EVALUATION OF THE IMPLEMENTATION OF BASIC SCIENCE AND TECHNOLOGY CURRICULUM IN JUNIOR SECONDARY SCHOOLS IN KADUNA STATE, NIGERIA

BY

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A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER DEGREE IN EDUCATION (CURRICULLUM AND INSTRUCTION)

DEPARTMENT OF EDUCATIONAL FOUNDATIONS,
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DECEMBER, 2019

DECLARATION

I, LAAH Deborah declare that this Dissertation titled “Evaluation of the Implementation of Basic Science and Technology Curriculum in Junior Secondary Schools in Kaduna State, Nigeria. Is a record of my work and to the best of my knowledge has not been presented partially or wholly anywhere for the award of a higher degree in a university or any other institution. All sources of information have been duly acknowledged in the reference.

…… **……...……**

LAAH Deborah **Date**

CERTIFICATION

This Dissertation titled "EVALUATION OF THE IMPLEMENTATION OF BASIC SCIENCE AND TECHNOLOGY CURRICULUM IN JUNIOR SECONDARY SCHOOLS IN KADUNA STATE, NIGERIA" meets the regulations governing the award of the Masters Degree in Curriculum and Instruction of Ahmadu Bello University (ABU), Zaria and is approved for its contributions to knowledge and literary presentation.

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Chairman, Supervisory Committee

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DEDICATION

This work is dedicated to my loving and caring Mother, Mrs. Martha La'ah Jarumi.

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All Glory be to GOD Almighty, the creator of heaven and earth, for his Grace and guidance over me all through the course of my postgraduate program at Ahmadu Bello University, Zaria. I am indeed indebted to my Aged beloved Parents Mr and Mrs LAAH Jarumi for your prayers and Encouragement. I LOVE YOU.

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LIST OF ABBREVIATIONS

BST	-	Basic Science and Technology
JSS	-	Junior Secondary School
UBE	-	Universal Basic Education
UBEC	-	Universal Basic Education Commission
NCE	-	National Council on Education
NERDC	-	Nigeria Educational Research and Development Council
MDGs	-	Millennium Development Goals
NEEDS	-	National Economic Empowerment and Development Strategies
CIPP	-	Context, Input, Process, Product
PTA	-	Parents Teachers Association
NGOs	-	Non Governmental Organizations
FRN	-	Federal Republic of Nigeria
SMT	-	Science Mathematics Teachers
EE	-	Environmental Education
DAE	-	Drug Abuse Education
POP/FLE	-	Population and Family Life Education
STI	-	Sexually Transmitted Infections
HIV	-	Human Immuno Deficiency Virus
AIDS	-	Acquired Immuno Deficiency Syndrome
WAEC	-	West African Examination Council
NECO	-	National Examination Council
NATEB	-	National Business and Technical Examination Board
JAMB	-	Joint Admission and Matriculation Board

NCCE	-	National Commission for Colleges of Education
NUC	-	National Universities Commission
NBTE	-	National Board for Technical Education
NTI	-	National Teachers Institute

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ABSTRACT

This study was set to investigate the issue of the implementation of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna state. the study was carried out with five objectives, which are to assess the extent of content coverage in the implementation of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna state, to determine the utilization of instructional materials in the implementation of Basic Science and Technology Curriculum between public and private junior Secondary Schools in Kaduna State among others. Research questions and hypothesis were formed in line with the objectives. The study adopted a descriptive survey Design. The instruments used for data collection was Questionnaire and Observation schedule from the randomly selected sample of 322 out of the population of 2484, the questionnaire for principal, teachers and students was made up 50 Items. Descriptive and inferential methods of data were both employed. Findings of the study revealed that Basic Science and Technology Curriculum contents between public and private Junior Secondary School in Kaduna State was significantly covered ($P=0.000<0.05$). It was also discovered that the instructional materials used by teachers for the implementation of Basic Science and Technology curriculum between public and private junior secondary school was significantly utilized($P=.000<0.05$) in Kaduna State among others. Based on the findings and Conclusion of the study, recommendations were made that if Basic Science and Technology curriculum content is to be covered in junior secondary school in Kaduna state, school administrators should intensify efforts to see that curriculum contents are covered extensively through internal supervision and motivation. Also school administrators should intensify efforts to adequately provide functional instructional materials in public and private junior secondary schools in Kaduna State among others.

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

The Implementation of the Basic Science and Technology programme started in July, 2006 with the appropriation of the UBE fund to the Universal Basic Education Commission (UBEC) and subsequent disbursement to States. The education programme is regarded as a reinforcement of the 9-3-4 policy on education rather than a new policy in itself. The New Basic Science curriculum was approved by the National Council of Education (NCE) in December 2005. There is no doubt that the curriculum is the bedrock of any educational reform of which the Basic Science and Technology is not an exception. The main objectives of the Basic Science and Technology programme according to the Federal Republic of Nigeria (2013), include; preparing students to acquire adequate laboratory and field skills, inculcation of meaningful and relevant knowledge in basic science and the ability to apply scientific knowledge to everyday life in matters of personal and community health, and agriculture; reasonable and functional scientific attitudes.

However, as important as the objectives of teaching Basic Science and Technology appear, there is no certainty whether these objectives are achieved as documented evidences. It has been observed that most junior secondary school teachers do not have prerequisite knowledge of the objectives of Basic Science and Technology Curriculum. Among the resources for the implementation of Basic Science and Technology programme, the Basic Science and Technology teachers occupies a strategic position as the quality of teachers in any educational programme determine to a large extent the quality of the system itself (Onyedrian, 2010).

The importance of science and technology to national development in the life of any country cannot be over emphasized. This is because knowledge and skills in science and technology are very vital in the development of any society. Mulemwa, (2005) points out that, the fast changing applications of science and technology and the global reliance on its processes

and products in all areas of human endeavour have made them invaluable that any society or country without them risks being alienated from the global village. This means that for an individual to be well-grounded in science, and competent enough to face the challenges of life in his society, he or she must have gone through a science programme that is well planned, assessed and implemented.

There has been growing concern throughout the country over the years about the discouraging state of teaching and learning of Integrated Science. This has arisen mainly as a result of a failure within teaching-learning contexts to illustrate the connections between classrooms Integrated Science and the environment learners come from. It has been argued that junior secondary school (JSS) students must be well grounded in Basic Science and Technology at this level for them to be able to study the core science subjects such as Biology, Chemistry, Physics and so on.(Sambo 2012).

The 9-3-4 system of education is referred to as universal basic education (UBE) which implies that every child spend the first 9-years of basic and compulsory education up to the junior secondary school (JSS-3) level, another three years in the senior secondary school, and 4-years in the tertiary institutions. The system operates a curriculum with comprehensive opportunities for all candidates having varying talents and abilities to acquire different and relevant skills through technical, commercial and vocational subjects. The prevailing system of education in the country also lays great emphasis on the teaching of science and technology at all levels of the 9-3-4 education structure. With the adoption of the National Policy on Education, the Basic Science and Technology programme was introduced as core subject at the Junior Secondary School level to introduce students to the world of science and to prepare them for higher education in Science and Technology. Basic Science and Technology is a science subject taught at the lower, upper primary and lower upper basic junior secondary school levels. Basic Science in junior secondary school is a subject of study which is devised and presented in such a way that students gain the

concept of the fundamental unity of science, the commonality of approach to problem of scientific nature and helps students to gain an understanding of the roles and functions of science in everyday life and the world in which they live. Baiki (2000),in Agbo(2008),stated that, Basic science is the bedrock to advance studies in science, technology and engineering.

For the past several years (2007-2012), the percentage of students who obtained a credit pass in Basic Science and Technology was low in Kaduna State. For example, the JSSCE results that were released in 2012 showed that 33.9%, 38.6% and 21.5% of students obtained a credit pass in Basic Science respectively. It was observed that, the percentage of credit pass for Basic Science and Technology was low compared to home economics subjects. Reasons among others such as poor utilization of instructional methodology in teaching Basic Science and Technology, lack of content coverage by the teacher among others. (Sambo, 2012).

