ASSESSMENT OF THE IMPLEMENTATION OF MATHEMATICS CURRICULUM IN SENIOR SECONDARY SCHOOLS IN KANO STATE

BY

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A THESIS SUBMITTED TO THE DEPARTMENT OF EDUCATIONAL FOUNDATIONS AND CURRICULUM, AHMADU BELLO UNIVERSITY ZARIA, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE MASTERS DEGREE IN EDUCATION (CURRICULUM AND INSTRUCTION)

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DECLARATION

I hereby declare that the work in this thesis entitled Assessment of the Implementation of Mathematics Curriculum in Senior Secondary Schools in Kano State has been carried out by me in the Department of Educational Foundations and Curriculum under the supervision of Dr (Mrs.) H.O. Yusuf and Dr. A.F. Mohammmed. The information derived from the literature has been duly acknowledged in the text and the list of references provided. No part of this thesis was previously presented for another Degree or Diploma at this or any other University.

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Name	Signature	Date

CERTIFICATION

This thesis entitled ASSESSMENT OF THE IMPLEMENTATION OF MATHEMATICS CURRICULUM IN SENIOR SECONDARY SCHOOLS IN KANO STATE by Abdu, Bello Magaji meets the regulations governing the award of the Degree of Masters in curriculum and instruction of the Ahmadu Bello University and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

I dedicate this research work to loving caring of my mother (Hajiya Hajara Abdulsalam), my late father, Alhaji Abdussalam Magaji and late Prof. M.B. Yunusa (May their souls rest in perfect peace), Ameen.

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Praise and infinite thanks be to Allah, the Almighty. May His peace and blessing be upon his most beloved servant. My thanks and praise is entirely due to the Almighty Allah (S.W.) who accorded me the opportunity to complete this work and accomplish my academic pursuit successfully**.**

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ABSTRACT

This study was set to primarily investigate the issue of the implementation of Mathematics curriculum in Senior Secondary Schools in Kano State. In other words, the study was an attempt to study the level of curriculum content implementation. Research objectives, Questions and hypothesis were made to guide the study. Relevant research findings, studies and scholastic analysis related to this study were sought. The research design of the study was non-experimental or Qualitative Descriptive Design. The instrument used for the collection of data from the randomly selected sample of 624 out of the population of 3,679, was questionnaire. Two types of questionnaires were used in the study; one Questionnaire for Teachers and the other for Supervisors. Teacher's Questionnaire was made up of thirty items that were adopted from Mehmet (2005) and Ismet (2005) while supervisor's questionnaire was made up of twenty items. The response pattern or format of the questionnaire is open ended .On the-spot collection technique (Mkpa, 1998) was employed in the collection of the questionnaire distributed to subjects. Descriptive and Inferential Methods of Data Analysis were both employed in the analysis of the collected data. The Descriptive method of Simple Percentage was employed to test the research questions of the study, while the inferential analysis of Chi-square was used to test the stated research hypothesis of the study. Findings of study revealed that Mathematics curriculum contents in Senior Secondary Schools in Kano State were not fully implemented. In addition, it was discovered that some internal factors i.e. those inclusive aspects within the curriculum, and other external factors such as provision of teaching and learning facilities, Qualified Teachers were influential to effective implementation of Mathematics curriculum. Based on the findings of the study, recommendations were provided at the concluding part. Part of the recommendations emphasized on the need for review of the entire curriculum contents in order to make it relevant to the needs and demand of this modern era.

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LIST OF ABBREVIATIONS

MAN	-	Mathematical Association of Nigeria
AMAS	-	Approved Minimum Academic Standard
FAN	-	Federal Republic of Nigeria
STAN	-	Science Teachers Association of Nigeria
ETF	-	Education Tax Funds
NECO	-	National Examination Council
WAEC	-	West African Examination Council
NCMT	-	National Council of Mathematics Teachers
USA	-	United States of America
NTI	-	National Teachers Institute
NERDC	-	Nigeria Educational Research Development Council
NUC	-`	National Universities Commission
NCCE	-	National Commission for Colleges of Education
JAMB	-	Joint Admission and Matriculations Board
K.S.S.S.S.M.B	-	Kano State Senior Secondary Schools Management Board
S.S.C.E.	-	Senior Secondary Certificate of Education

OPERATIONAL DEFINITION OF TERMS

Assessment: This refers to activities which involve making relevant comments or giving useful information on the worth of learning programme. Assessment is to investigate the effectiveness

Content: It refers to the different sections that are contained in curriculum or the subject matter of a curriculum.

Curriculum Implementation: Curriculum is the way content is designed and delivered. It includes the structure, organization, balance, and presentation of the content in the classroom.

Experienced Mathematics Teachers: Teachers with five years and above teaching experience at senior secondary level are regarded as experienced Mathematics teachers Less experienced Mathematics teachers are those with below five years' teaching experience at senior school level.

Objective: This refers to the main purpose of Mathematics curriculum that is aimed at achieving.

Structure: It refers to the arrangement or organization of Mathematics curriculum in a system of pattern.

Suggested methodologies:

Teacher' Qualification;

a. Professional qualifications such as B.Ed (Mathematics Education), B.Sc. (Mathematics) plus P.G.D.E, or N.C.E.

b. Teachers with any of the specified professional qualifications are regarded as qualified teachers.

c. Teachers who do not possess any one of the specified qualifications are regarded as unqualified teachers.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The selection of Mathematics as one of the core subjects offered in primary and post primary institutions in Nigeria, as well as its status as part of mandatory requirement for admission into Post-Secondary Institutions in the country (i.e. attainment of pass at credit level) are clear indications of the relevance of the subject in Nigeria education. In addition, job opportunities and recruitment exercises into security agencies are accessible with good performance or success in Mathematics. Aptitude tests for employment, promotion and placement are made up of questions that are based on Mathematics. These are significant justification of the relevance of Mathematics for individual personal development and success. At national and global levels, there is a general consensus that economic development, viability and stability are solely, in the 21st century, scientific and technologically based. This means that, economic prosperity of a nation depends largely on the scientific and technological development, which cannot be possibly attained without sound, effective and strong Mathematics education (Fajemidagba, 1986; Sule, 1990 and Collins, 2000 as cited in Aminu, 2005). The relevance of Mathematics is therefore multi-dimensional, global and undisputable.

Scholars (Fajemidagba, 1986; Sule, 1990; Aminu, 2005), stakeholders in education and relevant established examination bodies (WAEC, NECO, NABTEB, NTIC) have been showing great concern over the poor performance of students in Mathematics. Similarly, students' negative attitude towards the subject coupled with their poor academic achievement in the subject have also warranted discussion among scholars especially on possible precipitating factors (Aminu, 2005).Evidences that are obviously abound in the existing literature are the traditionally aged-long

factors like, unqualified teaching staff, lack of teaching and learning facilities, classroom congestion, as well as, teachers and students attitude as the much quoted reasons. But as life and society are dynamic, other precipitating factors can be highly influential in affecting Mathematics teaching and learning processes in schools, especially factors that relate to curriculum content completion.

Evidence abounds to justify that many students or candidates (during standardize examination) could not answer half of the questions, not because of time factors, but inability to confidently and independently attempt the questions (Aminu, 2005). Many students therefore resort to examination malpractice. Based on these seeming problems, one begins to ask, "Did teachers really teach their students all the courses or topics provided in the Mathematics curriculum?" This question is fundamentally the basic background to this study. The study is therefore an attempt to find out the level of Mathematics curriculum implementation in classes in Senior Secondary Schools.

Factors related to curriculum contents, activities and successful completion of all the topics that are expected to be taught to students at different levels of education, within a stipulated period of time are found to be very effective in students' academic performance, attitude to learning and achievements (Roser, 2000; Radford,1998; and Hamisu, 2008). Consequently, students' poor academic performance, attitude to learning and achievements are influenced by factors related to curriculum contents and the level of curriculum implementation. Roser (2000) is of the view that curriculum contents that are heavily characterized by factors of traditional approaches are detrimental to teaching process as according to him, such curriculum limits learners' active participation in learning and equally makes teaching and learning flower. In the same vein, Radford (1998) opines that, poor implementation of curriculum contents results in learners' poor academic performance in examination as well as formation of negative attitude to

learning. In view of the scholars assessment and prevalent social realities relating to learners academic incompetence in Mathematics, poor attitude to learning and massive students failure are also imparts to the study of this nature. The study is therefore an attempt to investigate the level of implementation of Mathematics curriculum and its relation to various factors considered viable to learners performance, interest, attitude and motivation.

1.2 Statement of the Problem

The main problem of this study is to primarily study the level of Mathematics curriculum implementation in Senior Secondary Schools in Kano State. The main focus or problem of the study is essentially to determine the level of Mathematics curriculum coverage or implementation in Senior Secondary Schools.

Poor implementation of curriculum contents can result in multiple problems. One of the problems is students' poor performance in examinations, especially standardized one. This is because all the questions set are based on the syllabus or curriculum contents. But in a situation where students are not adequately taught and prepared, they will find it difficult, if not impossible to answer questions, as such failure is unavoidable. Another seeming problem is that which involves students' future performance or learning in tertiary institutions. Courses and topics at that level are continuation of what students learnt at the Senior Secondary School level, as such poor implementation of curriculum content makes students incapable to cope appropriately with the academic challenges at the post Senior Secondary Schools level (Aminu, 2005).

Problems associated with curriculum contents and designs are also part of the identified factors that negatively affect full implementation of curriculum in schools (Aminu, 2005); Radford, 1998 and Roser, 2000). This issue is also part of the problems being investigated in the study. Curriculum contents and activities that are based on traditional approach are considered by constructivists as teacher-dominated, less appealing, with little or no provision of learners' active

participation, these factors are according to constructivists, problem that negate full implementation of curriculum contents in schools(Berry,2005; MacDonold,2000; Perguson,2000; Smith,1980 as reported in Mehmet,2005).

1.3 Objectives of the Study

The following objectives were made to guide this study:

1. To determine the relevance of the methodology suggested in the Mathematics curriculum for effective implementation of curriculum contents in Kano State.
2. To identify the appropriateness of instructional materials in the effective implementation of Mathematics curriculum contents in Senior Secondary Schools in Kano State.
3. To examine the roles of Teacher's qualification and competency in the effective implementation of Mathematics curriculum contents in Senior Secondary Schools in Kano State.
4. To ascertain the influence of students population (class size) in the implementation of Mathematics curriculum contents in Senior Secondary Schools in Kano State.

1.4 Research Questions

1. What is the relevance of suggested methodology to content in the effective implementation of mathematics curriculum in Senior Secondary Schools in Kano State?
2. What is the appropriateness of instructional materials in the effective implementation of curriculum contents?
3. What is the relevance of teacher's qualification/competence in the effective implementation of curriculum content in Senior Secondary Schools in Kano State?
4. What is the role of student's population in the implementation of Senior Secondary Schools mathematics curriculum contents in Kano State?

1.5 Research Hypotheses

The following null hypotheses were made for this study:

HO1: There is no significant difference between suggested methodology and content in Senior Secondary School Mathematics Curriculum and effective implementation of Mathematics Curriculum in Senior Secondary Schools in Kano

HO2: There is no significant difference between instructional materials and effective implementation of curriculum content in Senior Secondary Schools in Kano State.

HO3: There is significant difference between Teachers qualification and mathematics curriculum implementation in Senior Secondary School in Kano State.

HO4: There is no significant difference between student's population (class size) and effective implementation of mathematics curriculum content in Senior Secondary School in Kano State.

1.6 Basic Assumptions

The basic assumptions of this study are:

1. That Mathematics curriculum contents in Senior Secondary Schools are not fully and adequately implemented.
2. That some internal factors (curriculum contents) that characterized the curriculum contents are not in conformity with the dynamic and contemporary demand of our century (21^{st}). Contents were non-pragmatic, but traditionally – based relegating learners as passive.

1.7 Significance of the Study

The findings of the study will be beneficial to relevant stakeholders in education, such relevant bodies are Nigerian Educational Research and Development Council (NERDC), Ministries of Education (Federal and States), Mathematics Association of Nigerian (MAN), Examination Bodies (WAEC, NECO), as well as curriculum planners responsible for curriculum development. The research will be beneficial by explicitly exposing the level or extent by which Mathematics curriculum contents are covered by teachers. This will enable the major stakeholders in taking appropriate measures with regard to the level of implementation. In addition, findings will also enable the stakeholders determine topics to be selected in relation to time allotted for in-depth coverage of the selected topics. Moreover, factors responsible for poor implementation will be exposed, as such; corrective measures can be taken by the relevant bodies or stakeholders in tackling the problems. Specifically, the stakeholders will find the following as part of significant contribution of the study:

The findings of this research will be of significant importance to supervisors in clarifying those topics or areas of Mathematics curriculum that are fully implemented by the teachers or otherwise. This will go a long way in facilitating creativity and identification of effective strategies, as well as, apt application of relevant pedagogical procedures and instructional materials needed in solving any identified obstacles (if any) in the implementation of the Mathematics curriculum.

Examination bodies set examination questions (standardized Test) based on the curriculum contents and the questions are set to cover on all selected topics. This is done to ensure content validity. Therefore, findings of this study will provide clear insight to those bodies on the extent of coverage, so that questions can be set on those areas covered by teachers. Alabi, (2000) identified non-coverage of Mathematics curriculum content as one of major problem responsible for student

massive failure and poor performance in Mathematics examinations (WAEC, NECO). It will also be useful to examination bodies in tackling problems of massive failure and poor performance in SSCE examinations.

The findings of this research is expected to be of significant importance to both teachers and educational administrators alike by means of intimating and expanding their awareness on those areas in Mathematics curriculum that are not fully implemented(if any) as well as the possible negative repercussion on poor implementation on both students and teaching-learning processes. This will serve as a viable major yardstick in solving problems precipitated by poor implementation of Mathematics curriculum in Senior Secondary Schools.

The findings of this research will help to facilitate research interest in areas related to curriculum content implementation, as well as evaluation or innovation. In the same vein, the research will motivate the emergence of other empirical studies need to be conducted especially on the relative influence of implementation of Mathematics curriculum on students' performance in Senior Secondary School Examination.

1.8 Scope of the Study

This study investigated specifically implementation of Mathematics curriculum in selected Senior Secondary School in Kano. The study was therefore focused on basic issues relating to processes of implementation of Mathematics curriculum in Senior Secondary Schools. The primary scope of the study was limited to implementation and Mathematics curriculum contents. The study was also limited to Senior Secondary Schools in Kano state. Schools and subjects selected for the study were all selected from the limited area covered by the study.

CHAPTER TWO

Review of Related Literature

2.0 Introduction

This chapter presents related work and the Theoretical Framework of the study. It also examines critically the constructivists approach to curriculum implementation and their theoretical principles regarding curriculum contents, activities, methodology, teaching- learning processes, as well as both teachers and learners role in teaching- learning situation. These factors were extensively examined and concisely presented because of their relevance in the effective implementation of curriculum contents. In addition, the chapter has extensively highlighted related studies and scholarly works.

