	Adequate teaching material and aids are provided to improve learning.				
25	Regular government supervision of schools to regulate modes of teaching are done.				
26	Libraries are equipped with standard books for both students and teachers to use.				
27	Teachers are allowed and sponsored to school to improved their knowledge and skills.				
28	Teachers are adequately remunerated and rewarded where necessary.				
29	Government should encourage professionalism and pay teachers based on professional acquisition.				

APPENDIX II

DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION,
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA NIGER STATE.

THE EXAMS OFFICER,

_____(Write Name of School).

Please, kindly fill-in the overall students performance of your school for these subjects, according to the years indicated, and in percentage overall score per subject in credits in WAEC examinations.

You are assured of total secrecy of this information/data supplied, which is for the purpose of academic research only.

Thanks.

YEARS (SESSIONS)					
SUBJECTS	***1996/97***	***1997/98***	***1998/99***	***1999/00***	***2000/01***
1. Mathematics 2. Biology 3. Chemistry 4. Physics 5. Geography 6. Agric. Science 7. H/Management 8. Foods and Nut.					

UMARU USMAN
RESEARCH STUDENT

APPENDIX III

FORMULAE USED IN THE RESEARCH.

1. MEAN (X)

$$X = \frac{\Sigma (X)}{n}$$

Where: F = Frequency of respondents

X = Value of 4 – points Likert option.

n = Total Number of respondents

2. STANDARD DEVIATION

$$SD = \frac{\sqrt{\Sigma F (X-X)^2}}{n}$$

Where = all parameters are same as in 1

3. t- test FORMULA USED FOR TESTING THE HYPOTHESES

$$t = \frac{X_i - Xii}{\sqrt{\frac{N_i S_i^2 + N_{ii} S_{ii}^2}{N_i + N_{ii} - 2} \left\{ \frac{(Ni + Nii)}{N_i N_{ii}} \right\}}}$$

Where X_i = Mean score of 1st group of samples

X_{ii} = Mean score of 2nd group of samples

S_i = Standard Deviation of 1st group of samples

S_{ii} = Standard Deviation of 2nd group of samples

N_i = Total population of 1st group of samples

N_{ii} = Total population of 2nd group of samples

$N_i + N_{ii} - 2$ = Degree of freedom (df)