The need to evaluate the Implementation of the Basic Science and Technology programmes after almost eleven years of its establishment has been stressed by Ortyoyande, (2006), FRN (2007), Ajaja and Kpangbon (2007), Ajelem (2008), Ajaja (2009), and Balasa, and Bello, (2008), respectively. Generally, when a programme is evaluated, some data related to the programme are collected, analysed and interpreted so that decisions regarding the programme can be made. These decisions may lead to programme improvement, programme re-planning and personal improvement, among others. It is evident that the implementation of Basic Science and Technology programmes in most junior secondary schools in Nigeria may be unsatisfactory. The situation in Kaduna State may not be left out; hence the need to assess the Implementation of what exists in the Basic Science and Technology programme in Kaduna State, which involves the collection of data and the use of such data to assess the effectiveness of the quality of new science programme. (Onwuegbuna,2005). Mustapha (2001), further maintained that, educational programmes are assessed to determine the extent to which the purposes for such programmes are being achieved.

Curriculum evaluation is an empirical, field-based attempt to find out how the use of particular curriculum content only meets the objectives of implementing it in schools. Olaitan and Ali, (2007) viewed curriculum content in terms of how it relates to the national and individual objectives. The achievement of the objectives is partly determined in terms of how well the curriculum is implemented. For effective implementation of the Basic Science and Technology curriculum in Junior Secondary Schools, teachers need to possess the required competency.

The study observed that most of the junior secondary schools in Kaduna state have inadequate qualified Basic Science and Technology teachers, on a visit to these schools, the researcher observed that chemistry, Geography teachers are assigned to teach Basic Science and Technology. The issues of Basic Science and Technology teachers qualifications cannot be overstressed.

Many teachers in sub-Saharan Africa, including are not able to apply modern information technologies in teaching due to computer illiteracy hence they mostly rely on lecture method of teaching (Haambokoma, 2002) in Adenipekaan (2009). Failure to expose learners to hands on experiences has resulted in their low academic achievement in the SMT subjects namely Mathematics, Biology, Chemistry, Physics and Agriculture.

A study by Adeogun (2001) in HajiyaAlhaji REM (2008), in Nigeria found that the quality of any education system depends on the quality of teachers. Review of related literature indicates that the most important school- based determining factor of students' achievement is the teacher quality (Harris and Sass, 2008).

The study observed that, planned curriculum leads to an effective teaching and learning process both in and outside the school. More so because Science and Technology plays a key role in the nation's economy, it is pertinent that students should pay more attention to understand this subject so as to be self-reliant and also become functional members of the society. The

effective implementation of Basic Science and Technology as a subject will go a long way in making impact when there are adequate teaching materials and qualified teachers to teach the subject to the best of their knowledge.

1.2 Statement of the Problem

Basic Science and Technology is an integrated science subject in the curriculum of Junior Secondary Schools where students are supposed to acquire basic knowledge, skills and attitudes about science and technology. It has been observed that many students find this subjects to be difficult and uninteresting due to; large class sizes, insufficient resources, poor teaching skills and inadequate of support for teachers among other factors further limit the effective implementation of the Basic Science and Technology curriculum in Nigerian Junior Secondary Schools. It is reported by Junior WAEC, that 50% of the students who sat for the examination in the year 2014 and 2015 failed. The current situation of Basic Science and Technology teaching and learning in Nigeria is a concern to all including; government and the society at large. These bring about the curiosity to ascertain the extent to which Basic Science and Technology curriculum is being delivered and whether the instructional materials, teachers' qualification, curriculum contents, pedagogical methods, learning environment and evaluation techniques are adequate in bringing the desired changes in the learners. The failure of students in Basic Science and Technology could be attributed to ineffectiveness in the implementation of the Basic Science and Technology curriculum in our schools (Ishaya 2015).

In addition, it is very clear that Basic Science and Technology Education in Nigeria is faced with numerous problems that need to be addressed so that the goal of equipping students to live effectively in our modern age of science and technology, as formulated in the Federal Government of Nigeria (2013), will be achieved. It is, however, believed that if appropriate steps are not taken to address these lingering barriers to the reform, the citizens will not be able to develop scientific literacy necessary for coping in the modern scientific and technological world.

It is imperative for the issues involved to be examined empirically in the context of Basic Science and Technology Education in Nigeria. And with these issues at heart, the researcher embarked on an empirical research in order to evaluate the level at which Basic Science and Technology curriculum is being implemented and the problems militating against its proper implementation especially at the lower basic level of education in Nigeria.

1.3 Objectives of the Study

The study is guided by the following specific objectives, which are to:

1. assess the extent of content coverage in the implementation of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria.
2. determine the utilization of instructional materials by teachers in the implementation of Basic Science and Technology curriculum between public and private junior secondary school in Kaduna State, Nigeria.
3. find out the variety of instructional methods used by teachers in the implementation of Basic Science and Technology curriculum between public and private junior secondary school in Kaduna State ,Nigeria.
4. identify the variety of assessment techniques used in the implementation of Basic Science and Technology curriculum between public and private junior secondary school in Kaduna State ,Nigeria.
5. asses the qualification of teachers in the implementation of Basic Science and Technology curriculum between public and private junior secondary school Kaduna State, Nigeria.

1.4 Research Questions

The following are the research questions that guide the research work.

1. What is the extent of content coverage in the implementation of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria?
2. To what extent is the instructional materials utilized by Basic Science and Technology teachers in the implementation of Basic Science and Technology curriculum between public and private junior secondary school in Kaduna State, Nigeria?
3. What are the instructional methods used by teachers in the implementation of Basic Science and Technology curriculum between public and private junior secondary school Kaduna State ,Nigeria?
4. What are the variety of assessment techniques used in the implementation of Basic Science and Technology curriculum between public and private junior secondary school in Kaduna State, Nigeria?
5. What are the qualifications of teachers in the implementation of Basic Science and Technology curriculum between public and private junior secondary school in Kaduna State, Nigeria?

1.5 Hypotheses

Based on the research objectives, the following null hypotheses were developed:

H_{O1}: There is no significant difference on the extent of content coverage in the implementation of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria.

H_{O2}: There is no significant difference in the instructional materials used by teachers in the implementation of Basic Science and Technology curriculum between public and private junior secondary school in Kaduna State, Nigeria.

H_{O3}: There is no significant difference in the utilization of instructional methods used by Basic Science and Technology teachers and the implementation of Basic Science and

Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria.

H_{O4}: There is no significant difference in the variety of assessment techniques used by the teachers in the implementation Basic Science and Technology curriculum between public and private junior secondary school in Kaduna State, Nigeria.

Ho5: There is no significant difference in the qualification of teachers in the implementation of Basic Science and Technology curriculum between public and private junior secondary school in Kaduna State, Nigeria.

1.6 Significance of the Study

The findings of this study is of great benefits to; teachers, students, examination bodies, Government, policy makers, curriculum planners, curriculum developers, educational administrators, ministry of education, society, educational researchers and Nigerian Educational Research and Development Council. For teachers, it helps them acquire additional useful knowledge, skills and values that will help them to be efficient and effective in Basic Science and Technology. The findings of this study established the need for training and re-training of teachers through workshops, conferences and seminars to improve their knowledge. The procedures and the skills needed for good academic performance in Basic Science and Technology will help the teachers to make use of inquiry, discovery, problem solving, and individualized instructional method as methods of teaching while in the classrooms. When teachers become aware of these methods, their work will become easier since the student will take part in the teaching and learning process, also the teachers will take less time to teach concepts and allows the students to find out the rest with teachers support.

The students: benefit from the findings of this study if only the teacher uses the methods. Using of these methods will improve student interaction, self esteem, academic performance,

group affiliation and accommodation among students since they have to work in groups, tolerating each other's mistakes so that success is achieved.

The Government and policy makers: this study is of great importance to the Federal government and policy makers, as it will help them enhance policy position on the need for the training of Basic Science and Technology teachers; provision of needed infrastructural and structural facilities.

Curriculum planners/developers: The findings of this study encourages curriculum planners/developers, a useful insight on the relevance of providing learners-based curriculum content rather than the subject-based curriculum content, to emphasise on proper implementation of the Basic Science and Technology Curriculum in junior Secondary Schools. By so doing, the student will take major responsibility in their accomplishment of curriculum learning task. This will also make the curriculum task easier to accomplish since the students and the teacher will be involved.

Educational researchers:- also educational researchers benefits from the findings of this study. The essence of schooling is to make or build up students that will be functional and contributors to nation building. One of the importance of Basic Science and Technology curriculum, it brings students to real life situation and enables them to articulate and find ways of solving their problems in collaborating with others. The much desired peace and unity in the country may be restored through this.