2.1 Theoretical Framework

The theoretical framework of constructivism is chosen for this study because of its worldwide acceptability and most importantly, its relevance to this contemporary age or century. There has been a growing consensus the world over on the need to encourage learning by doing, learners' active participation in learning and motivating learners to discover things by themselves, while teachers' role is to facilitate learning by guiding them to discover things. These new approaches to teaching learning processes were tested and proven to be the best (Obinna, 2007). The advantages associated with the new approaches is that learners are motivated, learning becomes real, retention effective and achievements higher. The principles of the new approaches are radical departure from the traditional approaches where learners are regarded as passive and teachers' dominance in class is powerful. The newly introduced approaches or principles are parts of the contribution made by constructivists in teaching and learning. In view of this, the constructivist approach to curriculum implementation is chosen, in orders to ascertain how its

application can effectively foster full implementation of curriculum contents in Senior Secondary Schools. In addition, the theoretical framework chosen would assess the weaknesses or otherwise of the traditional approach or other approaches adopted in developing our curriculum contents. The constructivist theory, on the other hand can be objectively evaluated in the study as an objective means of validating the major tenets of the theory in curriculum implementations, content and selected activities for learners and teachers.

Apart from its relevance to contemporary situation, and its global acceptance and recognition constructivist theoretical approach is also adopted due to its multi-dimensional approach to curriculum. It assesses both the content on one side and also the extent by which learners can genuinely demonstrate the content taught. In the aspect of curriculum implementation, the theory is both pragmatic and functional. The level of implementation is assessed by using both internal and external factors. The internal factors are those aspects of the curriculum, such as; its contents, suggested activities, methodology and stated objectives. On the other hand, the external factors relate to those provided aspect or factors that are essentially needed for the implementation to be possible. These include; provision of qualified competent teachers, teaching and learning facilities, regular supervision, keeping of up-to-date records, as well as learners role in the overall teaching and learning processes (Tezci and Gurol, 2003; Evers, 2006 and Spinner and Fraser, 2002 as reported in Mehmet,2005).

Another justification for the selection of constructivist theoretical framework for this study is due to its relevance to the objectives of this study. By their nature, the objectives are made to ascertain the role of those internal and external factors that are influential in the implementation of curriculum.

2.2 Constructivism (Theoretical Approach)

Although constructivism has many definitions and variations, according to Lamii (1985), it is, "the theory according to which each child develops his own knowledge from the inside, through his own mental activity, in interaction with the environment "In addition, Gloserfeld (1990) argues that constructivism means," Knowledge is not passively received, knowledge is actively built up by the subject." Constructivism is described as a theory that deals with the way people create meaning of the world through a series of individual constructs. Constructs are the different types of filters we choose to place over our realities to change our reality from chaos to order (Wood, 1998). It is also seen as a learning process which allows learners to experience or become conscious of the environment, thereby, giving the learners reliable knowledge. Learners are required to act upon the environment to acquire and test new knowledge. According to Wood (1998) constructivism is an educational philosophy which holds that learners ultimately construct their own knowledge that resides within them, so that each person's knowledge is as unique as they are. The Key precepts or tenets of the theory are:

a. Situated or anchored learning

It presumes that most learning is context-dependent; as such cognitive experiences situated in authentic activities such as project-based learning are effective and easy to recall.

b. Case-based learning environments.

Based on the principles of the theory, it is believed that case-based learning resulted in richer and more meaningful learning experiences.

a. Social negotiation of knowledge.

This is a process by which learners form and test their constructs in a dialogue with other individuals and the larger society.

It is plainly clear that, constructivism learning is solely based on learners' active participation in problem solving and critical thinking learners are allowed to construct their own knowledge by testing ideas and approaches based on their prior knowledge and experience, applying these to a new situation, and integrating the new knowledge gained with pre-existing intellectual constructs (Wood, 1998; Evers, 2006 and Roser 2000).

2.2.1 The Principles of Constructivism

The principles of constructivism in learning and curriculum development are:

1. Create real- world or environment that employs the context in which learning is relevant;
2. Focus on realistic approaches to solving real world problems;
3. The instructor is a guide or facilitator of the strategies used to solve problems;
4. Conceptual inter-relatedness and provision of multiple representations or perspectives on the content;
5. Instructional goals and objectives should be negotiated and not imposed;
6. Evaluation of tools and environments that help learners interpret the multiple perspectives of the worlds;
7. Provision of tools and environment that help learners interprets the multiple perspectives of the worlds;
8. Learning should be internally controlled and mediated by learners.

Constructivist curriculum framework and learning theories are based on the afore-listed principles. As plainly indicated by the principles; teachers role in the classroom and during teaching – learning processes is that of a facilitator i.e. a guide. The learners on the other hand,

become the active makers. Learning activities are designed to encourage learning by doing through problem solving, research and analysis (Radford, 1998).

2.3 Constructivist Curriculum and Implementation Analysis

The constructivist curriculum structure and its method of accessing level of implementation is made of the following parts:

- Objectives
- Contents
- Activities (teaching-learning)
- Learner
- Teacher
- Evaluation
- Teaching and learning
- Instructional materials

2.3.1 Constructivist Curriculum Objectives

According to Mehmet (2005) and Wilson (1996) the main objective people of constructivists curriculum is to educate people who know how to find and use knowledge, who know the method and means by which they can learn better and make use of their knowledge and facilitate new learning, using prior experiences. In addition, expected behavioral outcomes are expressed in a general manner, not strictly specific. This is based on the constructivists belief that each individual perceives the world differently and possessed different experiences, as such there is no single truth for all in constructions. Each individual may therefore construct a variety of ideas about a single phenomenon. So objectives, in constructivism cannot be set strictly for all, but general objectives expected from/for students may be defined. (Wilson, 1996).Specifically, the

Mathematics curriculum objectives according to constructivist approach are not deviation from the general principles and objectives. The California Department of Education (CDE, 1992) which based the curriculum entirely on constructivists' theoretical framework described the objectives of Mathematics curriculum on constructivist approach as the provision of students who can think and communicate independently. Wilson (1996) summaries Mathematics curriculum objectives as:

- Foster students problem –solving skills independently;
- Motivate learner, ability to use previous experience in solving new problems;
- Encouraging learners' active participation in learning.

2.3.2 Constructivist Curriculum Content

According to Tezc and Gurol (2003) constructivist Curriculum contents lead to interdisciplinary studies, while learners are made to focus on a problem. Contents are not specifically designed but general, thus limits are not set. Contents are derived from the common interest of learners as well as their psychological needs. In addition, selected topics are created to serve as instructional units. All activities are related to primary goal and developed in an engaging meaningful context. As for Mathematics curriculum, contents are designed in such a way that learners are encouraged to investigate rich and complex problems situation, conjecture, explore ideas, make connections between Mathematicsal ideas and generalized their findings. Furthermore, curriculum units are recommended to focus on large assignments, open ended problems and exercises which lead to the development of main idea in the unit (Gurol in Mehmet, 2005). Constructivist curriculum contents are also designed from simple to complex, from known to unknown and are based on learners' experience.

2.3.3 Teachers Roles in Constructivist Curriculum

Mehmet (2005) indicates that constructivist curriculum defines Mathematics teachers' responsibilities in four key areas: selecting or creating Mathematicsal tasks, stimulating and managing classroom discourse, creating a classroom environment and finally analyzing students learning, Mathematicsal tasks and the learning environment.

Draper (2002) as reported in Mehmet (2005) asserts that constructivists' teachers reject the transmission model of teaching or pedagogy of just telling. Instead, key embrace teaching methods that put students in contact with the environment, with one another and with the teacher in order to pose questions, research resources and propose solutions to problems.

According to Spinner and Fraser as cited in Aminu (2005) explain that when a teacher uses constructivist approaches, learning is built and concepts are negotiated between the teacher and students. Teachers are also move away from the traditional system or approach of being authority figure. In constructivist approach, activities controlled by teachers decrease; teachers become more of a facilitator, as such learning becomes student –centered.

Activities selected for teachers in constructivist curriculum are made to reduce teacher dominance in teaching-learning processes. However, they are made to create learners-centered situation and foster greater participation of learners in learning task. In view of this, words that have manipulative connotation are avoided, rather; words which connote guidance and encouraging learners to develop their own initiative and potentialities are used.

2.3.4 Learners Roles in Constructivist Curriculum

In constructivist curriculum, learners are seen as active participants in teaching-learning processes. They are seen and regarded as those endowed with inherent intellectual abilities to

manipulate and solve problem in their own ways, as such, teachers are needed to provide them with guided and facilitating activities for them to construct their own ways of solving problem. Learners have active and greater role in learning as they are independent, active, and not manipulated by teachers. In constructivist curriculum learners are provided with ample activities. In addition, suggested activities for learners are not meant to describe learners as mere passive or audience, in contrast they are interactive in multi-dimensional ways, first, there is student- to-student interaction, Second, student to teacher dialogue and lastly student to environment interaction. This indicates that learners are involved not only in discovery, but also in a social discourse involving explanation, negotiation, sharing and evaluation.

2.3.5 Teaching and Learning Process

In constructivist theory, teaching activities are based on dialogue and reflection process (Brooks and Brooks, 1993 as cited in Mehmet, 2005). In addition, teaching is supposed to be explicit, concrete, exploratory and base on the principle of transfer of learning (Wood, 1998). Use of instructional materials, demonstration and drills/activities are highly encouraged. Schifter (1996) and Martin (1993) as reported in Mehmet, (2005) explained that constructivist teaching and learning theory are based on the following principles:

- Encouraging learners initiative and autonomy ;
- When assigning tasks to students cognitive terminology such as, “Classify, analyze, predict and create” are used;
- Use of learners responses when making “on –the –spot” decision about teacher behavior, instructional strategies, activities and content to be taught;
- Searching for students understanding and prior experiences about a concept before teaching it to them;

- Encouraging classroom communication between teacher and students and also among learners;
- Encouraging learners critical thanking and inquiry by asking them thoughtful, open-ended questions- and encourage them to ask question to one another;
- Asking follow up question and seeking elaboration after learners initial response;
- Putting students in situations that might challenge their previous conceptions and that will create contradictions that will encourage discussion;
- Giving learners adequate time to think about their answer and be able to respond thoughtfully;
- Giving learners enough time to construct their own meaning when learning something new.

2.3.6 Constructivist Evaluation and Assessment

Constructivist evaluation of learning outcome is based on the application of the previous learning to new situations, not essentially on traditional method or tools. The evaluation is not focused on what is memorized, but on what is comprehended (Brooks and Brooks, 1993 in Aminu,2005). Rather than focusing on "error in thinking", constructivist teachers based that assessment on how learners view situation. For constructivist theory, the learning outcome of learners differ, as a result objective observation will be difficult(of learning outcome) , so the theory supports open-ended evaluation or learning experiences (Mergel as reported in Mehmet, 2005).

The evaluation in constructivism focuses on students' ability to construct knowledge. Because of this, tests, oral expression, group discussion and problem –solving processes are all used for evaluation (Cunningham as cited in Mehmet, 2005).

2.3.7 Teachers and Learners Activities in Constructs Curriculum

Suggested teaching activities in constructivists' curriculum are expressed using words that do not portrayed teachers as manipulative. On the other hand, learners 'activities are expressed using cognitive taxonomy that portrayed learners as active participants in learning (Mehmet, 2005). All activities are expected to cover the psychomotor, affective and cognitive domains. They are also expected to be learners-centered, relevant, engaging and stimulating.

2.3.8 Constructivist Instructional Materials

Instructional materials according to constructivist approach are supposed to make learning real rather than abstract. They are also expected to make transfer of learning accessible, makes teaching explicit, motivating and encourage learners perception of new world. Instructional materials according to teem IM are supposed to move students and make them active during teaching and learning situation. They are also expected to involve more than one sense. In addition, facilitators are expected to select a wide range of relevant instructional materials for given topics, in an attempt to ensuring that the need of individual differences is effectively taken care of (Mehmet, 2005).

2.4 Concept of Curriculum Implementation

The term Curriculum implementation has been defined in different ways by different scholars. Nkpa (1997) defines Curriculum implementation as, "The task of translating curriculum document into the operating curriculum by the combined efforts of the students, teachers and others concerned" In addition; Garba (2004) viewed curriculum implementation as, "putting the curriculum into work for the achievement of the goals for which the curriculum is designed." Okebukola (2004) describes curriculum implementation as, "the translation of the objectives of the curriculum from paper to practice." Ivowi (2004) provides a concise definition, "the translation of

theory into practice, or proposal into action" Similarly, Onyeachu (2008) viewed curriculum implementation as the process of putting all that have been planned as a Curriculum document into practice in the classroom through the combined effort of the teachers, learners, school administrators, parents as well as interaction with physical facilities, instructional materials, psychological and social environment. All these definitions show that Curriculum implementation is the interaction between the teachers, learners and other stake holders in education geared towards achieving the stated objectives. The various suggested definitions have indicated that curriculum implementation requires the combine effort of many in order to succeed; as such it is not an inclusive responsibility of teachers alone. In addition many variables, as indicated by scholars are needed and apply for the effective evaluation of the level of curriculum implementation. Such variables include; curriculum content, instructional materials, teachers' competence, as well as learners' population in a given learning environment or context.

2.5 Constructivists Approach to Curriculum Implementation

The constructivists have a well developed theoretical framework on how a curriculum implementation is supposed to be done. Though ,the approach is relatively similar to others but the constructivists approach is the most pragmatic and activity oriented(Mehmet and Ismet, 2005).The approach is based on the systematic and careful analysis of the following variables:

Methodology

According to constructivists one of the major and fundamental factor or variable to be considered in determining the level of curriculum implementation is the suggested methodology embedded in the curriculum; this does not specifically and entirely dwell on teachers' methodology. In other word, it refers to both According to constructivists, the primary concern of the assessment of the implementation is focused on the relevance or suitability of the methodology to the curriculum

contents learners needs ,instructional materials ,number of content actually covered by teachers, learners participatory roles during teaching learning processes and the relevance of the content, methodology to suggested activities for both teachers and learners. These are key variables in determining the level of curriculum implementation in schools. Scholars (Williams, 1998; Robinson, (2000) and Hudson, (2003) as Cited in Aminu, (2005) have unanimously agreed that effective curriculum implementation can not be determined without proper assessment of the methodology used in the teaching of curriculum contents as well as the other related variables. Wrong application of methodology, constitute impediments to effective implementation of curriculum, as such relevant methodology, based on learners centred approach, complemented by the use of relevant instructional materials facilitate effective implementation of curriculum content.

Instructional Materials

Constructivists approach to curriculum implementation has given prominence to the use or application of appropriate instructional materials, as according to them, apart from making lesson explicit, easier, simple and aid retention, they are also useful in boosting and reinforcing transfer of learning and acceleration of content coverage. These according to them will go along way in quick content coverage (Hudson, 2003 in Hamisu, 2008).

Teachers' Competence and Learners Population

Constructivists consider both competence and learners population in the classroom setting as essential factors that can either facilitate or affect the level of curriculum implementation in schools. Mehmet (2005) maintains that the level of teachers professional qualification and mastery of the subject matter are essential for effective content converge. Teachers, who are lacking the professional requirement and mastery of the subject matter, have the unavoidable tendency to skip those topics they find difficult. These issues of skipping some topics included in the curriculum

are detriment to implementation. In view of this, the constructivists strongly advocate teachers' mastery of the subject matter and qualification as essential determinant factors of viable consideration in curriculum implementation. In addition, lack of teachers competence and taching qualification imply that wrong and poor method of teaching will be used in the class, and once that happen the criterion of methodology as a determinant factor in curriculum implementation is equally affected (Demirkol, 2010).