Nigerian Educational Research and Development Council (NERDC): The teaching of Basic Science and Technology according to Report of Nigerian Educational Research and Development Council (NERDC) (2007) became necessary due to technological development and increased national policy orientation towards vocational education development. The desired development in the Nigerian vocational education system can only be achieved through effective implementation of Basic Science and Technology in junior secondary school level.

The findings of the study are now revealed to Ministry of Education areas where teachers need improvement such as training and re-training for effective implementation of Basic Science and Technology curriculum. Workshops, seminars or conferences can now be organized for these teachers in order to enrich their knowledge in Basic Science and Technology and appropriate methods of teaching it.

Examination bodies such as WAEC and NECO also benefits from this study. Since they set questions based on curriculum content and the questions are set to cover all selected topics, the results of this study will provide clear insight on the extent of content coverage, so that questions can be set on the areas covered by teachers.

The study is of significant benefit to educational administrators on the relevance of using updated and modern approaches and methods that are meaningful, relevant and contemporary to the social needs and demands of the 21st century. In addition the study is also expected to provide basis on the needs and the roles educational administrators in the employment and placement of relevant teaching staff needed for effective teaching and learning Basic Science and Technology curriculum. Finally, it is expected that government will further realize that the subject (Basic Science and Technology) is not just a mere addition to the existing school curriculum, but one that is actual for the attainment of much needed goals for scientific and technological development/advancement.

1.7 Scope of the Study

This study is focused on Evaluation of the Implementation of Basic Science and Technology Curriculum in Public and Private Junior Secondary Schools in Kaduna State, Nigeria, The study is limited to junior secondary schools (JSS2) in Zaria education Zone, Kaduna state. In addition to that, principals, teachers and students of the sampled schools are the respondents for the study.

CHAPTER TWO
REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter reviewed the relevant literature on the evaluation of the implementation of Basic Science and Technology curriculum in public and private Junior Secondary School level in Kaduna State. Specifically, the review covered the following aspects; Theoretical Framework, Concept of Basic Science and Technology curriculum, Concept of Curriculum, Concept of Curriculum Implementation, Concept of Curriculum Evaluation, Concept of Instructional Materials, Models of Curriculum Implementation, Content Coverage in Basic Science and Technology Curriculum, Instructional Methods in Basic Science and Technology, Assessment Techniques of Teaching and Learning of Basic Science and Technology, the Roles of Teachers in Curriculum Implementation, the Roles of Students in Curriculum Implementation, Participants in Curriculum Implementation, Determinants of Curriculum Development, Problems and Prospects of Curriculum Implementation, Evaluation of the Implementation of Basic Science and Technology Curriculum, teachers qualification, Empirical Studies and Summary.

2.2.1 Conceptual Framework

This study is built on the conceptual framework of curriculum implementation of Basic Science and Technology curriculum, successful learning and teaching will not take place without a successful implementation of any curriculum contents, the curriculum content of Basic Science and Technology would not be implemented properly without the necessary factors that facilitate the implementation of any curriculum contents such as teachers, students, the content itself.

2.2.2. Concept of Curriculum Evaluation

Curriculum evaluation means a continuous process which looks for the diagnosis of strengths and weakness of the curriculum, identification of the outcome of instructions, recognition of the need for teacher improvement, identification of the need for review of the curriculum. Curriculum evaluation is very essential in education because it is used to transform

quantitative data into qualitative interpretations as an educational programme is assessed and judgment made on its effectiveness and efficiency (Baiyero, 2003), As curriculum evaluation concerns certain form of measurement or assessment in a bid to form value judgments of the curriculum or its goals and objectives, it assigns qualitative values to what is being measured in order to make meaningful judgment of the teaching- learning process. It draws attention to the weaknesses of the programme and calls for its eventual review or modification to improve the curriculum.

Ndubuisi (2006), observed curriculum evaluation to involve the identification and provision of information, the selecting of criteria, data collection and analysis and drawing logical conclusions for specific purpose, using appropriate processes. Ali and Ndubuisi (2006), observed that the objectives of evaluating an educational programme are basically to gain specific information or knowledge about the various aspects of the programme evaluated. The authors went further to note that the findings made from an evaluation provide a basis for making decision among alternatives and decision arising from evaluation sometimes are predicted on feasibility fund, physical plant facilities, staffing, time and so on. They continued to say that the scope of curriculum evaluation usually varies with regard to the stage of the programme development, the quality and variety of technical experts available for the evaluative purposes, the type of evaluation studies deal with the following major aspects:

1. the identification of the broad purposes of the programme;
2. Preparing the questionnaire test materials appropriate for the target population.
3. trying out on a small scale, the questionnaire test materials under stimulated conditions;
4. field trial of the test materials;
5. modification and development of the final draft of the test materials;
6. the use of the final draft of the test to elicit information about the programme being evaluated, and the preparation of a report of findings and recommendations.

According to Olaitan and Ali (2007), curriculum evaluation involves making a value judgement about the effectiveness of the curriculum after comparing the degree of achievement of goals, objectives and aims with set standards especially after schooling. The discrepancies between what it should be (standard) and what it is (degree of achievement) are identified and proposals made for improvement of the curriculum. The authors continued by saying that effective curriculum is realized when after studying the trends of curriculum development in the past and seeing how it served particular purpose, it is then related to the present situation.

2.2.3 Concept of Curriculum Implementation

Implementation is the process through which a proposed concept, model, topic, theory and so on is taken up by some practice. To implement means to make something that has been officially decided start to happen or be used. It means to carry into effect. Implementation means putting a plan, scheme, decision, proposal, intention, an agreement, policy or ideas into effect. It is the bedrock of any plan, the determination of a plan's success or failure. Garba (2004),in Sambo (2012), viewed curriculum implementation as 'Putting the curriculum into work for the achievement of the goals for which the curriculum is designed'.

Curriculum implementation is the disseminating of information on a wide basis, after pilot-test, on a newly designed curriculum or on a changed or revised curriculum. It ascertains the feasibility; adequacy or relevance of curriculum plans towards the accomplishment of intended learning outcomes. Okebukola (2004), described curriculum implementation as ' the translation of the objectives of the curriculum from paper to practice'.

Curriculum implementation is the stage of presentation of a combination of the curriculum content and topics, methodology and instructional materials by the teachers to the learners, most of the time in a classroom setting, a subject or combinations that will enable them take up such learning that the teacher wants to pass across to them. In the light of a given topic, the teacher adopts the appropriate teaching methods and materials to guide student's learning.

The students on their own are actively involved in the process of interaction with learning activities. (Pwajok, 2000). It is not restricted to sheer translation of curriculum proposal or decision into practice. It involves a complex of activities, materials, personnel and other factors which when approximately harnessed constitute integral parts of curriculum implementation. These include the schools which are the major implementation theatre, the teachers, curriculum materials, students, teacher training institutions, administrative and political factors, examination bodies the public, place of implementation in the curriculum planning process before curriculum evaluation or community members,.

Ekpo and Okam (2009) viewed curriculum implementation as the various steps involved in achieving the desired curriculum objectives of educational programmes. To achieve these objectives, emphasis must be placed on the quality of educational programmes undertaken as well as the quality of teachers who implement them. Teachers are the major implementers of the curriculum at the classroom level. The ability to put the curriculum into practice in the classroom is called curriculum implementation. After the curriculum has been planned with regard to identified objectives, selecting the contents, learning experiences and materials based on their assumed effectiveness in making it possible for the objectives to be achieved, then the design is put into action.

Curriculum implementation as used in this study is the transmission of planned Basic Science and Technology curriculum into operational curriculum in the classroom. It is at this stage that all the relevant curriculum inputs are brought into direct contact with the target audience in such a way that through a variety of activities, and learning experiences, mastery of subject matter can be maximally achieved at minimal cost. Curriculum implementation occupies a strategic position in teaching and learning Basic Science and Technology Curriculum as it link the design with evaluation stages, that is the materials and methods are put together to produce the desirable learning outcome.

2.2.4 Concept of Basic Science and Technology

Nigeria has witnessed a catalogue of educational reforms since the pre-independent era. The latest of this is the restructuring of the 6-3-3-4 system of education to the present 9-3-4 system of education. This reform expanded the 6-year basic education to 9-year Universal Basic Education (UBE). The 9-year UBE programme was subsequently divided into lower basic (Primary 1-3), middle basic (Primary 4-6) and upper basic (Junior Secondary [JS] 1-3). This was as a result of the need to attain the Millennium Development Goals (MDGs) by 2015 and by extension the implementation of the National Economic Empowerment and Development Strategies (NEEDS) by Nigeria. It therefore became expedient that the curricula for primary and junior secondary schools be reviewed, re-structured and re-aligned to fit into the 9-year UBE programme (Obioma, 2007). The Nigerian Educational Research and Development Council (NERDC) developed the curricula for the various subjects taught at these basic education levels on the directives of National Council on Education (NCE).

The curricula reflect depth, appropriateness and inter-relatedness of the curricula contents. Also emerging issues which covered value orientation, peace and dialogue, including human rights education, family life, HIV and AIDS education, entrepreneurial skills etc, were incorporated into the relevant contents of the 9-year UBE curriculum. In general, the curriculum pays particular attention to the achievement of the MDGs and the critical elements of NEEDS (Obioma 2007).

Among the re-aligned and restructured subject curricula are the Basic Science and Technology curriculum. The Primary Science was re-aligned and restructured to Basic Science and Technology for Lower and Middle basic level and Integrated Science to Basic Science and Technology for Upper basic level. Some introductory technology topics were introduced to the Basic Science and Technology curriculum while the Basic Science curriculum was purely science. According to Adeniyi (2007) and Danmole (2011), three major issues shaping the

development of the nation's worldwide, and influencing the world of knowledge today were identified in selecting the Basic Science and Technology curriculum content as globalisation, information/communication technology and entrepreneurship. The desire of Nigeria to be identified with contemporary development worldwide, led NERDC to the infusion of relevant contents of four approved curriculum innovation in the areas of:

1. Environmental Education (EE)
2. Drug Abuse Education (DAE)
3. Population and Family Life Education (POP/FLE)
4. Sexually Transmitted Infections (STI) including HIV/AIDS.

The overall objectives of the Basic Science and Technology curriculum according to Adeniyi (2007) are to enable the learner to:

1. develop interest in science and technology;
2. acquire basic knowledge and skill in science and technology;
3. apply their scientific and technological knowledge and skill to meet societal needs;
4. take advantage of the numerous career opportunities offered by science and technology;
5. become prepared for further studies in science and technology.

A thematic approach to content organisation was adopted in order to achieve a holistic presentation of the science and technology content to learners. Consequently, four themes were used to cover knowledge, skills and attitudinal requirements. These are:

1 you and Environment

2. Living and Non-Living Things

3 you and Technology

4 you and Energy

The topics under each theme were sequenced across the years in a spiral form beginning with the simple to the complex in order to sustain the interest of learners and promote

meaningful learning (Adeniyi, 2007). Obioma ,(2007) states that since the curriculum represents the total experience to which all learners must be exposed, the contents, performance objectives, activities for both teachers and learners and evaluation guides are provided. He went further to state that the curriculum prescriptions represent the minimum contents to be taught in the school to achieve the objective of science education. However, the teachers who are the key actors in the provision of quality education are encouraged to enrich the contents with relevant materials and information from their immediate environment, by adapting the curricula to their needs and aspirations as well as those of their learners. This means that it is expected of the Basic Science and Technology teachers to contextualise the Basic Science and Technology curricula with respect to their various immediate environments in relation to the Basic Science and Technology objectives. By implication, the Basic Science and Technology teachers are not to limit their teaching to just the four walls of the classroom but to also utilise the resources that abound in their environments in enriching the teaching of Basic Science and Technology. This could be in form of bringing materials, resource person to the class or visiting sites of interest etc. The researcher observed that these activities have been included in the teacher's column of the Basic Science and Technology curriculum.

Teachers are therefore expected to carry out these activities in their lesson delivery in order to implement the curriculum for the attainment of its objectives. This means that Basic Science and Technology should be taught using many teaching methods and strategies and these have to be appropriate (Obioma 2007). However, it could be deduced that Basic Science and Technology is an abridge of introductory technology, integrated science and other science subjects taught in junior secondary school with the use of various teaching methods and instructional materials in order to achieve the objectives of Basic Science and Technology as enshrined in the curriculum.

2.2.5 Concept of Curriculum

The term curriculum is derived from the French word; CURERE' which means to 'To Run'. Curriculum is a set of planned and unplanned course content in which both students and teachers work for the attainment of educational goals.

Curriculum in the opinion of Offorma, (2009), is a document, plan, or blue print for instructional guide which is use for teaching and learning to bring about positive and desirable change in behaviour. Esu (2009), viewed curriculum as those knowledge, activities and experiences both formal and informal planned and guided by the school for the benefit of the learner. Curriculum can be looked at as the organized knowledge presented to the learner in school, which covers every element in the learning environment. It is through curriculum that ideas, concepts and theories are translated into practice, into teaching, learning and assessment programs that form the day-to-day experiences for educators at all levels.

Offorma (2009), viewed by saying that curriculum varies from society to society because it is influenced by existing elements in each society. Offorma (2009),listed the major elements that influence type of curriculum offered by schools and the extent of its implementation to include:

1. the nature of the society
2. philosophy of education
3. subject specialists
4. the learners
5. the teachers
6. examinations
7. economy of the society
8. resources and
9. values

A new trend towards a more comprehensive approach to curriculum definition is to view it in terms of major components. Olaitan and Ali (2007), in this direction assumed that there is an order which must be followed for a more dynamically conceived and planned curriculum. This order must be as follows:

1. Diagnosis of students learning need
2. Formulation of objectives
3. Selection of contents of instruction
4. Organization of content
5. Selection of learning experiences to facilitate the learning and understanding of the content
6. Organization of learning experiences in line with the content of instruction.
7. Determination of what to evaluate and the ways and means of evaluating what had been taught.

Curriculum is defined by Akudolu (2004), as an organized knowledge presented to learners in a school, embedding every element in the learning environment. Curriculum is all the experiences children have under the guidance of teachers. In line with the above, Ali (2006), viewed curriculum as a sequenced contents or course of instruction needed by the learner who is expected to demonstrate some objectives or behavioural change

Ali (2006),viewed curriculum as an attempt to communicate the essential principles and features of an educational proposal in such a form that it is open to critical scrutiny and capable of effective translation into practice. Hanna (2012),viewed curriculum as the totality of all planned and unplanned learning experiences to attain educational goals. However, from the definitions above a practical curriculum is the formulation and implementation of an educational proposal to be taught and learned within a school or other institution and for which that

institution accepts responsibility at three levels, its rationale, its actual implementation and its effects.

Ogunyemi (2009), viewed curriculum as the planned and unplanned experiences, which learners receive in the process of their formal or semi-formal education for the purpose of becoming rounded persons who can make meaningful contribution to the betterment of their society and the world. If the curriculum is not implemented, all efforts expended in the planning are in vain. Curriculum implementation refers to the actual use of curriculum plan or document in the classroom. That is putting the curriculum in use.

Walker (2003),viewed curriculum as a complex network of physical, social and intellectual conditions that shapes and reinforce the behaviour of individual's perception and interpretations of the environment in order to reinforce the learning objectives and to facilitate the evaluation.

2.3 Theoretical Framework

The relative importance of Basic Science and Technology as a foundation for other science subjects in schools justifies the need for theories to guide and provide adequate framework for this study. The key factors behind the curriculum are the learner, the teacher or facilitator, the subject matter, strategy and the society. The ancient Greek philosopher, Plato viewed that education and curriculum are necessary for the promotion of the concepts of health, citizenship, vocational and critical values. Clarity, correctness and logical sequence are the important characteristics of a good curriculum theory.

Curriculum is the totality of learner's experiences. The main components of the curriculum are learners, content, strategies, social aspects and evaluation. Here, the teachers work as facilitator in providing opportunities to the learners to acquire co-operative, collaborative and co-learning. Learning process is the sum and substance of the nature of curriculum. In other words, curriculum is the medium for interaction, the construction and maintenance of knowledge. Thus, the curriculum, as a social document, includes the

involvements of learners, teachers, administrators, policy makers, and quasi official agents; private and public discussion and action, actions of professional organizations, actions of interest groups, and funding agencies. The modern trend of curriculum is encircled with the responsibility of learner's own learning. The curriculum approach of Nigeria is related to the opportunities, responsibilities and experiences of the learners as in the case of curriculum formation and method of integration, process oriented approach, and activity-based classrooms and modern theories of learning.