On the other hand, learners' population can positively or negatively influence the level of curriculum implementation. Manageable number of learners in a conducive learning environment supports effective classroom management, and the use of effective method of teaching as well as instructional materials capable of satisfying the psychological needs of learners. However, over-crowded classroom setting affects classroom management, orderliness, methodology, use of instructional materials and disciplines. These multiple problems render teaching boring, make learners anticipatory roles in teaching/learning processes difficult, precipitates the use of methodology incapable of satisfying the psychological needs of learners (Mehmet, 2005; Demirkol, 2010 and Aminu, 2005).The determinant factors mentioned by the constructivists are the care internal factors i.e. factors within the provision of the curriculum content that can positively or negatively influence full implementation of curriculum content.

2.6 Implementation Issues in Secondary School Education Curriculum

Issues that are fundamentally relevant for the successful implementation of Senior Secondary School Curriculum are extensively discussed and studied by both scholars and researchers. The main issues discussed are related to those factors that obviously are influential in the effective implementation of curriculum in schools. The main issues identified by the scholars include:

1. Provision of Teaching and Learning Facilities.
2. Teachers' Participation in Curriculum Planning, Assessment and Implementation
3. Teachers Qualification.
4. Funding.
5. Motivation of Teachers.
6. Regular Supervision and Inspection.

Provision of Teaching and Learning Facilities

Scholars(Dike,1987;Onyejemezi,1991;Ehiametalor,2001;Babalola,2004;Ivowi,2004;Ughamadu,(2004) and Olokor,(2006) as reported in Aminu,2005) have unanimously indicated that effective teaching and learning which is a pre-requisite for curriculum implementation cannot be possible without adequate provision of effective teaching and learning facilities. They make teaching real, concrete, explicit and understandable. As Olokor (2006) indicates, lack of proper teaching and learning facilities makes curriculum implementation impossible and too slow, as teachers who are responsible and dutiful spend time on revision. Similarly Ughamadu (2004) explains that facilities such as text books and provision of relevant instructional materials are essential for practical teaching and learning and their inadequacy affect full implementation of curriculum. The provision of adequate teaching and facilities are serious issues in curriculum implementation in Senior Secondary School because of their inadequacy in Nigeria (Ughamadu, 2004; Olokor, 2006 and Babalola, 2004).

Teachers Participation in Curriculum Planning, Implementation and Evaluation

Teachers' active participation in curriculum planning, implementation and evaluation is found to be relevant for effective implementation of the curriculum content. Nwachukwu (2005) stressed that the involvement of teachers in curriculum design and evaluation is relevant and necessary because teachers are the real implementers of the curriculum contents. In addition, their involvement in the key areas of the selection of contents is important due to their closeness to students. They understand the psychological needs of their learners and their intellectual disposition, background and ability. Based on this, they are in a better position in providing basic information pertaining learners, availability of relevant teaching and learning facilities. Such information is vital for effective and full implementation of curriculum contents (Babalola, 2004 and Nwachukwu, (2005) Teachers involvement is an issue in curriculum implementation in Nigeria because they are relegated to classroom alone. They are not in any way involved in making decision involving curriculum planning, innovation and design, as such those information that are absolutely vital are lost(Aminu,2005 and Ivowu,2004)

Teachers Qualification

Teachers' qualification and ability to competently teach topics in the curriculum contents is undoubtedly viable in the effective implementation of curriculum contents in secondary schools. Teachers having poor academic qualification in the subjects they are assigned to teach cannot be effective, such teachers skip and refuse to teach topics they find difficult. This has significant and detrimental effect in curriculum implementation (Aminu, 2005; Ivowi, 2004 and Ughamadu, 2005) Teachers qualification is a significant issue in curriculum implementation as it is discovered by many scholars and research findings (Aminu, 2005 and Olokor, 2006) as impediments to effective curriculum implementation in Nigeria. Secondary schools subjects like Mathematics and English

language, where competent and well qualified teachers are inadequate are taught by Teachers from other disciplines were employed to teach the subjects (Aminu, 2005) Similarly, Ivowi (2004) observed that teachers not professionally qualified to teach constituted serious problem to effective implementation of curriculum content in Senior Secondary Schools in Nigeria.

Funding

Provision of adequate funding is necessary for the provision of conducive teaching, and learning environment, facilities and instructional materials (Babalola,2004).Adequate funding is an external factor viable for effective implementation, without it necessary materials needed for effective teaching and learning processes cannot be provided and lack of provision of the materials will automatically make implementation impossible(Aminu,2005) Based on the social realities on the ground as well as the general public outcry on poor infrastructural facilities in schools, dilapidated structure and over congested classrooms are obvious indicators that poor funding of education sector by government is an issue in the implementation of secondary school curriculum in Nigeria .

Motivation of Teachers

Psychologists identified motivation as an essential and effective factor which encourages performance, maximum productivity and the optimum realization of organizational objectives. In view of this, various welfare packages, rewards and incentives are given to staff as a way of motivation. Issue of motivation is an outstanding issue in the implementation of curriculum in Nigeria as teachers at different levels of education are not motivated by both government and the general public. Teachers are not adequately paid and are accorded with low social status (Aminu, 2005.) Lack of motivation discourages competent and qualified people to join teaching profession

and those in the profession are just awaiting more promising job to leave. These problems have detrimental impact on curriculum implementation.

Regular Supervision and Inspection

Supervisory agencies and experience professionals are established and selected by government at all levels in order to conduct supervision and inspection of both teaching learning processes and relevant facilities. As part of their assigned responsibilities, supervisors and inspectors are expected to ensure strict adherence to quality standard, uniformity, content coverage and available facilities that are essential in teaching and learning. In the supervision of secondary school education, most of the responsibilities in this regard are with the state government as secondary school education is the responsibility of the state government. Supervisors and inspectors are responsible for checking teachers' records and students exercise books with a view to critically assessing the level of conformity of topics taught to students as well as the extent of implementation. According to Aminu (2005) regular supervision and inspection were not conducted on regular basis, therefore teachers were actually reluctant. In addition, Ivowi (2004) indicated that lack of motivation and provision of necessary facilities for effective supervision and inspection were part of the problems that negate effective supervision and inspection, and consequently impacted on the implementation of curriculum content in Senior Secondary School in Nigeria.

In addition, Ivowu (2004) indicated that lack of motivation and provision of necessary facilities for effective supervision and inspection were part of the problems that negate effective supervision and inspection, and consequently impacted on the implementation of curriculum content in Senior Secondary School in Nigeria.

2.7 Prospects of Implementing Secondary Education Curriculum

Despite the numerous challenges and problems bedeviling effective implementation of curriculum contents in Nigeria as shown by the findings of researchesr and scholars' analytical review on the level of implementation, however, the existence of many regulatory institutions and provision of professional training schemes, are identified by many-scholars as part of realistic measures that give future hope, in the effective implementation of curriculum contents in Nigerian. The identified institutions and features that give hope are:

Intervention Schemes Projects

Federal and some states governments in Nigeria have gone a long way in the establishment of institutions for funding vital sectors in education, especially in the provision of adequate facilities, which are identified as essential factors for effective implementation of curriculum contents. The most vibrant of these agencies in the provision of infrastructure in schools are:

a. Educational Trust Fund

b. Petroleum Trust Development Fund

Hamisu (2008) in his study of the role of ETF and PTDF in the provision of adequate infrastructural facilities in primary and post primary institutions in Nigerian, discovered evidence of remarkable achievements in that regards, in other words, the institutions were discovered to impact positively in the area of the provision of basic infrastructure in schools. This according to scholars (Evers, 2006; Mehmet, 2005) are influential in the effective and full implementation of curriculum contents.

Apart from the established government agencies that provide intervention funding for the provision of infrastructure and learning facilities in schools, non-governmental bodies and donor agencies contribute immensely in the same direction, Hamisu (2008) also identified the viable roles of the followings;

Parent Teachers Associations (PTA)

Co-operate bodies

UNESCO

The roles of both government established agencies and non-governmental bodies are found to be viable especially in complementing government efforts in the provision of learning and teaching materials as well as other needed facilities, such efforts restore hope.

2.8 Curriculum Implementation Supportive Mechanisms

Various tactics are suggested by scholars as the effective strategies used in facilitating curriculum implementation in schools. The strategies are aimed at reinforcing those determinant factors that are essential for the effective implementation of curriculum content:

Pre- Service Training

Hawes (1972) has argued that teacher education and professional competence can be considered as the first essential requirement in the process of implementation. In addition, Beeby (1966) shows that the ability of an educational system to implement curriculum successfully depends on the level of general education of teachers and the kind of training they received. Both the two studies stressed the significance of teacher qualification in implementation of Curriculum. Majority of the teachers are under-qualified, untrained and if perhaps; inexperienced, it is likely that implementation may be possible. Instead, old ideas and practices would continue to prevail in spite of the changes that have been introduced.

In-Service Training

In-service training is the training teachers receive to improve their knowledge of the subject matter and method of teaching when an innovation is to be introduced, Through in-service training, teachers become aware of new curricula objectives and contents but Oloye, Becher and Macclure as cited in Aminu 2005 indicated that in-service training is an instrument of curriculum implementation. They also observed that teachers mostly take in-service training as training on how to use techniques or information; about new subjects matter rather than something important that has influence on what they do in the classroom, an attitude that affects Curriculum innovation. Becher and Macclure (1978), also show that teachers see in-service training as an opportunity to be away from schools, Whatever is learnt during the training is not taken seriously. As such, this will give diverse effect on the implementation of the Curriculum. The researchers also showed that as in-service training is mostly voluntary, it is not every teacher in all subjects that attend the training that makes the coverage of the courses sporadic. Solomon in Fullan and Pomfret (1977), in a study conducted in the United States of America at pre-school level found that teachers who received maximum training (pre-service, in-service and materials) scored 10% higher degree of implementation than teachers who were given minimum training on materials only. In a research on secondary schools, they found a significant relationship between in-service training and degree of implementation. Ashley and Butts (1970) also in United States, in a research on elementary schools studies with a sample of 20 teachers all to whom received in-service training, reported a slight shift towards behavior consistent with the implementation of the Curriculum.

Cole, (1971) on a study of elementary level concluded that the main reason for the success of the implementation was the in-service training. He particularly emphasized the continuous interaction between teachers and consultants during the period of training. In a case study in the

United States of America, the same researcher found that the teachers' roles in planning, deciding and experiencing in-service training are fruitful way to implement complex curriculum innovation.

MacDonald and Walker as cited in Mehmet (2005) reported a research conducted in the United Kingdom on in-service training where two groups of teachers were involved. One group received training and the other group received no training. Pre-test and post-test data were collected by using variety of pupils test consistent with the objectives of the innovation. At the end, the researcher found a substantial shift in pupils score on many of the test for the trained group compared with the untrained group. Generally, in-service training is expensive and often takes long time to organize centrally and regionally. This may be the reason why Government and Education Establishments are reluctant to organize training courses. In any case, in-service training as distinct from single workshops or pre-service training is an important strategy for implementation of curriculum

Resource Support

Resources support includes the provision of time, materials, finance and other facilities during implementation. No matter how well a Curriculum is planned and how well it is adequate, absence of resource support could hamper the effective implementation of the curriculum, lack of time and adequate materials were identified by Hudson,Williams and Smith as reported in Demirkol, (2001) as barriers to effective implementation of curriculum contents. Bernan and Pouly, (1975) in the United States concluded that inadequate materials and space were found as problems of implementation well above all other factors except lack of clarity and of familiarity with materials and methods.

Use of information and communication technology (ICT) in communicating science and Mathematics is quite inevitable in a rapidly changing world of technology. ICT is very useful

in many areas of Mathematics. For example, in the area of assessment, Computer simulation, where there are sufficient instructional materials in Mathematics, Scalada and Zollman (1996) confirmed that computer simulations contribute to students understanding of science and Mathematics concepts. The use of information communication technology has a lot to give in the area of Mathematics and should be maximally utilized to teach various concepts in Mathematics. This use of media can also help retention and transfer of knowledge. Mathematics laboratory is very important and necessary in the development of Mathematics concepts relevant to modern technology.

Mathematics laboratory plays a unique role in the teaching and learning of Mathematics concepts. Adeniran (2000) listed the role it plays to include:

• Providing, non-threatening realistic and concrete approach in the learning of Mathematics as opposed to the difficulty encountered in learning the formal abstract treatment of a typical textbook.

• providing opportunity for individual and independent work which is profitable to creative talented students.

• providing opportunity for working in small groups which encourages leadership, shared responsibilities and team work.

He emphasized that the use of laboratory lessons in Mathematics will breakdown hostility towards Mathematics and provide pleasant and enjoyable experience to the learner. Presently, most secondary schools lack Mathematics laboratory. Adeniran (2000) stated that no single standard laboratory for Mathematics existed in the Colleges of Education in Nigeria where the teachers of Mathematics are being trained.

Participation

Curriculum implementation engages many participants. Such participants can be broadly grouped into two: that is participants outside and those inside the school. Participants outside the local school include institutes of Education Commission and Boards, Federal Government controlled bodies like National Teachers Institute (NTI), Nigeria Educational Research and Development Council (N.E.R.D.C), J.A.M.B, W.A.E.C, National Universities Commission (N.U.C) and the National Commission for Colleges of Education (N.C.C.E). Such bodies engage in research work, training of personnel, planning and production of materials that facilitate any changes introduced into curriculum while participant within the school include the learners, supportive staff, the Parents Teachers' Association and the Principal.

Feedback Mechanism

There is a need to monitor Curriculum and provide feedback to the Stakeholders such as teachers, students and parents. This is necessary because stakeholders would need to know about new knowledge and skills of the programmes. This monitoring or implementation could be done by school leaders using informed conversation and formal process, for example, observation checklist, looking at students work or tools, etc. It should be noted that monitoring is a professional mechanism for ensuring responsibility for Curriculum implementation.

2.9 Factors Affecting Curriculum Implementation

Qualified Teachers

The issues of teachers' competency and effectiveness in Mathematics have been one of the problems in Mathematics education. Begle (1979)discerned that teachers variable in Mathematics education include knowledge of Mathematics, teacher effectiveness, teacher's competencies, teach affective characteristics and teacher training programmes. According to Farell (1970), no Mathematics Educator minimizes the complex problem of preparing teachers, who teach Mathematics better. Probably, Mathematics teachers teach "better" Mathematics but do not teach Mathematics better. Usually, much attention is focused on teachers' subject matter knowledge. This does not allow teacher educators to pay the needed attention to pedagogical components and skills. Sizer (1984) observed that a competent Mathematics teacher with good academic and pedagogical background, is not easily worn out by the "system".

Farell (1979 & 1984) derived the indicator of teacher competency in Mathematics teaching and learning. The two types of competencies were identified by Farell (1984). The first type is characterized as Mastery type and the second type is Label Developmental based. Moreover, it was suggested that the first type of competency is that secondary school Mathematics teachers certainly possess. However, Farell (1979) cautioned the over use or abuse of Mastery type of teacher competency. She argued that this type of competency should be merged with the development type. As an illustration, the following indicators of Mathematics teacher competency provide base line information for readers.

• Teacher gives history, etymology of terms and symbols.

• Teacher explains why (e.g. graphing) techniques are being taught.

• Teacher correction indicates the "why" of certain convention in Mathematics.

• Teacher uses counting and measuring examples before new formulae are developed and point out the usefulness of the formula.

In the newly celebrated Approved Minimum Academic Standard (AMAS) Produced by the National Universities Commission (NUC), students in the faculty of education offering Mathematics with one of the following' Subjects: - physics, Chemistry, Statistics, Geography and Economics will be awarded with the B.Sc. (Ed) Mathematics as a major. The Mathematics components should be 33%. This shows that much attention is focused on the acquisition of the subject matter of Mathematics. The 67% given to education is shared between theory and practical. A closer look at the AMAS reveals that only three (3) to four (4) hours of courses in method are recommended for the entire period of training.

It is true that teacher knowledge of the subject matter content of a discipline has influence on students' achievement. However, this necessary aspect of the teacher education is not sufficient for the components of the programme. Mathematics teachers could be good solver of problems in Mathematics, but the same teacher may not know how or when to engage their students in problem solving or be able to design or select appropriate problems. This transition from learner of Mathematics to teacher of Mathematics is complex and deserves more attention than it is presently receiving in the education of Mathematics teachers.

Funding

The phenomenal increase in the number of schools between 1990 to date coupled with students population explosion and life comprehensive nature of 6 – 3 – 3 – 4 system of education have implication for increased expenditure in terms of provision of equipment and teaching facilities, schools building and employment of qualified Teachers in required quantity.

The issue of funding can be looked at in two ways. First, the issue of funding which relates to what priority Government decides to accord to and how much money is allocated to education. For example, Government devoted 5.2% of its total expenditure to education during1986 – 1990 and this was slashed to 4.1% since 1990, (Federal Republic of Nigeria, 1990). Secondly, priority is also about how much they have committed to the demand and challenges of education.

Nigeria's quest for scientific and technological advancement may be derailed by inadequate funding of schools. There is no doubt about the high cost of science, technology and Mathematics education because the successful teaching of these subjects involves the use of specialized materials and skilled teachesr that are not easy to come-by and they have therefore become luxuries. Though Government has decided to share the burden of educating children with parents, Parents are responsible for the learning materials for their wards and are also made to pay some incidental charges such as the development and examination levies. It is hoped that, when the Education Tax Funds (ETF) is fully operational, more funds will become available for the development of science, technology and Mathematics education.

2.10 Strategies of Curriculum Implementation

Strategies of Curriculum implementation are very importantand relevant to this study. The actual questions in any innovation are how can a desired change be brought about? What strategy or strategies are appropriate? A strategy is a way of Carrying out plan. Also, strategy means "all available procedure and techniques used by individuals and groups at different levels of educational systems to reach desired objectives", Beeby (1966) pointed out that the success of a strategy depends to a large extent on the level and amount of training teachers receive. Three broad types of strategies have been identified. These are empirical rational, normative re-educative and power coercive. They were first offered by (Chin and Benne 1969).

2.10 Empirical - Rational Strategies of Change

The fundamental assumption underlying this is that the people are rational and keen to be efficient. It follows that they will adopt a proposed change if it appears rational and seems to be a better way of doing things. This strategy of Curriculum implementation involves convincing people by rational means and appealing to reason and logic using the result of applied and basic research for further conviction. Rational strategies emphasize activities that involve communication about the nature of the change and why it is justified. The methods used in this strategy include education (e.g. in-service training) and information dissemination. Despite all these, rational strategy depends on the quality of change itself. This strategy may require teachers to spend more time on the process of innovation. The empirical rational strategy of change does not recognize social acceptance as motivating force. Here, the image of the practitioner is that of a rational person. According to Sieber, (1972), change result from a personal wholly intellectual judgment, which he describes as an "internal intellectual process".

2.10 Normative Re-Educative Strategy of Change

This strategy is much more concerned with the social origins of innovation. It assumes that behavior is affected by habits, values and attitudes, or by conceptions of rules and relationships, formed in group of institutional settings. The change strategy, therefore, involves more than making people aware of technically more effective ways of doing things so that the practitioner is a voluntary participant in the change process. This method of Curriculum change involves manipulating some aspects of change environment so that the change target sees the situation differently. Zaltman, et al, (1977) and Seiber, (1972) describe this as internally effective. This brings us to the last and final strategy of Curriculum implementation.

2.10 Power Coercive Strategy of Change

The assumptions here are based on power and compliance. Power may take many meanings but in this context, it refers to those who are less powerful that will comply with the plans, directions and leadership of those with greater power. Examples of these are the way examination boards change syllabuses. This strategy of change is the easiest to apply since they are based on control of reward and punishment, deprivation and are important to participants in the change process (Zaltman, et al, (1977). The success of this strategy depends on the extent to which success of power are really valued, or important. This model fits well in the centralized system of education control like that of Nigeria. The practitioner is that of "power of fewer functionaries" Seiber. (1972) further describes it as "externally structured".

Harvelock, (1971) suggested what he called "linkage process" if effective implementation of innovation is desired. That is, we take the best out of the strategies and put them together depending on our resources and circumstances. All the indices of Curriculum implementation discussed above were found to be barriers to implementation when they are not considered during implementation.

2.11 Reviews of Empirical Studies

Report's findings of various studies conducted in Africa (Aminu, 2005; Johnson, 2000; Wakili, 2005), Asia (Mehmet and Ismet, 2003; Shagzhi,2007) on the level of Mathematics curriculum implementation abound. There are various studies conducted in Africa, Asia, Europe, and America. Some of the studies conducted examined different theoretical approaches, and others explored the relative influence of some factors affecting curriculum implementation at primary and post primary institutions.

Aminu (2005) studied the level of Mathematics curriculum completion in some selected primary schools in Bauchi State. He discovered gross deficiency and inadequacy of completion, as according to his findings topics were not chronologically taught as designed or recommended in the syllabus. Teachers jumped or even taught topics not included in the syllabus. His studies discovered various reasons that were responsible for the identified trend. Teachers' competence, qualification, attitude to teaching, lack of conducive teaching and learning environment, lack of provision of relevant facilities and pupils poor background in Mathematics were identified as responsible factors for the problem. Aminu's findings of responsible factors were restrictive and one-sided, as only the external factors that influence curriculum implementation were examined or identified. In the same vein, Johnson (2000) discovered that students' involvement in examination malpractice was significantly related to gross failure in the full implementation of curriculum content. Similarly, Wakili (2005) identified strong and significant relationship between students poor academic competence with level of curriculum implementation. In addition, he identified lack of consistency, indiscriminate and haphazard change of curriculum and education policies as the major responsible factors for poor implementation.

Mehmet and Ismet (2003) studied the application of constructivist theoretical framework in the newly designed Mathematics curriculum for Senior Secondary Schools Mathematics in Turkey. They discovered that the application of the theory provided optimum possibility for the successful implementation of the curriculum in schools. Their findings attributed the success due to the radical departure from the traditional approach to a pragmatic approach of constructivism.

Shagzhi (2007) studied the relevance of constructivist approach in the full implementation of Mathematics curriculum in China. Finding of the study indicated high level of successful implementation. Similar studies conducted in Europe revealed the same. The successful advancement of science and technology education in Europe and Asia is linked with the

development of Mathematics education. Similarly, learners' developed interest in Mathematics is also found to be significantly influenced by the used of constructivist approach in curriculum design.

Researchers and scholars (Johnson, 2000;Onikan, 2005) have unanimously indicated that Mathematics curriculum contents for Senior Secondary Schools in Nigeria are arranged from simple to complex , but they critically condemned the inclusion of many items and the use or application of traditional approach in the selection of content. They emphasized on the need to have contents that are viably relevant to the dynamic challenges of the 21stcentury.

Many researcher and scholars (Onikan, 2005; Johnson, 2000; Aminu, 20005) who assessed the suggested activities for both teachers and students lamented vehemently on the use of teacher-dominated activities, as according to them the activities rendered learners passive and dormant, thus making lessons teachers centered.

Based on the analysis and assessment of the suggested activities that are included in the Senior Secondary School Mathematics Curriculum, it is discovered that the suggested activities are not meant to encourage students' active participation in learning. This is justified by the use of words or verbs that openly denote teacher dominated approach. Words like; *give, states, explain, bring, displays, show, revise* etc. are still used as a guide to teachers on what they are expected or advised to do in order to reinforce learners understanding. Suggested activities that are described by the use of these words above are regarded by many scholars as teacher dominated. On the part of Students activities, Aminu (2005) identified the activities as not based on developing learners' domains of learning. Most of the activities are made to focus on the cognitive domain of learning. Words for the suggested students' activities include; *define, state, transform, find, solve, revise etc* .Findings of this study relate significantly with this investigation or analysis. On the implication of

this to curriculum implementation, scholars discovered that it is detrimental to effective curriculum implementation.

2.12 Summary

Based on what has so far been discussed, it is clear that constructivist theoretical approach is a radical departure from the traditional approach. It emphasizes on learners active participation in learning and reduces teacher dominance. The approach is universally recognized as effective in full implementation of curriculum content. It obvious from the scholars' analysis and related researches so far reviewed in this chapter that Mathematics curriculum was not effectively implemented in Nigeria, as a result of multiple problems. One of the identified repercussion of this phenomenon is students' massive failure in Mathematics as well as the continuous cases of examination malpractice.

CHAPTER THREE

Research Methodology

3.1 Introduction

This chapter presents the general methodology of the study. It discusses the research design, population of the study as well as sampling technique and size. It also highlights the data collection instrument, and the procedures used/employed in the analysis of the data that are also presented in the study.

3.2 Research Design

The research design is the structure or plan of a research. It explains what to do and how to do it. It is a careful design on how the research should be carried out (Mkpa, 1997). Design research for this study is a descriptive survey. A descriptive survey design involves systematic collection of data from all or part of a population to determine the distribution of attributes, characteristics of people and description of the present state of affairs (Sambo; 2005; Ndagi in Hassan 2005). In addition, the descriptive research is defined as the collection of data for the purpose of describing and interpreting existing conditions, prevailing practices, beliefs, attitude and on-going practice or process. The goal of survey/descriptive study is to discover on-going situation or practice and to describe or explain **"what happened"** (Hassan, 2005). Descriptive or survey study is concisely described as, "the present state of affairs" (Sambo, 2005). This study is authentically a descriptive one, because the nature of the problem of this study involves the collection of data from a sample in order to make inferences on the prevalent condition or situation (gender difference) in a population. In addition, this study is an attempt to discover or study on-going practice and explain **"what happened"**. This situation or phenomena has suitably qualified this study as descriptive one, and therefore determine the design of the study.

Similarly, non-experimental design was also used in the study, since the subjects of the study were not manipulated and conditionally subjected to any phenomena (Mkpa, 1997).

3.3 Population of the Study

A population (of a study) is the set of all elements, objects or events that are of interest for a particular study (Sambo, 2004). It is also seen as an aggregate, or collection of all elements (in a given area of study) that meet certain criteria defined by a researcher. The elements can be human or non-human (Isyaku, 2004). The population of this study consisted of all senior secondary school Mathematics teachers in Kano State. The target population of this study therefore included the entire population of the senior secondary schools in Kano. There were seven hundred and thirteen (713) secondary schools with a population of 2,533 Mathematics teachers and 1,146 supervisors/inspectors. Therefore, the total population of the study is 3,679.

3.4 Sample and Sampling Technique

A sampling is a subset of a population from which data for a study is collected (Sambo, 2005) this shows that sample is a smaller group of element drawn (through a define procedure) from a specific population. Hassan (2005) explains samples as, "those selected elements or variables to be directly involved for the collection of data". Samples are therefore chosen to represent the entire population. Sampling is necessary in a study (research) because of the impossibility of involving all the entire elements or variables. Random Sampling Technique was used in the selection of sample for this study. The sample size of the study was 624 randomly selected subjects out of the population of 3,679 Mathematics teachers' and supervisors. Morgan and Kreycie (2001) proposed formula of determining sample size was adopted. It is based on the formulae that 624 samples were selected out of 3,679 teachers and supervisors that were present in the selected schools. 333 Mathematics teachers were randomly selected as a sample of this study out of the population of 2,533 (Mathematics teachers). In addition, there were 291 selected

supervisors/inspectors as a complementary part of the sample of the study. The sample was drawn from the population of 1,146 inspectors and supervisors. Below is the summary/description of the distribution of samples size based on Morgan and Kreycie style (1971):

Table 3.1: Distribution of Subjects (Mathematics Teachers)

S/N	ZONE	SCHOOLS	SAMPLE SIZE
1	Kano Municipal	1-GSSS Gwale 2-GGSSS S/Mainagge 3-Rumfa College	12 12 12
2	Nassarawa	1-GSSS Vice Adamu 2-GSSS Kawaji 3-GSSS Maikwatashi	11 11 11
3	Minjibir	1-GSSS Kunya 2-GSSS Minjibir 3-GSSS Ungogo	11 11 11
4	Bichi	1-GGSS Kwa 2-GSSS Bichi 3-GSSS Tsanyawa	11 11 11
5	Dambatta	1-GGSS Dambatta 2-GSSS Dambatta 3-GSS Makoda	11 11 11
6	Tudun Wada	1-GSSS T/Wada 2-GGSS Tiga 3-Science & Technical School Bagauda	11 11 11
7	Rano	1-GSSS Kibiya 2-GSSS Rano 3-GGSS Kura	11 11 11
8	Gwarzo	1-Unity School Karaye 2-GGSS Kunchi 3-GSSS Kabo	11 11 11
9	Wudil	1-GGSS Yargaya 2-GGSS Gano 3-GSSS Wudil	11 11 11
10	Gaya	1-Science & Technical, Gaya 2-GSSS Gaya 3-GGSS Toranke	11 11 11
	Total	**30**	**333**

Table 3.2: Distribution of Subjects (Supervisors/Inspectors)

S/N	Units/Institutions	Sample Size
1	Ministry of Education /Kano Educational Resource Department	50
2	Kano State Teachers Service Board	45
3	Kano State Science and Technical Board	45
4	WAEC	40
5	NECO	40
6	NABTEB	40
7	NERDC	31
	Total	**291**

3.4 Instrumentation

The research study utilized questionnaire as major instrument for this study. It was designed to elicit the information required for testing the stated research hypotheses and research questions, and satisfying the objectives of the study as well. Two types of questionnaires were designed and used for this study; teachers and supervisors questionnaires. The teacher's questionnaire (TSAMCIQ) meaning Teacher Assessment of Curriculum Implementation Questionnaire. This instrument is made up of two sections: Section one contains or requires demographic information of subjects. Section two contains forty(40) items. The questionnaire items were structured in a form of response alternatives consisting of five preferences, in other words; the questionnaire response format was structured or restricted in the form of multiple choice items. The selected items of the instrument were adopted from a validated instrument of Mehmet and Ismet .The forty (40) items of the instrument were made to reflect and address issues related to curriculum

implementation. On the other hand, the supervisor's questionnaire was made up of thirty two (32) items.

3.6 Validation of Data Collection Instrument

An instrument is valid when it measures (as accurately as possible) what it is set to measure, (Hassan, 2005). The questionnaire (instrument) for this study has content validity, because the statements contained in the questionnaires are made to cover as accurately as possible the stated objectives and hypotheses for the study. The instrument is also valid because it has already been validated. The items of the questionnaire are also validated by Mehmet (2005) and Ismet (2005). Since the instrument is an adaptation of Mehmet and Ismet (2005), the process of validation was based on their established validation process.

3.7 Data Collection Procedures

The questionnaires were distributed and collected from subjects of the study using "On-the-spot" technique**.** This means that, the questionnaires were given out to the subjects, they were given time to fill them and collected back on the pot. This method was adopted in order to reduce high frequency of missing or unreturned questionnaires. A total number of 624 questionnaires were distributed, to correspond or tally with the sample of the study. Out of this number, 619 questionnaires or 98.6% were collected back or retrieved from the subjects, while 05 or 1.4% were not returned. However, additional 05 questionnaires were given as a complement so 100% collection was made.