2.3.1 Models of Curriculum Evaluation

Models are useful in curriculum evaluation because they provide a set of steps that could be followed in carrying out a proposed evaluation (Okoro, 2000). When appropriate evaluating models are used, they yield useful information for curriculum improvement. According to Idoko (2001), an evaluation model or framework may be regarded as a set of steps or a system of thinking which if followed or implemented will result in the generation of information which can be used by decision-makers in the improvement of curriculum implementation. Evaluation models are of great help to evaluators because they provide a general guide which can be adopted or modified to each specific curriculum being evaluated. Idoko (2001) outlined the following principles of curriculum evaluation:

1) Evaluation must be based on goals and objectives of the curriculum being evaluated.
2) All personnel of the institutions concerned and other individuals connected with curriculum must be committed in the evaluation process.
3) Evaluation should be comprehensive
4) All groups of individuals who can contribute must be involved e.g. teachers, administrative and industrial personnel, parents and external experts.

5) It should have a system of recording all information and data obtained. It is a scientific problem-solving process therefore; data obtained should be objectively recorded and analyzed.
6) Evaluation process should result in judgment about the curriculum by the evaluators.

A number of factors should guide evaluators in determining which of the models to adopt in carrying out evaluation purpose, type and scope of the evaluation among others.

Stufflebeam (1971) recommended the steps or procedure of evaluation as follows:

1) Identification of objectives of the curriculum.
2) Definition of the kind of data needed in making these decisions.
3) Data collection
4) The criteria for determining the quality of the matter evaluated.
5) Analysis of data in terms of criteria above and
6) Providing data for decision-makers.

Elaborating on the steps, the author stated that the objectives of the curriculum when determined or identified will enable the evaluator know what should be evaluated. Based on this, the evaluator should determine the specific form of information needed to make about curriculum. This will be followed up by evolving strategies for collecting the data processing to make the desired decisions. This also means determining the methods or instruments that will be used for evaluation. Then the level of acceptable performance should be analyzed after deciding on the criteria for determining the quality of the matter being evaluated.

According to Ifeobu (2000), a model is a way of representing and testing an idea which may otherwise be difficult to communicate in words. Evaluation model is an evaluation framework or strategy which is meant to provide a sense of direction and magnitude to the evaluation design and implementation. Okpala and Onoche (2004) stated that evaluation model is expected to provide answers to the questions stated below:

1) How best should evaluation be defined?

2) What should be the purpose of evaluation?

3) What should be the duties, authorities and responsibilities of an evaluator?

4) What is the relationship between evaluation and decision-making?

5) What types of evaluation are to be involved?

6) What criteria are to be used in judging evaluation studies?

To prevent unnecessary drift during curriculum evaluation, there is need to design curriculum evaluation within the confines of some evaluation models. The major models of evaluation useful in education are concerned with:

i. Ascertaining the achievement of desired outcomes;

ii. Assessment of merit;

iii. Decision-making.

The purpose of the evaluation should guide the evaluation in determining the appropriate statistical analytical procedure and tool to be employed. In the end, the result of the evaluation will be used to improve the quality of the curriculum. This process is similar to that suggested by Olaitan and Ali (2007) that the curriculum evaluation involves making a value judgement about the effectiveness of the curriculum after comparing the degree of achievement of goals, objectives and aims with set standards especially after schooling. The discrepancies between what it should be (standard) and what it is (degree of achievement) are identified and proposals made for improvement of the curriculum. The aim of evaluation should, to a large extent determine the process to be adopted in carrying it out. The author suggested that evaluation process should take the following steps:

Focus the evaluation which means the definition of evaluation and types of data, who would use the data among others, State how information will be collected, Sequence and schedule of evaluation specification of how the information gathering activities will be carried out as well as

time limit, identification of individuals and groups who should be involved, definition of system or theories for the analysis of data that will be collected. determining system or theories for reporting evaluation findings or conveying findings to decision makers and to those who would make use of the findings, specifying system for monitoring the execution of evaluation activities in selected evaluation model to use, the evaluator should according to Okoro (2007) consider: The appropriateness of the model, can it yield adequate information? the complicity of the model, can it be effectively applied by the evaluator taking into consideration his experiences, cost of implementation and other related factors?

There are several models of evaluation. Each one has its own strength and weaknesses. None of them can claim of being suitable for every purpose rather there should be justifications for using any particular one. Some of these models are listed below:

1) Goal Evaluation Model: Tyler (1950)

2 The Provus Discrepancy Evaluation Model by Provus (1971)

3) Goal-free Evaluation Model Proposed by Scriven (1972).

4) Proto-type Evaluation Model by Baker and Alkin (1973)

5) Needs Assessment by Within (1977)

6) Stufflebeams (1971) context, input, process, product (CIPP) model.

Okoro (2007) noted that each of the models focuses on some particular feature of evaluation activities. Features of these models or framework are presented according to the following sub-headings:

1. Definition
2. Purpose
3. Key Emphasis
4. Relationship to Objectives
5. Relationship to Decision

2.3.2 Goal Evaluation Model by Tyler:

a) Definition: This is an objective oriented model or behavioural objective model on achievement of desired outcome.

b) Purpose: To provide periodic feedback on the extent to which the set goals of a school curriculum are being achieved.

c) Key Emphasis: Identification and determination of educational experiences and the best approach to effectively organize educational experiences.

d) Relationship to objectives or goals of learning experiences and evaluation. Use the objectives to determine the learning experiences that will yield the expected result.

e) Relationship to decision-making: In this model the curriculum is evaluated using its goals and objectives as standard for judgment.

The three major component of this evaluation model are objectives or goals, learning experiences and evaluation. The evaluator uses the objective to determine the learning experiences. The evaluator designs the instrument to be used, provides feedback to show how the objectives are being achieved. The evaluator suggests the learning experiences and then provides new objectives as a result of the new learning experience. Evaluation here is interested in finding out what learning experiences produce. It refuses to do the early diagnosis of the students to know actually what they know and what they do not know (Okoro, 2007).

Therefore this model is considered inappropriate for this study.

2.3.3 Provus Discrepancy Evaluation Model

a. Definition: Comparing performance against standard.

b. Purpose: To determine whether to improve, maintain or terminate the curriculum.

c. Key emphasis: Identifying discrepancies between standard and performance using team approach.

d. Relationship to Objective: Agreement of evaluation team and curriculum staff on standard comparison of performance against standard to see whether discrepancy exists.

e. Relationship to Decision Making: Evaluation staff collects information essential for curriculum improvement and note discrepancies between performance and standard. Every question involves a criterion, new information and a decision. Evaluation provides the new information. The present curriculum evaluation is a self study judgment and is based on sets of predetermined criteria. Therefore Provus model is considered inappropriate since there are other appropriate models to adopt.

2.3.4 Goal-Free Evaluation Model by Scriven

a. Definition: Gathering and combining performance data with weighted set of goal scales. It is used to determine what a curriculum is actually doing and not what it was meant to do.
b. Purpose: It is used to determine the merit of a curriculum from an appraisal of curriculum effects without reference to goals or objectives.
c. Key Emphasis: Justification of data gathering instruments, weighting and selection of goals. Evaluation model combining data on different performance scales into a single rating
d. Relationship to Objectives: Look at goals and judge their worth, determine whether they are being met.
e. Relationship to decision-making: Evaluation reports (with judgment explicitly stated) for producers or consumer used in decision-making.

There is need for a professional evaluator in this model. The evaluator carefully examines all the potential causes for observed effects and establishes solid connection to prior curriculum activities. The evaluator determines the needs of the affected population, and uses the needs to set criteria for judging the curriculum effects. There is no reference to goals or objectives,

therefore this model is considered inappropriate since there are other more appropriate models to be adopted.

2.3.5 Proto-type Evaluation Model

a. Definition: The process of ascertaining the decision areas of concern, selecting appropriate information, collecting and analyzing information.
b. Purpose: To report summary data useful to decision-makers in selecting among alternatives. It is designed to assess the product of instruction or instructional effectiveness of a curriculum and identify areas that require revision or adjustment.
c. Key emphasis: Evaluation reports used for decision-making.
d. Relationship to objective: Specificity of curriculum objectives determine the system assessment, curriculum planning provides way to reach objective, curriculum improvement provided data on the extent of achievement of objective, curriculum certification determines whether objectives are met.
e. Relationship to decision-making: Provides first source data for curriculum revision and decision-making.