3.8 Data Analysis Procedures

For the data analysis of this research work, a non-parametric statistical test is used by means of employing chi-square to address the stated hypotheses of the study and to find out whether there exist or not a significant difference in curriculum implementation and curriculum content. The acceptability or rejection of the null hypothesis for this study is determined by the analysis

provided by chi-square. The selection of chi-square for the analysis of formulated hypotheses was done to determine whether or not a significant difference exist between curriculum content and implementation in Senior Secondary School Mathematics. On the other hand, a descriptive statistic was employed to address the stated research questions of the study.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presents the findings of the study. Data collected via the validated questionnaire instrument from the randomly selected samples of six hundred and twenty four out of the population of 3,679 was analyzed, using both parametric and non-parametric methods of data analysis. Descriptive analysis of simple percentage was used to provide answer to the research questions of the study. In addition, non-parametric statistical analysis of Chi-Square was employed to test the stated research hypotheses of the study. Based on the presented data and analysis, a summary of the major findings of the study, as well as, general discussion on the findings are made.

4.2 Descriptive Analysis

Descriptive analysis of simple percentage was used to analyze the data collected which was meant to provide answer to the stated research questions. The questions were:

Research Question One

What is the relevance of suggested methodology to content in the effective implementation of Mathematics Curriculum in Senior Secondary Schools in Kano State?

To provide answer to the afore-stated research question, data was collected from the subjects of the study via the questionnaire instrument. In addition, students' exercise books, teachers' scheme of work and Mathematics Curriculum Content were analyzed for the collection of relevant data. The collected data was analyzed using descriptive analysis and the result is presented below in Table 4.1, 4.2, 4.3, 4.4, 4.5 and 4.6 respectively.

Table 4.2.1: Relevance of Suggested Methodology to Effective Implementation of Curriculum Content in Senior Secondary Schools.

Relevance of Methodology	Response pattern/Format					TOTAL
	SA	A	SD	D	UD	
Relevance to Suggested Instructional Materials	151 24.2	96 15.4	178 28.5	140 22.4	59 9.5	624 100
Relevance to Students Population	97 15.5	150 24.40	179 28.7	160 25.6	38 6.1	624 100
Relevance of learners background needs	103 16.5	141 22.6	197 31.5	173 27.2	10 1.6	624 100
Relevance to Learners Centered Approach	81 12.9	164 26.3	199 31.9	173 27.2	07 1.1	624 100
Relevance of Content Coverage	159 25.5	140 22.4	180 28.8	117 18.8	28 4.5	624 100

Table 4.1 shows the respondents response pattern on the relevance of methodology to instructional materials, students' populations' learners background and needs, students' active participation and content coverage as well. 50.9% of the subjects disagreed with the relevance of methodology to instructional materials used in teaching and learning, while 39.6% agreed with the relevance and appropriateness of the methodology with instructional materials used by teachers. On the relevance of the methodology with learners population (in the classroom) majority of the subjects, 54.3% disagreed with relevance or conformity, while 39.6% agreed. In addition, 59.3% of the respondents indicated that there was no relevance between the teachers' methodology and learners' background in mathematics, while 39.1% showed the opposite. On the issue of the relevance and relationship between the teachers methodology and learners centered approach i.e. the relevance of the methodology in promoting or encouraging learners active participation in teaching and learning processes, majority of the subjects, 59.6% showed the contrary. In the same vein, 47.9% agreed that the methodology used by teachers could facilitate content coverage, while 47.6% did not.

Mathematics curriculum is designed with suggested methodology (ies) that can effectively facilitate teaching and learning processes. In addition to that, activities for both teachers and learners during teaching and learning processes are also suggested in an attempt to reinforce effective teaching and learning. In view of this, the two suggested activities were analysed in an attempt to see their relevance and appropriateness in the effective implementation of mathematics curriculum content in Senior Secondary Schools. The result is presented in Table 4.2 and 4.3 below:

Table 4.2.2: Action Words for Teacher Suggested Activities in Mathematics Curriculum.

Action Words	**Description**	
	Teachers – centered Activities	**Learners – centered Activities**
States	(	X
Gives	(	X
Explains	(	X
Revises	(	X
Separates	(	X
Presents	(	X
Shows	(	X
Draws	(	X
Displays	(	X
Guides	X	(
Leads	X	(
Illustrates	X	(
Total	**09 (75%)**	**03 (25%)**

Table 4.2 above indicates that action words used in suggesting teachers activities for reinforcing learning were actually teachers – centered as **75%** of the words did not connote or denote learners' participatory role in learning. On the other hand, only 25% of the words i.e. 03 out of 12were

learners – centered as the words denote and connote learners' participation in teaching and learning processes.

Table 4.2.3: Learners Suggested Activities in Mathematics Curriculum

Activities/Learning Domain	Number	Percentage
Cognitive Domain	21	65.6
Psychomotor Domain	08	25.0
Affective Domain	03	9.4
Total	32	100

Table 4.6 above shows that most of the action words (verbs) used in the curriculum contents (Mathematics) to suggest useful activities for learners as a mean of reinforcing learning activities were for cognitive aspect of learning, as 21 out of the 32 words or 65.6% were solely on cognitive domain of learning, while 08 out of the 32 or 25.0% were for psychomotor domain, and 03 out of the 32or 9.4% were for affective domain of learning. This shows that the suggested activities were not meant to encourage functional skills, practice, learning by doing and independent approach to problem solving. The suggested activities focused on the intellectual disposition of learners with less emphasis on practical skills and appropriate application of knowledge in solving problems in real life situation; a radical departure from the constructivists approach to curriculum implementation.

Suggested methodologies in curriculum content relate significantly to curriculum content, as the methodologies are meant to serve as parameters for the apt implementation of the content as such the two, as suggested by constructivists are imperatively needed concurrently for balanced and reliable analysis. Based on this, the curriculum content in relation to effective implementation is analysed and the result is presented in the table below:

Table 4.2.4: Appropriateness of Curriculum Contents for Effective Implementation of the Curriculum

Contents/items in the curriculum	Response Pattern/Format					TOTAL
	SA	A	SD	D	UD	
Contents are arranged from simple to complex, known to unknown.	210 33.7	171 27.4	117 18.8	96 15.4	30 4.8	624 100
Contents are relevant to students' needs, skills and interest.	162 25.9	133 21.3	165 26.4	153 24.5	11 1.8	624 100
Contents are made to provide opportunities for students to learn by doing.	163 26.1	160 25.6	167 26.8	130 20.8	04 0.6	624 100
Contents and selected activities are made to enrich the curiosity and desire to search	165 26.5	160 25.6	160 25.6	125 20.0	14 2.2	624 100
Activities are related to learners life and environment	122 19.6	140 22.4	190 30.4	94 15.1	78 12.5	624 100
Students get active roles in the recommended activities	141 22.6	154 24.7	191 30.6	135 21.6	03 0.5	624 100
Contents activities are made to make teachers role dominant	190 30.4	170 27.3	120 19.2	100 16.0	44 7.1	624 100
Contents are complex for students background	217 34.8	180 28.8	130 20.8	86 13.8	11 1.8	624 100

Table 4.4 indicates that 63.6% of the respondents agreed that the selected contents (topics) in Mathematics curriculum were difficult and complex due to learners' poor background in Mathematics, while 34.6 didn't agree**.** 61.1% agreed that the selected contents in the curriculum

were systematically arranged in order of difficulty i.e. from simple to complex and from known to unknown. On the other hand, 34.2% didn't. On whether the selected activities in the curriculum were made to make teaching teachers – centered, 57.7% agreed that suggested activities were made to make learners passive, while 35.2% didn't. 52.1% of the subjects of the study had indicated that contents and selected activities were made to enrich learners' potentialities, curiosity and desire to search, while 45.6% didn't agree. On the relevance of Mathematics curriculum contents to learners need, skills and interest, 50.9% didn't agree while 47.2% agreed. 52.9%didn't agree with the relevance of contents in motivating learning by doing while 46.4% agreed. Similarly, 52.2% supported the previous response format by indicting that students did not get active roles in the selected activities, while 47.3% agreed that activities in the curriculum encouraged learners' active role. In addition, 45.5% didn't agree with the relevance of contents to students 45.5% didn't agree with the relevance of contents to students life and environment, while 42% agreed.

Suggested activities for teachers (Mathematics), which are intended to make teaching explicit and boost learners understanding, were actually made to make teaching teachers-centered, learners passive and less participatory in teaching and learning processes. This was justified by the verbs or action words used in the curriculum in suggesting activities for teachers in order to reinforce learning. Table 4.2 which was presented above indicated this manifested problem.

Relevant to this analysis on the appropriateness of suggested methodology is the level of curriculum implementation in schools. Constructivists indicate that the appropriateness of methodology and content is reliably judged, examined and justifiably analysed by assessing the level or extent by which the curriculum content is implemented, in view of this, relevant data was collected from the subjects of the study, as well as from the students notes in order to ascertain the

level 0f implementation of mathematics curriculum content in Senior Secondary Schools in Kano. The result is presented below in Table 4.5 and 4.6 respectively.

Table 4.2.5: Level of Mathematics Curriculum Implementation in Senior Secondary School.

Levels	**Response pattern /format**					
	SA	**A**	**SD**	**D**	**UD**	**TOTAL**
High	80	49	252	191	52	624
	12.8	7.9	40.4	30.6	8.3	100
Medium	176	156	128	131	24	624
	28.2	26.4	20.5	20.9	3.9	100
Low	99	95	224	186	20	624
	15.9	15.2	35.9	29.8	3.2	100
Zero	70	52	230	197	75	624
	11.2	8.3	36.9	31.6	12.0	100

Table 4.5 sought to find out from the subjects of the study the level of curriculum implementation in secondary schools. 71% of the subjects indicated that the level of completion was not high, while 20.7% agreed that it was high. 54.6% agreed that the level of completion was medium, however 41.4% disagreed. 65.7%of the subjects indicated that the level of completion was low, while 31.1%considered the level as not low, in addition, 68.5% disagreed that the level of completion was zero, on the other hand 19.5% agreed that the level of completion was at zero level. The whole analysis therefore indicated that the level of implementation was neither high nor low, which further shows that the level of implementation was not full, but partial.

To further ascertain the level of completion of Mathematics curriculum content in senior secondary schools, data was collected from recorded materials (students' exercise books) with specific focus on the topics taught in the seventh week of second term. The result of the survey is presented in Table 4.5 below:

Table 4.2.6: Mathematics Topics Taught in the 7th Week of 2nd Term in Some Selected Senior Secondary School Classes.

Schools	**Classes**	**Topics last taught**	**Terms & Week**	**Topics in cc & syllabus**	**Remarks** Timely	**Not Timely**
Govt Senior Secondary Sch. Gwale, Kano	SS1 SS2 SS3	Quadratic equation Quadratic equation Trigonometric	2nd /wk7 " " " "	Construction Trigonometry Differentiation	X X X	√ √ √
Govt Girls Senior Sec. Sch. Dala	SS1 SS2 SS3	Logical reasoning Algebraic fractions Longitude and latitude	2nd /wk7 " " " "	Construction Trigonometry Differentiation	X X X	√ √ √
Muhammad Vice Adamu Senior Sec. School, Fagge.	SS1 SS2 SS3	Simple equation and variation logarithms coordinate geometry of straight lines	2nd /wk7 " " " "	Construction Trigonometry Differentiation	X X X	√ √ √
Govt. Senior Secondary Sch .Kunya	SS1 SS2 SS3	Quadratic equation linear in equalities graphs trigonometric ratios (1st term)	2nd /wk7 " " " "	Construction Trigonometry Differentiation	X X X	√ √ √
Govt Girls Senior Sec. Sch Kura.	SS1 SS2 SS3	Simple equation variation quadratic equation longitude and latitude	2nd /wk7 " " " "	Construction Trigonometry Differentiation	X X X	√ √ √
Govt. Science College, Gaya	SS1 SS2 SS3	Construction Trigonometry Differentiation	2nd /wk7 " " " "	Construction Trigonometry Differentiation	X X X	√ √ √
Govt Senior Sec. School Dambatta	SS1 SS2 SS3	Logarithms Sequence & series Metrics and determinants	2nd /wk7 " " " "	Construction Trigonometry Differentiation	X X X	√ √ √

(See appendix 3)

Table 4.6 above indicates that topics covered or taught in the seventh (7^{th}) week of second term (2011/2012 academic session) were not in conformity with the selected or designed topics of the designed syllabus. The designated topic of the week (7^{th}) in second term for SS1 was construction, trigonometry for SS2 and differentiation for SS3**.** However most of the topics taught in the classes were mostly topics of the 2^{nd} week or4^{th} week of first term. This indicates that two terms were spent in teaching one academic term topics, with that rate many topics were left untreated. Out of the selected schools in Table 4.6 only one school was able to teach topics that conform to the designed syllabus.

Research Question Two

What is the appropriateness of instructional materials in the effective implementation of mathematics curriculum content in Senior Secondary Schools in Kano State?

To provide answer to this research question, data was collected from both subjects of the study via the questionnaire instrument and the Senior Secondary School Mathematics Curriculum, designed by the Nigerian Educational Research and Development Council (NERDC). The result was computed and presented in Table 4.7 and 4.8 as follows:

Table 4.2.7: Appropriateness of Instructional Materials in the Effective Implementation of Curriculum Content in senior Secondary Schools

Appropriateness to:	Response pattern/Format					TOTAL
	SA	A	SD	D	UD	
Contents/Topics	301	209	72	31	11	624
	48.2	33.5	11.5	4.9	1.8	100
Students needs	119	138	127	130	110	624
	19.1	22.1	20.4	20.8	17.6	100
Teachers Suggested Activities/	152	151	117	124	80	624
Methodology	24.4	24.2	18.8	19.8	12.8	100
Content coverage	193	170	157	85	10	624
	30.9	27.2	25.2	13.6	3.0	100
Adequacy of the Materials	207	186	103	92	36	624
	33.2	29.8	16.5	14.7	5.8	100

Table 4.7 above indicates that majority of the respondents i.e. 81.7% indicated that instructional materials were appropriate and relevant with the selected topics of the curriculum, while 16.4% didn't. On the relevance or appropriateness of the instructional materials with the learners needs, 41.2% of the subjects agreed with the relevance, while 41.2% didn't. In addition, 48.6% of the total of the subjects agreed that the suggested instructional materials in the curriculum were relevant with the suggested activities or methodology, on the contrary 38.6% didn't agree. The appropriateness of the suggested instructional materials in content coverage was indicated by 58.1% as appropriate, while 38.8% didn't agree. Similarly, 63% agreed that the suggested instructional materials were adequately provided to satisfy the teaching and learning needs, however, 31.2% indicated the inadequacy of the instructional materials.

The suggested learning/teaching materials in the curriculum, which were meant to make teaching and learning explicit, concrete and motivating were supposed to be multi-dimensional in nature, ranging from real objects, pictures, diagrams, charts etc. Table 4.11 below shows the nature of the suggested instructional materials and the topics they were intended to use with, this would realistically show the validity of the materials in relation to the topics.

Table 4.2.8: Instructional Materials with the Given Topics in the Senior Secondary School Mathematics Curriculum.

Topics	Class	Suggested instructional materials
Number System	SS I	Charts
Modular Arithmetic	SS I	Charts
Logarithms	SS I	Charts
Sets	SS I	Real Objects
Simple Equations	SS I	Charts
Logical Reasoning	SS I	Charts
Construction	SS I	Real Objects
Presentation (Data)	SS I	Graph
Logarithms	SS II	Charts
Approximation	SS II	Models/Charts
Sequence and Series	SS II	Models/Charts
Quadratic Equation	SS II	Graph
Logical Reasoning	SS II	Charts
Algebraic Fraction	SS II	Charts
Trigonometry	SS II	Charts
Bearing	SS II	Charts
Probability	SS II	Real Objects
Surds	SS III	Charts
Matrices and Determinants	SS III	Charts
Logarithms	SS III	Charts
Arithmetic of Finance	SS III	Charts
Quadratic Equation	SS III	Charts
Algebraic Fraction	SS III	Charts, Computer

Table 4.8 above which shows the recommended instructional materials with the topics supposed to be used, as indicated in the Senior Secondary School Mathematics Curriculum Plainly, the table

indicates that most of the suggested instructional materials for the teaching of various topics were actually one-sided, though there are multiple of modern and most appealing materials that can be used.

Research Question Three

What is the relevance of teachers' qualification/competence in the effective implementation of curriculum content in Senior Secondary School in Kano State?

To provide answer to the stated research question, data was obtained from the subjects of the study, on the academic and professional qualifications of mathematics teachers teaching in Senior Secondary Schools in Kano State. The result is presented in Table 4.10 below:

Table 4.2.9 Professionals/Academic Qualifications of Mathematics Teachers Teaching in Senior Secondary Schools.

Qualifications	**Response**	**Percentage**
P.hd	00	00
M.Ed	02	0.6
M.Sc (Maths)	02	0.6
M.Sc (Sciences)	04	1.2
B.Sc Ed (Maths)	37	11.1
B.Sc (Maths)	48	14.4
B.Sc (Science)	86	25.8
N.C.E.	92	27.6
ND	31	9.3
Others	31	9.3
Total	333	100

Table 4.9 indicates that Mathematics teachers with NCE teaching qualifications were the highest, as 27.6% of the teachers teaching Mathematics at the Senior Secondary Schools had N.C.E., while

25.8% were B.Sc (degree) holders in science related discipline and without any teaching qualifications. 14.4% were also B.Sc (degree) holders in Mathematics, but without teaching qualifications. 11.1% had B.Sc (Ed) in Mathematics and ND holders were 9.3%, M.Ed. and M.Sc. 0.6% respectively. Other categories of teachers teaching Mathematics from disciplines like accountancy, economics and Business Education were 9.3%.The analysis showed that majority of the teachers teaching Mathematics at the Senior Secondary Schools levels were not professionally qualified to do so, as 11.1% were the only professionally qualified Mathematics teachers, while the remaining 88.9% were not.

Research Question Four

What are the role of student population in the implementation of Senior Secondary School Mathematics Curriculum Content in Kano State?

To provide answer to this question, data was collected, computed and presented in Table 4.10 and 4.11 below:

Table 4.2.10 Learners Population and Effective Implementation of Mathematics Curriculum Content

Response	Response pattern/Format					TOTAL
	SA	A	SD	D	UD	
I have over populated classroom	201 60.4	92 27.6	16 4.8	06 1.8	18 5.4	333 100
I have manageable population in my class	10 3.0	16 4.8	226 67.9	51 15.3	30 9.0	333 100
Over–population effective in classroom management	08 2.4	10 3.0	209 62.8	100 30.0	06 1.8	333 100
Over–populated classroom suitable for content coverage	08 2.4	10 3.0	207 62.2	89 26.7	19 5.7	333 100
Over-populated classroom suitable for effective teaching and learning	10 3.0	16 4.8	222 66.7	53 15.9	32 9.6	333 100

Table 4.10 indicates that 88% of the respondents agreed that they had over-populated classroom, while 6.6% didn't. Similarly, 83.2% indicated that they didn't have manageable number of learners in their classroom, while only 7.8% admitted of having manageable classes. In addition,

92.8% of the respondents showed that over-populated classroom was an impediment to classroom management, while 5.4% didn't. 88.9% and 82.6% indicated that over-populated classroom setting didn't facilitate effective content coverage as well as teaching and learning. On the contrary, 5.4% and 7.8% didn't. over populated classroom was indicated by the majority of the respondents as impediment to effect teaching and learning, and also effective implementation of mathematics curriculum content in Senior Secondary Schools.

Table 4.2.11: Learners Population in Some Selected Senior Secondary Schools in Kano State.

Schools	Classes	Number of Students
G.S.S.S. Gwale, Kano	SS I	89
	SS II	90
	SS III	73
G.G.C. Dala, Kano	SS I	91
	SS II	70
	SS III	72
MV Adamu S.S.S, Kano	SS I	77
	SS II	71
	SS III	68
G.S.S.S Kunya, Kano	SS I	58
	SS II	50
	SS III	56
G.G.S.S Kura, Kano	SS I	78
	SS II	73
	SS III	69
Science College Gaya	SS I	58
	SS II	50
	SS III	50
G.S.S.S Dambatta, Kano	SS I	55
	SS II	53
	SS III	51

Table 4.11 indicates that all the Senior Secondary school Classes were over-populated, as the maximum students per class are expected to be forty (40), and anything above that number is considered as over population.

4.3 Inferential Analysis

Testing of Research Hypotheses

Research Hypothesis One: There is no significant difference between suggested methodology in Senior Secondary School Mathematics Curriculum and Effective Implementation of Curriculum Content.

The stated hypothesis was tested using Chi-Square**,** based on the data collected from the selected sample of the study. The stated hypothesis sought to identify the existence of difference (if any) between teachers' performance, commitment to lesson and effective curriculum implementation in Senior Secondary Schools. The result of the analysis is presented in contingency Table 4.12 below:

Table 4.3.1: Contingency Table of Difference between Suggested Methodology in Senior Secondary School Mathematics Curriculum and Effective Implementation of Curriculum Content

O	**E**	**O-E**	**$(O-E)^2$**	**$(O-E)^2/E$**
190	63.3	126.7	16052.89	253.6
97	32.3	64.7	4186.09	129.6
04	1.3	2.7	7.29	5.6
		X^2 Calculated		388.8
		Critical Value		15.5

Contingency Table 4.12 shows that there is significant difference between the suggested methodology(ies) and Mathematics curriculum content implementation in Senior Secondary Schools, as the stated null hypothesis was rejected by the result analysis. The X^2 calculated of 388.8 is greater than the critical value of 15.5at .05 level of significance therefore the null hypothesis is rejected. This indicates that the suggested methodologies were not effective in

motivating full implementation of mathematics curriculum content at Senior Secondary School level.

Research Hypothesis Two: There is no significant difference between instructional materials and effective implementation of curriculum content in Senior Secondary Schools in Kano State.

The hypothesis was tested using Chi-Square analysis. The result is presented in Table 4.13 below:

Table 4.3.2: Contingency table of the difference between Instructional Materials and Effective Implementation of Curriculum Content in Senior Secondary Schools

O	**E**	**O-E**	**$(O-E)^2$**	**$(O-E)^2/E$**
193	638.3	-445	198025	310.4
170	277.7	107.7	11599,3	41.8
157	464.9	307.9	94802.41	203.9
85	202.3	117.3	13759.3	68.0
		X^2 Calculated		624.1
		Critical Value		3.84

Contingency Table 4.16 indicated that there was significance difference between instructional materials suggested in the curriculum and effective implementation of Senior Secondary School Mathematics Curriculum as the Calculated X2 values (624.1) is significantly greater than the critical values of 3.84 at .05 level of significance. The stated null hypothesis is therefore rejected.

Research Hypothesis Three: There is no significant difference between teachers' qualification and Mathematics Curriculum implementation in Senior Secondary Schools

To test the stated null hypothesis, data was collected from the randomly selected sample of the study via the questionnaire instruments. The collected data was analyzed using Chi-Square. The result is presented in Table 4.8 below:

Table 4.3.3: Contingency Table of Significance Difference between Teachers Qualification and Curriculum Implementation

O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
367	312	55	3025	9.7
257	312	-55	3025	9.7
		X^2 Calculated		**19.4**
		Critical Value		**7.81**

Contingency Table 4.14 above indicates that there is significant difference between curriculum content and curriculum implementation in Senior Secondary School, as the X^2 calculated value of 19.4 is greater than the critical value of 7.81 at .05 level of significance, therefore the stated null hypothesis is rejected. This analysis shows that there exist significant difference between teachers' qualification and curriculum implementation.

Research Hypothesis Four: There is no significant difference between students' population and effective implementation of mathematics curriculum content in Senior Secondary Schools in Kano State.

To test the stated null hypothesis, data was collected from the randomly selected sample of the study via the questionnaire instruments. The collected data was analyzed using Chi-Square. The result is presented in Table 4.18 below:

Table 4.3.4: Contingency Table of Significance Difference between Students Population and Curriculum Implementation

O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
367	312	55	3025	9.7
257	312	-55	3025	9.7
		X^2 Calculated		**19.4**
		Critical Value		**7.81**

Contingency Table 4.15 above indicates that there is significant difference between students' population and curriculum implementation in Senior Secondary School, as the X^2 calculated value of 19.4 is greater than the critical value of 7.81 at .05 level of significance, therefore the stated null hypothesis is rejected. This analysis shows that there exist significant difference between students' population and curriculum implementation; as such the contents (curriculum) were not fully and effectively implemented as a result of over populated classroom setting.

provision of learners-centered approach in teaching learning processes.

4.4 Summary of Major Findings

Based on the analysis of the collected data, the following were discovered as the main or primary findings of the study, conducted to find out the level of Mathematics curriculum implementation in Senior Secondary Schools.

1. The suggested methodology (ies) in the mathematics curriculum content of Senior Secondary Schools prepared by the Nigerian Educational Research and Development Council were not appropriate for the effective implementation of mathematics curriculum content at the senior secondary school level, as the suggested methodology (ies); such as simulation and games,project and inquiry to reinforce the methodology (ies) as well as the curriculum contents were found to be inappropriate due to the difficulty and abstractness for implementation of mathematics curriculum.

2. The appropriateness of instructional materials to curriculum implementation indicated that most of the suggested instructional materials were not suitable to contents, students needs, suggested activities and methodologies.

3.Teachers qualification was discovered as one of the impediments to effective implementation of mathematics curriculum content in senior secondary schools as most of the teachers were not professionally qualified to teach mathematics.

4. That overcrowded classroom setting affects the level of Mathematics curriculum implementation in Senior Secondary Schools in Kano state.

4.5 Discussion of Findings

There were four stated research questions for the study.

Research question one sought to find out the relevance of suggested methodology and the content of the curriculum in the effective implementation of mathematics curriculum in senior secondary schools in Kano state. Many variables that are suggested as relevant to this question were analysed with a view to provide objective analysis. Answer to this question was provided in the analysis presented in Table 4.1, 4.2, 4.3, 4.4, 4.5 and 4.6. Finding in Table 4.1 which sought to analyse the relevance of the suggested methodology to learners need, population, content coverage and instructional materials revealed that the variables mentioned were not relevant to the suggested methodologies. This means that the variables suggested were not designed or selected to suit learners' psychological needs, as well as, the instructional materials meant to facilitate effective teaching and learning processes. In addition, it was equally discovered in Tables 4.2 and 4.3 that suggested activities intended to make learning more captivating and interesting were mostly teacher centred. This is justifiably indicated by the expressive words or verbs used in the curriculum. On the part of learners suggested activities, the same manifested trend is equally shown. The role of the duo in facilitating effective curriculum implementation or otherwise is basically on the area of learners participatory role and active engagement in teaching-learning processes, which are variables identified by constructivists as essentials in curriculum implementation. This is also based on their theoretical assumption that successful curriculum implementation is measured or determined by genuine level of learners understanding which can not be effectively obtained in a teaching learning environment where learners were unjustly made to become passive, dummy and act like vacuum cleaners. The type of learning atmosphere or

environment one is likely to obtain based on the suggested activities for teachers and learners is undoubtedly a teacher dominated context, leading to gross failure or shortcoming in the effective implementation of mathematics curriculum content in Senior Secondary Schools in Kano. In the same vein, other relevant variables in relation to the question of relevance of suggested methodology and content in the effective implementation of mathematics curriculum in Senior Secondary Schools are issues of the relevance of curriculum content and the level of curriculum implementation in schools. The analysis in Table 4.4,4.5 and 4.6 have indicated that both the contents and level of implementation were found to be grossly unsatisfactory in the effective and full implementation of the content. The topics that were supposed to be tought in the previous terms were carried over to the next terms, leaving most of the topics untaught. There are alot of social fact to support the finding or answer provided by the analysis presented in Tables 4.1-4.6 respectively; one of such obvious reality is on students massive failure in mathematics, for instance in the recent SSCE,WAEC November/December Examination Result for the 2013. There was overwhelming gross failure in mathematics as only 29.17% of the candidates passed with five credits including Mathematics and English, while 70.83% failed. Similar trend was also manifested in 2011 and 2012 as only 36.07% and 37.97% were able to obtain pass at credit level in Mathematics. Eguridu (2013), WAEC chairman, as cited in the Daily Trust Newspaper, indicates that lack of qualitative teaching which is akin to poor implementation of mathematics curriculum content is one of the major factors that constitute the problem of gross failure in mathematics. Another obvious viable reason to actually support the answer to stated research question is students' or candidates' indiscriminate preference of Social Science subjects and Arts based disciplines at the university and other tertiary institution level. One of the main reason responsible for the preference as explained by Demirkol, M.(2010) is students apparent failure in Mathematics at their O'level Examination Result, as a pass in Mathematics is a mandatory requirement for

admission into all science related disciplines. This trend has actually affected government ratio of 60:40 admission quota in science/arts subjects. In the same vein, the problem has contributed immensely in the deteriorating problem of massive youth unemployment, specifically, among the graduates. This is because of the demand of labour market which now shifted to science based manpower due to the global improvement and advancement in science and technology.

Research question two is answered by the analysis in Table 4.7 and 4.8 respectively. The question sought to find out the appropriateness of instructional materials in the effective implementation of Mathematics curriculum in Senior Secondary School. The inclusion of this question is based on the fact that instructional materials are identified by scholars and constructivists as essential instrument of curriculum implementation and also a viable factor employed as a tactic of ensuring effective implementation. Table 4.7 of the analysis analysed the appropriateness of the content in relation to selected contents or topics, students' needs, methodology, content coverage as well as the adequacy of the materials. Based on the obtained response patterns, it was discovered that the suggested instructional materials were not adequately relevant to the mentioned variables with the exception of content. One possible conclusion that can be drawn from the analysis is that the suggested instructional materials in the curriculum which are meant to make teaching and learning explicit, concrete and motivating, though relevant to the content, yet are irrelevant to the psychological needs of the learners. This further indicates that the suggested materials could not facilitate learners' interest which is an essential booster to effective teaching and learning processes. Consequently, diminishing interest in teaching learning processes breed learners low participatory role and poor grasp of what was taught. As indicated by scholars (Mehmet,2005;Demirkol,2010)instructional materials facilitate active transfer of learning. Based on this, one can easily deduce that with effective transfer of learning and continuous flow of previous learning experience into subsequent related learning task, learning processes are made

easier, quicker and effectively faster thereby facilitating the completion of curriculum content within the stipulated time frame. Without active transfer of learning and smooth transition of ideas into new learning, effective curriculum implementation will be unavoidably slower and the repercussion is poor and lower level implementation of curriculum content. Table 4.8 which is a supporting evidence for the analysis in Table 4.7 has shown that the suggested instructional materials in the Mathematics Curriculum Content prepared by the Nigeria Educational Research and Development Council were actually one sided, lop sided and not multi-dimentional in nature. This is because the materials were not meant to adequately satisfy the nature of individual differences inherently found in each context of learning, moreso, modern materials, realia, real objects and three dimensional objects were not adequately provided. In view of this, one can easily deduce that the recommended materials in the curriculum are meant to subject learners to mere dummy or passive listeners, a trend discouraged and rejected by the constructivists who encourage modern practical teaching and learning processes.