This model identifies errors in areas of a curriculum or instruction. It provides basis for corrective measure before a polished version of the curriculum is produced. It provides first source data for curriculum revision. It obtains information on the selection of appropriate goals and objectives and accuracy of content. It involves review of the curriculum by subject experts, try out the curriculum on learners and see how the curriculum can be implemented. This evaluation is done only during the formative stage of curriculum development; therefore this model is not very useful here

2.3.6 Needs Assessment by Within

a. Definition: Needs assessment could be components of several evaluation models. Data gathering and analysis process, technique for providing information for curriculum modification and curriculum evaluation.
b. Purpose: To identify the areas in which educational process or system is ineffective so that remedial measures could be taken.
c. Key Emphasis: Identifying different types of needs served by a particular educational system.
d. Relationship to objectives: Examination of the resources and the standard by which needs will be identified. Design and assign priorities to need.
e. Relationship to decision-making: In needs assessment, the evaluation staff collects information and use the result to improve the existing curriculum.

Needs assessment is used to identify the needs of students, determine weaknesses in students' achievement. It also determines the needs of teachers and future needs of education system. Here, experts are required to design the needs assessment procedures, assign priorities to need, and use the result to improve the existing education system. This model did not take into consideration how to utilize resources to achieve project objectives (Okoro, 2007). Therefore, Within needs assessment model is not considered very appropriate in this work.

2.3.7 Stufflebeams Context, Input, Process and Product (CIPP) Model

Context, Input, Process, Product and (CIPP) Model is a program evaluation model which was developed by Daniel Stufflebeams. CIPP Model is an evaluation model that requires the evaluation of context, input, process and product in judging a programs value. This model according to Achebe (2004), is used to evaluate a curriculum in relation to the context in which it operates the input of the curriculum process through which students go and the product of the curriculum as well as the problems militating against the implementation of the curriculum. The

author reported that this model otherwise known as decision-facilitative evaluation model considers evaluation as the process of delineating, obtaining and providing useful information for judging decision alternative. This context, input, process, product and model therefore categories the main components and specific aspects of a curriculum evaluation study, by assessing the curriculum in terms of the variables that are represented as follows:

a. Context: Context Evaluation helps in the diagnosis of the curriculum problems in relation to the determination of the extent to which the aims and objectives of the national curriculum for junior secondary school Basic Science and Technology contents have been achieved. This includes examining and describing the context of the school we are evaluating; determining the objectives, mission, and goals of school. The achievement of the objectives results into curriculum improvement. The methodology of context evaluation involves the provision of the curriculum and philosophy of education adequacy of space provided, environmental provision and adequacy of training room Achebe (2004).
b. Input: This includes activities such as description of inputs and resources. How the school has structured its resources? The resources are of various types. For school, infrastructure such as class room, furniture, audio–Video aids, laboratories, library, workshops, auditorium and playground are the physical facilities which are essential. But at the same time school should also have human resources such as counsellors, special teachers, teaching, nonteaching and administrative staff. The purpose of input evaluation is to provide information for determining the rate at which Basic Science and Technology teachers utilize the available input factors such as teaching equipment and materials; (chemicals, specimens) and other teaching support facilities.
c. Process: Process evaluation looks at the level of compliance of teachers with the recommended teaching methods as indicated in the Basic Science and Technology

curriculum. The process is needed to provide periodic feedback to persons responsible for implementing plans and procedures. Implementation is a crucial phase in which the inputs are utilized in appropriate way to achieve the desired product. The evaluators when assess school processes, they will gain information about what is actually occurring in the school. It is in this phase that we can take implementation decisions. The schools have various programmes and practices. Each and every process in the school has to have a systematic approach. It may be teaching learning process, organizing events like workshops for students, science practical classes, parent teacher associations meetings, organizing students' co-curricular and extra curricular activities, preparing students for competitive and public examinations, for every process the school has to have a systematic approach. Process evaluation involves the use of a fulltime evaluator, instruments and regular feedback.

d. Product: The overall purpose of product evaluation is to measure the evaluation techniques used by Basic Science and Technology teachers in assessing their students and interpret attainments at the end of a project cycle. The specific objectives include provision of information for deciding to continue, terminate or modify a change in an activity and provision of information for linking an activity to other phases of the change process. Product evaluation is the extent of attainment of objectives, quality of performance at the end of the curriculum implementation. The most important outcome of the school is the student of the school. The student in himself is not the product but the knowledge, skills, values, and attitude, that is gained by the student is the product. The product of the school should not be measured only in terms of percentage of passing or number of meritorious students passing from school, but should focus on how the science students of the school are succeeding in various walks of life in the society. How many students are working in different sectors of society and helping society

to grow? How many students are holding important positions in various institutions and helping the institutions to grow Achebe (2004).

The CIPP model is an attempt to evaluate directly relevant to the needs of decision-makers during the phases and activities of a programme, also the model is considered as a framework to systematically guide the conception, design, implementation and assessment of the overall teaching and learning activities to provide feedback on the area of success and weakness of the curriculum in other to make necessary improvements.

This research work adopts the use of CIPP model because the model was developed as means of linking evaluation with program decision making. It aims to provide an analytic and rational basis for program decision making, based on a cycle of planning structuring, implementing, reviewing and revising decision, each examined through a different aspect of evaluation. Therefore, this model is comprehensive, purposeful, accepted and could be used by curriculum evaluators in different parts of the world. For example, such indicators as curriculum, teaching staff, rate of participation, presentation of curriculum, materials and organization of curriculum are all part of modified Stufflebeam's model that are categorized into context, input, process, product.

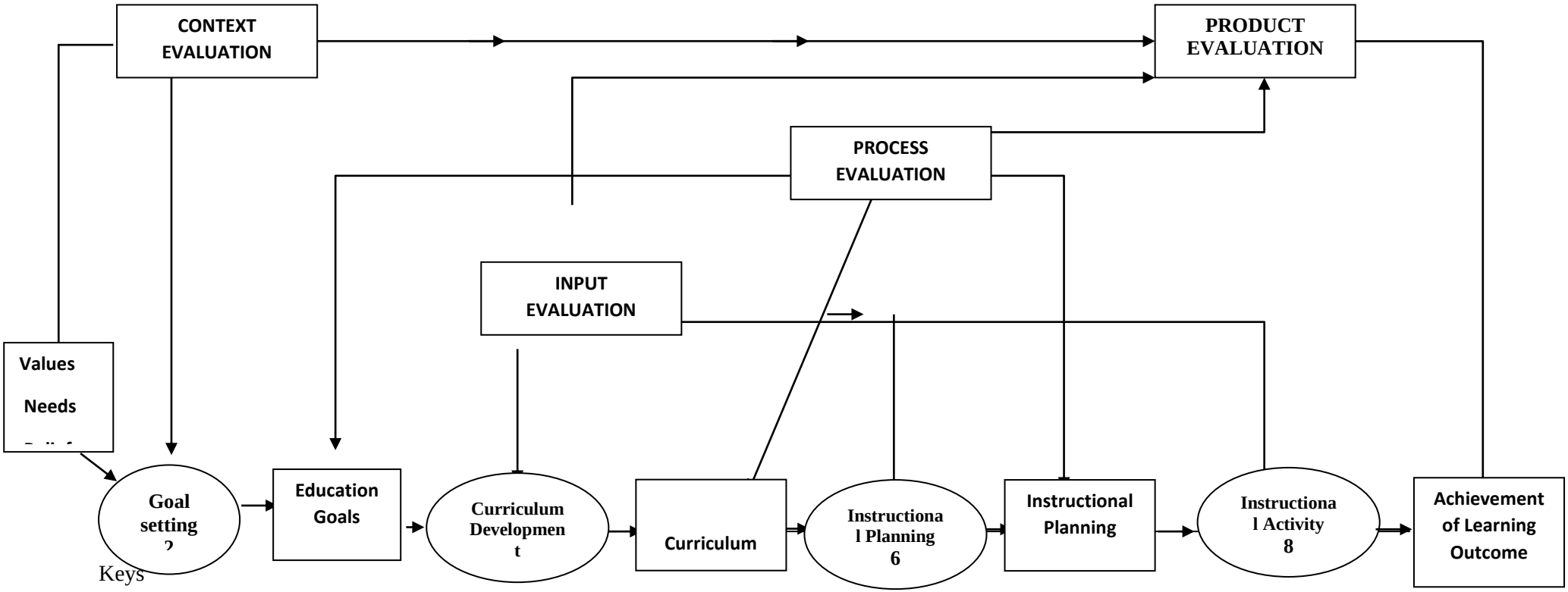
The CIPP model helps in decision making in the following way:

Context	School planning decisions
Input	Structuring decisions
Process	Implementing decisions
Product	Summative evaluation decisions

Thus this model will help us to make decisions about the school. It will not assign a school a particular grade alone but will also help the school to understand why they are at a particular grade and what they need to do to go to higher grade. Stufflebeam himself no longer talks about CIPP model but refers to Decision/Accountability oriented evaluation. If schools take this

approach, they will realize their accountability towards the learners (Science students), parents, society and nation in general. This model will definitely help to improve the quality of education.

Fig. 1: Curriculum Evaluation Model of (CIPP) by Stufflebeam (1971)



Source; Olaitan and Ali (1997, p. 432)

2.4 Instructional Materials

The ultimate goal of any teaching-learning activity is to bring about desirable behavioural changes in the learner. Effective interactive process demands appropriate utilization of instructional materials and resources which are utilizable in teaching learning activities in general, certain materials and resources are most appropriate for effective Basic Science and Technology instruction in Nigeria, given the relevance nature of Basic Science and Technology coupled with the low-level of technological development of the Nigerian society. The growing emphasis on technological advancement and vocational empowerment and the dwindling economic circumstances which have occasioned the inadequate supply of instructional materials and facilities to our schools. Some of the curriculum resources most relevant to Basic Science and Technology teaching and learning in the Nigerian situation are largely: Chalkboard and Graphic or two dimensional materials such as picture, diagrams, cartoons, comics, posters, billboards, graphs, charts, maps/ atlases. Meziobi (2002)

Ikerionwu (Isola, 2010) also referred to instructional materials as objects or devices, which help the teacher to make a lesson much clearer to the learner. Instructional materials are also described as concrete or physical objects which provide sound, visual or both to the sense organs during teaching (Agina-obu, 2005).Instructional materials are in various classes, such as audio or aural, visual or audiovisual, Thus, audio instructional materials refer to those devices that make use of the sense of hearing only, like radio, audio tape recording, and television. Visual instructional materials on the other hand, are those devices that appeal to the sense of sight only such as the chalkboard, chart, slide, and filmstrip. An audio-visual instructional material however, is a combination of devices which appeal to the sense of both hearing and seeing such as television, motion picture and the computer. Among the instructional materials the classroom teacher uses, the visuals out-numbered the combination of the audio and audio-visual.

Instructional materials refer to those alternative channels of communication, which a classroom teacher can use to concretize a concept during teaching and learning process. Traditionally, classroom teachers have relied heavily on the 'talk-chalk' method during their teaching. But recently, instructional materials help to provide variations in the ways in which messages are sent across. In using instructional materials teachers and students do not only extend the range of sense organs we use but also extend the range of materials used for convening the same message through the same organ. For instance, in teaching a topic a teacher can manipulate real objects or use their stimulators. Instructional materials therefore constitute the media of exchange through which a message transaction is facilitated between a source and a receiver. In addition to extending the range of materials that can be used to convey the same instructional message to learners instructional materials also facilitate the 'process' nature of communication.

Balogun (2002) identified two main constraints militating against the successful improvisation of Science equipment. These are the technical and the human factors respectively. While the technical factors relate to the question of degree of accuracy and precision that is possible with the improvised equipment, the human factor relates to the teachers' skill in developing the resources while providing the appropriate learning experience to the learners.

Also, Maduabunmi (2003) reported lack of adequate professional training as a major problem militating against the effective use of local resources for Science teaching. Oyediran (Isola, 2010) then stressed the need for a definite well planned training programme of improvisation for teachers. He suggested regular meaningful workshop on improvisation technique for Science teachers to improve and update their competence. However, instructional materials attract students' attention and interest on the subject being taught and maintaining their attention alive during learning process. It enables a comprehensible and an efficient teaching to occur. The more the sensory organ of the students are addressed the more efficient and

permanent learning will be. For this reason teachers have to use the instructional materials in order to address the sense of the students as much as possible. Besides, the rapid improving technology increases the instructional alternatives in the educational system. It is therefore pivotal for Basic Science and Technology teachers to attain and maintain a degree of technological competence to make instructional materials more effective and efficient in dealing with their daily task.

2.5 Students' Academic Performance

Academic Performance is determined by as the extent to which teacher or institution have achieved their educational goals, it is commonly measured by the examination or continuous assessment but there is no general agreement on how it is been tested. Olutade (2002) defined it as the outcome of examination results that determines who get promoted to the next class or otherwise. He said otherwise that there is hardly any discordance that a test or an examination is usually conducted for the purpose of revealing students' academic performance. Academic performance is the actual performance of pupils in academic subject and their basic knowledge on it.

Abdul (2002) defined academic performance as the students' level of attainment in the average grade point of courses offered in his/ her past year examination in educational institution, while Moradeyo (2015) defined academic performance as what students achieved in their studies and how they cope and accomplished different learning experiences given to them by their teachers. Academic performance represents outcomes that indicate the extent to which students' accomplished specific goals. That was the focus of the activities in instructional environment, specifically in the Schools, collages, and universities. Academic performance can generally referred to as the way and manner students deal with their studies. It is the student's ability to study and remember facts and be able to communicates knowledge verbally or down on paper Goldaber (2009) stated that pupils' performance varies according to individual score such as

high, average or low academic performance. In addition, Aremu and Sokan (2003) asserted alternative measure that: poor academic performance is a performance that is adjudged by the examinees/testee and some other significant as falling below an expected standard. This implies that moderate performance is at average level and good performance implies good standard. OECD (2005) also supported that students' performance is a measure of how well they have mastered the learning task presented to them. It covers the way they handled controversial issues and pass relevant judgment and the level at which they pass examinations. Improving the pupils' performance depends heavily on the interplay of their full commitment and the monitoring of some of their personality constructs.

2.5.1 Students Academic Performance in Basic Science and Technology

Basic Science and Technology has been regarded as the bedrock of modern day science and technology breakthrough. Nowadays, countries all over the world, especially the developing ones like Nigeria, are striving hard to develop technologically and scientifically, since the world is turning Scientific and all proper functioning of lives depend greatly on Science. According to Ogunleye (2009), Basic Science and Technology is a foundation for science and technology which demand dynamic human activity that involve understanding of elementary sciences and vocational upbringing.

This understanding helps learners to have a picture of scientific and technological needs in the society. Without the applications of Basic Science and Technology, it would have been difficult for learners to explore the other areas of science, skills and vocations. Basic Science and Technology comprises of the basic disciplines such a Physics, Chemistry, Mathematics and Biology.

Students' performance in Basic Science and Technology depends on many factors and stands out to show how well a student is doing. Festus (2007), contended that achievement appears generally to be the fundamental goal behind every life struggle, but the positive platform

has consequential effects of improving the worth of the students and can only be achieved through acquisition of positive learning attitudes. The attitude of a student triggers his behaviour.

Bassey (2002) opined that Basic Science and Technology is resource intensive, and in a period of economic recession, it may be very difficult to find some of the electronic gadgets and equipment for the teaching of Basic Science and Technology in schools adequately. A situation that is further compounded by the galloping inflation in the country and many at times, some of the imported sophisticated materials and equipment are found expensive and irrelevant; hence the need to produce materials locally. Researchers such as Obioha (2006) and Ogunleye (2019) reported that there were inadequate resources for teaching Basic Science and Technology subject in junior secondary schools in Nigeria. They further stated that the available ones are not usually in good conditions. There is the need therefore, for improvisation. Adebimpe (1997) and Daramola, (2008) however noted that improvisation demands adventure, creativity, curiosity and perseverance on the part of the teacher, such skills are only realizable through well-planned training programme on improvisation.

Meaning of Model

Guga A.(2019) viewed Models are used to represent an event interactions in a 'highly compact and illustrative manner. 'Thus, a model is not reality. Rather, it is a visual or written description of someone's perception of reality. Like theories, models help their authors explain various related concepts and relationships among the various parts of the models. A model is not intended to be a picture of reality but a tool for thinking. Like theories, models are imperfect. As more knowledge is gained about what a model portrays, the model becomes weaker, projecting a less complete image. This nature of models requires modifying them from time to time.