Research question three sought to find out teachers qualification/competence in relation to curriculum implementation, the question was rationally included because teachers qualification is being regarded by scholars, constructivists and curriculum experts as one of the basic fundamental external facilitating factors to effective curriculum implementation. The question was answered in the data analysis presented in Table 4.8.The analysis indicated that, most of the teachers responsible for the teaching of mathematics were not professionally competent to teach the subject. Most of the teachers teaching mathematics at the Senior Secondary School level in the area of study were not professionally trained to teach. In addition, there were some who were not trained in the discipline, in other words, they were disciplines of other specializations erroneously regarded as capable to teach mathematics. These erroneously perceived similar specializations were Chemistry, Physics, Geography, Economics, Commerce, Accountancy and other science and

management related disciplines where mathematics is essentially an integral part. The ugly trend of assigning teaching role to non-experts grossly contravenes teaching ethical practice, as well as government policy on teaching professionalism, as the policy states unambigously that a teacher must be professionally trained in a specific area of specialization. The obvious implication of unqualified teachers in curriculum implication is the fact that those teachers skip topics they can not competently handle, leaving many areas or topics uncovered and at the same time rendering the curriculum contents not fully implemented. Moreso, it is an authentic reality that mathematics teaching is handled by unqualified teachers as discovered by the analysis in Table 4.8 and other related studies(Aminu;2005;Olokor 2006 and Ivowi,2004)

As life is essentially dynamic, likewise our educational practice needs to reflect on the dynamic nature of society and human needs. Suggested activities need not be strictly focused on traditional approach, is old, less appealing and teacher–centered. Neo- dimensional, modern and learner centered approaches are essential for effective teaching and learning. It should equally be noted that the quality of teaching and learning is a viable parameter used by scholars in assessing the effectiveness of curriculum implementation; as such activeness and contents that are appealing, motivating and participatory are essential for the successful implementation of Mathematics curriculum in Senior Secondary Schools.

Research question four is answered by the analysis in Table 4.10. The question sought to find out how learners teeming population or over-crowded class setting is an impediment to curriculum implementation. The respondents indicated having over-crowded classroom which marred effective teaching and learning as well as classroom management. The analysis is supported by the result or data of student population in some selected classes in the area of study. The number of students exceeds the required number expected in each class; as such effective teaching and learning could not take place in such over-crowded setting, and this also affects implementation.

All the four stated research questions were answered by the tabular analysis (4.1 – 4.10) most of the answers were in affirmative, in other words, the responses indicated the presence of variables that serve as impediments to effective implementation of mathematics curriculum content in Senior Secondary Schools. The stated research questions attempted to provide answers on the appropriateness, and relevance of those essential variables, in the effective implementation of curriculum to some items within and outside the curriculum contents. These variables include; curriculum contents, level of implementation, suggested methodology, instructional materials, teachers' qualification and learners' population. Many scholars and researchers (Provo, 1971; Berman, 1977; Hord, 1997; Fullan, 1991; Farrelet'al, 1999; Collins, 2000; and Decaccoo, 2005 as cited in Aminu, 2005) have identified the stated factors or variables is quiet and essentially supportive in curriculum implementation. This fact is obvious, since without proper and the needed required professional qualification and competency, no objective can be realized, even with the existing problems of poor students background and inadequate teaching and learning facilities, professionally competent teachers can adequately and proficiently help in ameliorating the existing problem. In addition, lack of adequate and efficient trained Mathematics teachers coupled with students' poor background in Mathematics from the Junior Secondary Level, would most obviously affect full implementation of Mathematics curriculum contents in Senior Secondary Schools.

As life is essentially dynamic, likewise our educational practice needs to reflect on the dynamic nature of society and human needs. Suggested activities need not be strictly focused on traditional approach, as such methodological approach become old, less appealing and teacher–centered. Neo- dimensional, modern and learners centered approaches are essential for effective teaching and learning. It should equally be noted that the quality of teaching and learning is viable parameter used by scholars in assessing the effectiveness of curriculum implementation; as such

contents that are appealing, motivating and participatory are essential for the successful implementation of Mathematics curriculum in Senior Secondary Schools.

Based on the analysis of the four stated research questions in tables 4.1 – 4.10 it is plainly indicated that the level of mathematics curriculum implementation was low. The low level of implementation was precipitated by multiple factors: first; the content of the curriculum was not relevant to learner's psychological needs, aspiration and background. It was discovered that learners at the senior secondary school had already been affected by the problem of poor curriculum implementation, due to the fact that they were not properly and adequately taught at the junior secondary school level. This is confirmed by the analysis in table 4.5, as data collected from the learners note indicated that lesson topics were not based on termly scheduled, but topics brought from previous topics in a bid to complement learners deficiency. In addition teacher's qualification, irrelevant, suggested, instructional materials and over-crowded classroom settings were the most influential worrisome factors that grossly affect the full implementation of mathematics curriculum contents in Senior Secondary School in Kano state.

There were four null research hypotheses stated for the study. The hypotheses were tested by the Chi-Square statistical analysis. The hypotheses were designed to find out the existence of the differences or otherwise between the two stated variables in each of the hypotheses.

Research hypothesis one which sought to find out the difference between suggested methodology in Senior Secondary School Mathematics Curriculum and effective implementation of curriculum was tested by Chi-square analysis in Table 4.12. The analysis indicated that there was a significant difference between suggested methodology and curriculum implementation. This indicates that the suggested methodology were not significant in the effective implementation of curriculum contents, in other words, the suggested methodology (ies) were inappropriate in motivating the level of mathematics curriculum implementation in Senior Secondary School.

Research hypothesis two sought to identify the existence of significant difference or otherwise between the instructional materials suggested in the curriculum and the implementation of mathematics curriculum content in senior secondary schools. The hypothesis was tested by using Chi-square analysis, and the result rejected the null hypothesis. It was therefore established that there was significant difference between the suggested instructional materials and curriculum content implementation. What was revealed by the analysis was that the suggested instructional materials could actually facilitate curriculum content implementation. This was obviously justifiably based on the analysis of research questions four in Table 4.7 and 4.8. Both indicated that the instructional materials were not adequately provided and the few suggested ones were less motivating, one-sided, and incapable of satisfying the nature of individual differences, effective teaching and learning and grossly unavailable. These multiple problems associated with the use of the suggested instructional materials could not enhance speedy content coverage.

Research hypothesis three was on the difference between teachers qualification and curriculum implementation, while research hypothesis four considered students population and curriculum implementation, both hypotheses were rejected by Chi-square analysis in table 4.14 and 4.15 respectively. The two findings of the analysis relate significantly with the analysis on research question five and six on table 4.9, 4.10 and 4.11. Teachers' qualification and over-crowded classroom setting were identified as serious impediment to effective implementation of curriculum content. This fact is obviously justifiable, as many teachers teaching mathematics in schools were not professionally competent. Most of the teachers were either disciplined of science related area or N.C.E and Diploma Holders who were not professionally qualified to teach in Senior Classes. In addition, there were cases of teachers working without any teaching qualification. The implication of this in curriculum implementation is that unqualified teachers

skipped topics they could not teach. Similarly, they have poor method of teaching and do not even know how to break the curriculum content into teachable topics.

Over – crowded classroom setting was also discovered as a serious impediment to implementation of curriculum content, as conducive atmosphere for effective learning was jeopardized. All the four stated hypotheses of the study were rejected.

Based on the findings of the study, it was established that most of the findings relate significantly with other related studies. Finding of the study on the low level of mathematics curriculum contents relates with the findings of Aminu (2005). In addition, on the use of irrelevant suggested activities/methodology and instructional materials the finding relate significantly with that of Johnson (2000), Onikan (2005) and Aminu (2005).

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CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a comprehensive summary on assessment of the implementation of mathematics curriculum in senior secondary schools in Kano state. The conclusion focused primarily on the implication of the findings in teaching and learning of Mathematics in Senior Secondary Schools as well as the implication to curriculum planning and implementation. Recommendations are also provided by the researcher. The recommendations were made on the basis of the findings of the study. Objectives of the study; research questions and hypothesis were made to guide the study. Relevant data was collected from previous research findings and scholars' views. In addition, constructivist's theoretical approach was adopted as theoretical framework of the study.

5.2 Summary

Based on the major theoretical tenets of the constructivist approach to curriculum implementation, some aspects of the Senior Secondary Schools Mathematics Curriculum were assessed. Data was collected via the validated questionnaire instruments and record analysis. The data was collected from the randomly selected sample of 624 out of the population of 3,679 based on Morgan and Kreycie Formulae for determining the sample size of a given population. Two methods of data analysis were used for the analysis of the collected data. The first method of data analysis employed for the study was the Descriptive Analysis of Simple Percentage Method, which was employed to provide answer to the stated research questions of the study. Second, Inferential Method of data analysis of Chi-Square was employed to test the stated research hypotheses of the study. Based on the analysis of the collected data, the study discovered that Mathematics

curriculum at the Senior Secondary Schools level was not fully implemented. At the concluding one of the major recommendations was a review of the curriculum contents, especially in the

5.3 Conclusion

The study indicated that Mathematics curriculum implementation in Senior Secondary Schools was not fully implemented. Similarly, topics designed in the curriculum that were expected to be fully taught to students within a specified period of time were not fully and comprehensively taught. One of the most 0bvious impact of this short comings is actually on learners, as they are left half baked, and grossly ill-prepared to write exams and study science related courses in tertiary institutions. Mathematics is a basic pre-requisite subject for the study of Science and Technical subjects or courses the world over, as such, failure to master the subject is an obvious indication of inaccessibility to study Science or Technical related disciplines in tertiary institutions. This further indicates that the government's policy of 60:40 ratio of admission into tertiary institutions will never be fully realized with current trend of students' poor performance in Mathematics. Similarly, the need for curtailing high level of employment and the desire to foster national development will continue to remain a mere illusion and unattainable without proper and sound training in Mathematics. Poor or low level of implementation of Mathematics curriculum at the Senior Secondary School Level has therefore impact on national development, economic empowerment, self-reliance education, personal development and accessibility to university education.

Findings of the study identified many factors as facilitators to effective implementation of Mathematics curriculum contents in Senior Secondary Schools. These factors are basically; the provision of adequate and relevant facilities needed for effective teaching and learning, application of methods that allow learners active participation in teaching and learning processes, regular supervision, and good students' background in Mathematics as well as, teachers

qualifications. By implication, the absent of these external facilitators implies that Mathematics curriculum can never be fully implemented, Findings of the study revealed that the identified internal factors in the curriculum were not relevant to learners need, background, interest and real life situation. One obvious conclusion derivable from the mentioned findings is that, The traditional approach is therefore a challenge to full and effective implementation of curriculum content in schools.

The pedagogical conclusion deduced from the findings of the study is double faced. The first one is on the way and manner teachers in Senior Secondary School teach Mathematics. This is not in conformity with professional standard. This is confirmed by the Mathematics teachers' professional background as well as students' poor background. These twin factors are detrimental to effective teaching and learning processes, and are constraints to curriculum implementation.

5.4 Recommendations

Based on the findings of the study, the researcher wishes to provide the following recommendations.

1. Mathematics curriculum contents should be reviewed to reflect on the modern methods of teaching and internationally approved practices.
2. Competent teachers should be employed and assigned to teach Mathematics at all levels of education.
3. Effective supervision and inspection at close intervals should be carried out, as a way of checking teachers' performance and learners' problems.
4. Relevant authorities should make adequate provision of teaching and learning facilities.
5. Learners with poor background in Mathematics should be demoted or given specialized instruction as a mean of encouraging them to cope with the selected topics in the syllabus.

5.5 Suggestions for further Studies

1. Comparative studies or research on the level of Mathematics curriculum implementation and students' performance in Senior Secondary School Certificate should be conducted as a means of assessing the level of impact.
2. Researches on the relevance of Senior Secondary School Mathematics Curriculum Contents to the scientific and technological need of contemporary Nigeria should be conducted.

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APPENDIX A

TEACHERS' QUESTIONNAIRE

Options are provided for each question among which you are expected to choose one. The abbreviations used as SA, A, SD, DA and UD means: Strongly Agreed, Agreed, Disagreed and Undecided. Any information given will only be used for the purpose it is intended and will be treated as confidential. Your cooperation is highly needed.

SECTION A:

Name of school Zone

Academic Qualification Discipline/Specialization

Teaching Subject Class

Years of Teaching Experience

S/NO	ITEMS	SA	A	SD	D	UD
1.	Mathematics curriculums contents are coverable within stipulated period.					
2.	Topics are not arranged in order of difficulty.					
3.	Topics are not arranged to reinforce transfer of learning.					
4.	Topics or curriculum contents are designed to encourage learners-centered teaching.					
5.	Recommended methods of teaching are traditionally based.					
6.	Poor students/learners background affects full implementation of the curriculum content.					
7.	There are available textbooks to facilitate full implementation of Mathematics curriculum content.					
8.	There is adequate provision of instructional materials to facilitate effective teaching and learning.					
9.	Mathematics teacher's competence and academic qualification influence curriculum implementation in Senior Secondary School.					

10.	Students attitude to Mathematics facilitate curriculum implementation.					
11.	Students have poor background in Mathematics.					
12.	Mathematics curriculum objectives are vaguely stated.					
13.	Adequate teaching and learning facilities for the teaching of Mathematics are adequately provided.					
14.	Contents are relevant to students' needs, skills and interest.					
15.	Students are adequately prepared to write S.S.C.E.					
16.	All topics are covered for students to perform well in S.S.C.E.					
17.	Some topics are skipped.					
18.	Mathematics curriculum contents are made to provide opportunities for students to learn by doing.					
19.	Contents and activities are made to make teacher's role in the classroom dominant.					
20.	The level of Mathematics curriculum implementation in Senior Secondary School is high.					
21.	The level of Mathematics curriculum implementation in Senior Secondary School is medium.					
22.	The level of Mathematics curriculum implementation in Senior Secondary School is low					
23.	The level of Mathematics implementation at the Senior Secondary School is at zero level.					
24.	Regular supervision and inspection facilitate Mathematics curriculum implementation in Senior Secondary School.					
25.	Provision of coverable Mathematics contents aid curriculum implementation.					
26.	Keeping of up-date record of work by Mathematics teachers foster curriculum mplementation.					

27.	Students good background in Mathematics is essential for effective curriculum implementation.					
28.	Students active participation during Mathematics lesson encourages full implementation of Mathematics curriculum.					
29.	Teachers academic qualification facilitates full implementation of curriculum contents.					
30.	Instructional materials are relevant to suggested methodology					
31.	Instructional Materials are relevant to students population					
32.	Suggested instructional materials are adequately provided					
33.	Instructional materials facilitate implementation of curriculum content					
34.	Instructional materials are reevant to learners needs and background					
35.	I have over-crowded classroom setting					
36.	I have manageable population					
37.	Over-crowded classes affect classroom control/management					
38.	Over-populated classroom does not allow conducive learning envirnment					
39.	Classroom population affect content coverage					
40.	I recommend the change of Mathematics curriculum to facilitate full and effective implementation.					

APPENDIX B

SUPERVISORS QUESTIONNAIRE

This questionnaire is designed for M. Ed. Research in the implementation of Mathematics curriculum of senior secondary schools in Kano State.

SECTION A

RESPONDENT'S INFORMATION

Name of school: _____

Qualification: _____

Area of Supervision: _____

Years of experience: _____

SECTION B

Options are provided for each question among which you are expected to choose one objectively. The abbreviations used as SA, A, SD, DA and UD means: Strongly Agreed, Agreed, Disagreed and Undecided respectively. Any information given will only be used for the purpose it is intended and will be treated as confidential. Your cooperation is highly needed.

S/NO	ITEMS	SA	A	SD	D	UD
1.	These aspect are considered in inspection and supervision: coverage of curriculum content, relevance of instructional materials and suitability of methodology.					
2.	I am satisfied with the Teachers coverage of curriculum content within stipulated time.					
3.	There are areas not covered in the curriculum content.					
4.	Time factor affects content coverage.					
5.	Selected items / topics need to be reduced to facilitate content coverage.					

6.	Lack of qualified Teachers is an impediment to full content coverage.					
7.	Students are adequately prepared to sit for any target examination.					
8.	Student's performance in examination is determined by the extent to which course content are covered.					
9.	Students resort to examination malpractice due to poor coverage of curriculum content.					
10.	There is an urgent need to redesigned Mathematics curriculum.					
11.	Curriculum contents are arranged from simple to complex					
12.	Curriculum contents are relevant to students needs,skills and interest.					
13.	Contents and activities make teachers role ominant.					
14.	Students participation encourages curriculum implementation in Senior Secondary School.					
15.	Keeping of up-date record by teachers facilitate curriculum implementation in schools.					
16.	The level of curriculum implementation in Senior Secondary School is high.					
17.	The curriculum implementation in Senior Secondary School is medium.					
18.	The level of curriculum implementation in school is low.					
19.	The level of curriculum implementation in school is low.					
20.	There is a zero level of curriculum implementation in Senior Secondary School.					
21.	Adequate teaching and learning facilities are essential factors for effective implementation of curriculum contents.					

22.	Instructional materials are relevant to suggested methodology					
23.	Instructional Materials are relevant to students population					
24.	Suggested instructional materials are adequately provided					
25.	Instructional materials facilitate implementation of curriculum content					
26.	Instructional materials are reevant to learners needs and background					
27.	I have over-crowded classroom setting					
28.	I have manageable population					
29.	Over-crowded classes affect classroom control/management					
30.	Over-populated classroom does not allow conducive learning envirnment					

APPENDIX C

Distribution of Subjects (Mathematics Teachers)

S/N	ZONE	SCHOOLS	SAMPLE SIZE
1	Kano Municipal	1-GSSS Gwale	12
		2-GGSSS S/Mainagge	12
		3-Rumfa College	12
2	Nassarawa	1-GSSS Vice Adamu	11
		2-GSSS Kawaji	11
		3-GSSS Maikwatashi	11
3	Minjibir	1-GSSS Kunya	11
		2-GSSS Minjibir	11
		3-GSSS Ungogo	11
4	Bichi	1-GGSS Kwa	11
		2-GSSS Bichi	11
		3-GSSS Tsanyawa	11
5	Dambatta	1-GGSS Dambatta	11
		2-GSSS Dambatta	11
		3-GSS Makoda	11
6	Tudun Wada	1-GSSS T/Wada	11
		2-GGSS Tiga	11
		3-Science & Technical School Bagauda	11

7	Rano	1-GSSS Kibiya	11
		2-GSSS Rano	11
		3-GGSS Kura	11
8	Gwarzo	1-Unity School Karaye	11
		2-GGSS Kunchi	11
		3-GSSS Kabo	11
9	Wudil	1-GGSS Yargaya	11
		2-GGSS Gano	11
		3-GSSS Wudil	11
10	Gaya	1-Science & Technical, Gaya	11
		2-GSSS Gaya	11
		3-GGSS Toranke	11
	Total	**30**	**333**

APPENDIX D

Distribution of Subjects (Supervisors/Inspectors)

S/N	Units/Institutions	Sample Size
1	Ministry of Education /Kano Educational Resource Department	50
2	Kano State Teachers Service Board	45
3	Kano State Science and Technical Board	45
4	WAEC	40
5	NECO	40
6	NABTEB	40
7	NERDC	31
	Total	**291**

APPENDIX E

Appropriateness of Curriculum Contents for Effective Implementation of the Curriculum in Senior Secondary Schools

Contents/items in the curriculum	Response Pattern/Format					TOTAL
	SA	A	SD	D	UD	
Contents are arranged from simple to complex, known to unknown.	210 33.7	171 27.4	117 18.8	96 15.4	30 4.8	624 100
Contents are relevant to students' needs, skills and interest.	162 25.9	133 21.3	165 26.4	153 24.5	11 1.8	624 100
Contents are made to provide opportunities for students to learn by doing.	163 26.1	160 25.6	167 26.8	130 20.8	04 0.6	624 100
Contents and selected activities are made to enrich the curiosity and desire to search	165 26.5	160 25.6	160 25.6	125 20.0	14 2.2	624 100
Activities are related to learners life and environment	122 19.6	140 22.4	190 30.4	94 15.1	78 12.5	624 100
Students get active roles in the recommended activities	141 22.6	154 24.7	191 30.6	135 21.6	03 0.5	624 100
Contents activities are made to make teachers role dominants	190 30.4	170 27.3	120 19.2	100 16.0	44 7.1	624 100
Contents are complex for students background	217 34.8	180 28.8	130 20.8	86 13.8	11 1.8	624 100

APPENDIX F

Action Words for Learners Suggested Activities in Mathematics Curriculum

Action Words	Description		
	Cognitive	**Psychomotor**	**Affective**
Mention	(	X	X
Define	(	X	X
Draw	X	(	X
Identify	(	X	X
Study	(	X	X
Explain	(	X	X
Solve	(	X	X
Apply	(	(	(
Factories	(	X	X
Joints	X	(	X
Write	X	(	X
Negates	X	X	(
Recall	(	X	X
Find	(	X	X
Combine	(	X	X
Separate	(	(	X

Construct	X	(	X
Appreciate & apply	X	X	(
Carry out	(	(	X
Convert	(	(	X
Enumerate	(	X	X
Determine	(	X	X
Find	(	X	X
Examine practice	(	X	X
Approximate	(	X	X
Submit	(	X	X
Cut the given---	X	(	X
Use	X	(	(
Distinguish	(	X	X
Rewrite	X	(	X
Give	(	X	X
Total	**21/65.6%**	**08/25.0%**	**03/9.4%**

APPENDIX G

Learners Suggested Activities in Mathematics Curriculum

Activities/Learning Domain	Number	Percentage
Cognitive Domain	21	65.6
Psychomotor Domain	08	25.0
Affective Domain	03	9.4
Total	32	100

APPENDIX H

Level of Mathematics Curriculum Implementation is Senior Secondary School

Levels	**Response pattern /format**					
	SA	**A**	**SD**	**D**	**UD**	**TOTAL**
High	80	49	252	191	52	624
	12.8	7.9	40.4	30.6	8.3	100
Medium	176	156	128	131	24	624
	28.2	26.4	20.5	20.9	3.9	100
Low	99	95	224	186	20	624
	15.9	15.2	35.9	29.8	3.2	100
Zero	70	52	230	197	75	624
	11.2	8.3	36.9	31.6	12.0	100

APPENDIX I

Last Mathematics Topics Taught in Some Selected Senior Secondary School Classes.

Schools	**Classes**	**Topics last taught**	**Terms & Week**	**Topics in cc & syllabus**	**Remarks** Timely	**Not Timely**
Govt Senior Sec.	SS1	Quadratic equation	2nd /wk7	Construction	X	√
Sch. Gwale,	SS2	Quadratic equation	" "	Trigonometry	X	√
Kano	SS3	Trigonometric	" "	Differentiation	X	√
Govt Girls	SS1	Logical reasoning	2nd /wk7	Construction	X	√
Senior	SS2	Algebraic fractions	" "	Trigonometry	X	√
Sec. Sch. Dala	SS3	Longitude and latitude	" "	Differentiation	X	√
Muhammad Vice	SS1	Simple equation and	2nd /wk7	Construction	X	√
Adamu Senior	SS2	variation logarithms	" "	Trigonometry	X	√
Sec. School,	SS3	coordinate geometry of	" "	Differentiation	X	√
Fagge.		straight lines				
Govt. Senior Sec	SS1	Quadratic equation linear	2nd /wk7	Construction	X	√
Sch.Kunya.	SS2	in equalities graphs	" "	Trigonometry	X	√
	SS3	trigonometric ratios (1st term)	" "	Differentiation	X	√
Govt Girls	SS1	Simple equation variation	2nd /wk7	Construction	X	√
Senior	SS2	quadratic equation	" "	Trigonometry	X	√
Sec. Sch Kura.	SS3	longitude and latitude	" "	Differentiation	X	√
Govt. Science	SS1	Construction	2nd /wk7	Construction	X	√
College, Gaya	SS2	Trigonometry	" "	Trigonometry	X	√
	SS3	Differentiation	" "	Differentiation	X	√
Govt Senior Sec.	SS1	Logarithms	2nd /wk7	Construction	X	√
School Dambatta	SS2	Sequence & series	" "	Trigonometry	X	√
	SS3	Metrics and determinants	" "	Differentiation	X	√

APPENDIX J

Factors that Facilitate Effective Implementation of Mathematics Curriculum in Senior Secondary School

Factors	Response pattern /format					
	SA	**A**	**SD**	**D**	**UD**	**TOTAL**
Regular Supervision and Inspection	178 28.5	140 22.4	151 24.2	96 15.4	59 9.5	624 100
Keeping of up to date records	180 28.9	121 19.4	181 29.0	99 15.9	43 6.9	624 100
Provision of coverable contents	197 31.5	173 27.7	141 22.6	103 16.5	10 1.6	624 100
Students good background	199 31.9	164 26.3	173 27.2	81 12.9	07 1.1	624 100
Teachers qualification	181 29.0	156 25.0	151 24.2	88 14.1	48 7.7	624 100
Students participation	169 27.1	160 25.6	160 25.6	97 15.5	38 6.1	624 100

APPENDIX K

Relevance of Suggested Methodology to Effective Implementation of Curriculum Content in Senior Secondary Schools

Relevance of Methodology	Response pattern/Format					TOTAL
	SA	A	SD	D	UD	
Relevance to Suggested Instructional Materials	151 24.2	96 15.4	178 28.5	140 22.4	59 9.5	624 100
Relevance to Students Population	97 15.5	150 24.40	179 28.7	160 25.6	38 6.1	624 100
Relevance of learners background needs	103 16.5	141 22.6	197 31.5	173 27.2	10 1.6	624 100
Relevance to Learners Centered Approach	81 12.9	164 26.3	199 31.9	173 27.2	07 1.1	624 100
Relevance of Content Coverage	159 25.5	140 22.4	180 28.8	117 18.8	28 4.5	624 100

APPENDIX L

Appropriateness of Instructional Materials in the Effective Implementation of Curriculum Content in senior Secondary Schools

Appropriateness to:	Response pattern/Format					TOTAL
	SA	A	SD	D	UD	
Contents/Topics	301	209	72	31	11	624
	48.2	33.5	11.5	4.9	1.8	100
Students needs	119	138	127	130	110	624
	19.1	22.1	20.4	20.8	17.6	100
Teachers Suggested Activities/ Methodology	152	151	117	124	80	624
	24.4	24.2	18.8	19.8	12.8	100
Content coverage	193	170	157	85	10	624
	30.9	27.2	25.2	13.6	3.0	100
Adequacy of the Materials	207	186	103	92	36	624
	33.2	29.8	16.5	14.7	5.8	100

APPENDIX M

Instructional Materials with the Given Topics in the Senior Secondary School Mathematics Curriculum

Topics	Class	Suggested instructional materials
Number System	SS I	Charts
Modular Arithmetics	SS I	Charts
Logarithms	SS I	Charts
Sets	SS I	Real Objects
Simple Equations	SS I	Charts
Logical Reasoning	SS I	Charts
Construction	SS I	Real Objects
Presentation (Data)	SS I	Graph
Logarithms	SS II	Charts
Approximation	SS II	Models/Charts
Sequence and Series	SS II	Models/Charts
Quadratic Equation	SS II	Graph
Logical Reasoning	SS II	Charts
Algebraic Fraction	SS II	Charts
Trigonometry	SS II	Charts
Bearing	SS II	Charts
Probability	SS II	Real Objects
Surds	SS III	Charts
Matrices and Determinants	SS III	Charts
Logarithms	SS III	Charts
Arithmetic of Finance	SS III	Charts
Quadratic Equation	SS III	Charts
Algebraic Fraction	SS III	Charts, Computer

APPENDIX N

Professionals/Academic Qualifications of Mathematics Teachers

Teaching in Senior Secondary Schools

Qualifications	**Response**	**Percentage**
P.hd	00	00
M.Ed	02	0.6
M.Sc (Maths)	02	0.6
M.Sc (Sciences)	04	1.2
B.Sc Ed (Maths)	37	11.1
B.Sc (Maths)	48	14.4
B.Sc (Science)	86	25.8
N.C.E.	92	27.6
ND	31	9.3
Others	31	9.3
Total	**333**	**100**

APPENDIX O

Learners Population and Effective Implementation of Mathematics Curriculum Content

Response	Response pattern/Format					TOTAL
	SA	A	SD	D	UD	
I have over populated classroom	201	92	16	06	18	333
	60.4	27.6	4.8	1.8	5.4	100
I have manageable population in my class	10	16	226	51	30	333
	3.0	4.8	67.9	15.3	9.0	100
Over–population effective in classroom management	08	10	209	100	06	333
	2.4	3.0	62.8	30.0	1.8	100
Over–populated classroom suitable for content coverage	08	10	207	89	19	333
	2.4	3.0	62.2	26.7	5.7	100
Over-populated classroom suitable for effective teaching and learning	10	16	222	53	32	333
	3.0	4.8	66.7	15.9	9.6	100

APPENDIX P

Learners Population in Some Selected Senior Secondary Schools in Kano State

Schools	Classes	Number of Students
G.S.S.S. Gwale, Kano	SS I	89
	SS II	90
	SS III	73
G.G.C. Dala, Kano	SS I	91
	SS II	70
	SS III	72
MV Adamu S.S.S, Kano	SS I	77
	SS II	71
	SS III	68
G.S.S.S Kunya, Kano	SS I	58
	SS II	50
	SS III	56
G.G.S.S Kura, Kano	SS I	78
	SS II	73
	SS III	69
Science College Gaya	SS I	58
	SS II	50
	SS III	50
G.S.S.S Dambatta, Kano	SS I	55
	SS II	53
	SS III	51

Summary of Contingency Table of Significance Difference between Curriculum Content and Curriculum Implementation.

Yes	367
No	257

Summary of Contingency Table of Difference between suggested methodology in Senior Secondary School Mathematics Curriculum and Effective Implementation of Curriculum Content.

Yes	190
No	97

Summary of Contingency Table of the Difference between Students Academic Performance and Mathematics Curriculum Implementation in Senior Secondary Schools

Yes	307
No	240

Summary of Contingency table of the difference between instructional materials and effective implementation of curriculum content in Senior Secondary Schools

Yes	170
No	157

Summary of Contingency Table of Difference between teacher's performance and curriculum implementation in Senior Secondary Schools in Kano State.

Yes	190
No	97

Summary of Contingency Table of Significance Difference between Curriculum Content and Curriculum Implementation

Yes	367
No	257