2.6. Models of Curriculum Implementation

The main purpose of this section is to identify some curriculum models and strategies that are relevant in the evaluation of the implementation of Basic Science and Technology curriculum

in Junior Secondary School. Curriculum implementation as postulated by Offorma (2005:198) "is the translation of the planned curriculum document". Curriculum implementation is putting into action the planned curriculum. It is the actual classroom teaching which includes the use of infrastructure, personnel, materials, methods and techniques. There are several models of curriculum implementation; some of them as reported by Ben-Yunusa, (2000:97) include the following:

Research development and diffusion (RD&D), Social interaction (SI), Problems solving (PS)

Centre periphery (CP), Proliferation of centre models and Shifting centre models

Research Development and Diffusion (RD&D)

The RD &D models deal with empirical investigation into needs for a change in the aims, objectives and reasons for change. This assume an orderly translation of knowledge from research to development, diffusion and finally to adoption. It involves getting the curriculum products right and then marketing them to a user such as the school. Thus, Bercher et al (1978) supported by Ben-Yunusa (2000) saw RD&D models as delivering the complete package or product to the school or for whom it is intended. An instance of this in Nigeria educational system is the National Policy on Education (NPE) which supports Berchers opinion in Ben-Yunusa (2000:91) that:

> "The large groups which consist of teachers and students are passive receivers of the finished product from the central agencies. The developer, in this model; the teachers are not actively involved in the process of initiation of curriculum innovation"

Thus, the RD&D models depict the process of change in an orderly sequence of identification of a problem and activities in producing solution to a target group. The initiative in these activities is taken by the researchers, the developers, and the disseminators; the receivers remain

essentially passive, Havelock (1971) in Ben-Yunusa (2000:91). The change, which consists of solution to the identified problems will get to the point of implementation in the relationship. Formal and informal information are passed from sender to the receiver of the curriculum. The adoption of the curriculum can be said to be through the model (Social Interaction)by members of the adoption group.

The Problem Solving (PS) Model

The receivers, according to Ben-Yunusa, (2000:92) (teachers and his students) are actively involved in the initiation and development of curriculum innovation; through interaction between teachers, learners and learning materials at the local level. The receivers could be individual or a group which identifies an area of concern. After identifying the problem area, the receiver seeks to effect a change through his effort or assistance of others from outside the system. The same people that are actively involved in curriculum implementation are the ones that initiate and develop the curriculum innovation materials. This reflects the actual needs of the people using the curriculum not the perceived need as proposed by curriculum experts and researchers at the NERDC, WAEC, Ministry of Education and Institute of Education.

Centre Periphery Model

This model depends on either government or an agency. All facilities are centrally controlled by the agency vested with the responsibility for implementation. Its effectiveness depends on communication network, adequate supply of human and material resources and the periphery. It is important to note that the success of this model would require adequate communication network; adequate supply of material and human resources for the training, and regular monitoring of the programme in schools in order to have required feedback from the periphery.

Proliferation of Centre Model

Schon (1971) opined that in curriculum implementation there should be both primary and secondary implementation canters, the primary centre may be truncated by rejection at any stage. This resembles what is in the National Primary Education Commission document. The commission works with the primary school boards in the states, while each state board coordinates affairs in the various local governments and send feedback to the commission. For this to succeed, it requires that sufficient material and training facilities are made available for the centres, there should also be an effective communication network, adequate finance and effective supervision. The success of this model also depends on adequate funding, supply of adequate instructional materials and training facilities at the various levels of implementation. Besides, there should be an effective monitoring network and regular supervision of the entire process.

The Shifting Centre Model

This involves the implementation of curriculum innovation in a particular place at a time, after which another locality embraces the innovation and implements in its own area. This is said to be the reflection of the Universal Primary Education (UPE) scheme in Nigeria which started in the West in 1954. As it was fading away, the East took it up 18 in 1959 and finally, it was embraced by the Federal Government of Nigeria in 1973. It is worthy to note that the East and West operated independently before it became a nationwide programme (Ben-Yunusa, 2000:98). It should, however, be noted that this model could be best practiced when engaging in pilot testing of the implementation strategies to ensure adequacy of the relevant components. But it is generally assumed that this model could be problematic because the entire process could be abandoned by those centres that ate not financially stable to find the various aspects involved in the implementation process. From the above process, the external change agents in RD&D is concerned with mainly preparing and disseminating package solution. In (Social Interaction)

model, the concentration is on identifying and strengthening communication network and promoting the exchange of ideas, while in the Problem Solving (PS) model, it acts as a source consultant working in a non-directional relationship with his/her client. Specifically, what the new input will be in problem solving (PS) is determined by the receiver himself/herself whether or not this same input could also satisfy the needs of other receivers (that is mass diffusion).

For this study, Problem Solving (PS) model for curriculum innovation was used. This is because the research (that is the study) tried to appreciate the Basic Science and Technology curriculum implementation by identifying the problems and is actively involved in finding solutions to the problems. However, in Nigeria, the curricula are highly limited to certain areas. The Research Development and Diffusion (RD&D) model is most often used in curriculum implementation due to the centralized system of Nigeria educational system. Teachers are not involved in the curriculum decision making process, they just accept new ideas, practices and material (if provided) from the top and implement (Omulewa & Sarumi,2002:219).

2.6.1 Participants in Curriculum Implementation

The implementation of the curriculum requires many hands to be on deck if success is to be guaranteed. The participants are both within and outside the system.

2.6.2 Participants within the local School

Participants within the system consist of the learners/students, supporting staff, the parents-teachers association and the principal. The learners are the focus of any curriculum implementation. Whatever the teacher, parents and the government do, the learners provide feedback on the success or otherwise of the curriculum. It is from the learners' response that the teachers get to know the effectiveness of his statement of objectives, methods, instructional materials and evaluation procedures. Although decisions on what to teach, how to teach and the time required teaching may have been taken by policy makers, the implementation of these aspects of the curriculum lies in the hands of the classroom teacher. He is the one to interpret the

syllabus, the scheme of work and the lesson plan and presentation. It is for these reasons that the teacher must be given adequate training and support Ekpo, and Osam, (2009).

The teacher is charged with the responsibilities of monitoring and supervising the implementation of the curriculum at the school and classroom levels. He is to maintain an enabling environment to enable the teachers and learners interact meaningfully. He does this by maintaining good human relations with staff and students, assigns duties and gives assistance to teachers and learners as well as ensures availability and adequacy of instructional materials and other infrastructural facilities by keeping and maintaining regular line of communication between the school and the supervisory bodies like the ministry, education board, resource canters, research councils and so on. (Ekpo and Osam, 2009) .

The Parent-Teacher Association (PTA) is another internal component of the curriculum implementation process. The role of the PTA in curriculum implementation is often understood by most head teachers. In most cases, the role of the PTA is perceived to specifically be on providing money to the head teacher to produce materials for school. While this perception is not disputed, it should be understood that the PTA has a variety of functions to perform in the school for the achievement of educational objectives. (Ebiringa, 2012).

As a body, the PTA influences curriculum implementation in many ways. For instance, it serves as an advisory body to the school, recruitment of additional teachers in very needy subject areas, purchase of books and other instructional materials, providing funds for the execution of projects, soliciting assistance from government and other non-governmental organizations (NGO‟s) for the school, awarding scholarships to learners who excel but without financial base and many others. However, it should be understood that these components or agents of curriculum implementation must work in harmony if they are to achieve educational objectives through effective curriculum implementation. (Azikiwe, 2009).

Participants outside the local School

This category of participants include (a),institutes of Education based in universities and the National Teacher institute(NTI) (b) Education commissions and Boards and so on .National Universities Commission (N.U.C),National Board for Technical Education(NBTE), National Commission for Colleges of Education (NCCE) Universal Basic Education Commission (UBEC) Nigerian Education Research and Development Council (NERDC).These engage in research works and help in the planning and production of instructional materials.

A. Examination bodies. Such as the West African Examination Council (WAEC),National Examination Council (NECO),National Business and Technical Examination Board (NABTEB),Joint Admission and Matriculation Board(JAMB).These bodies plan and conduct examinations for various categories of schools.
B. Quality Assurance Units. These units, formally referred to as the inspectorate units, are owned by both the federal and state government. The federal and state ministries of Education have quality Assurance Directorates that monitor how the curriculum is implemented. They offer advice on how best the teachers and schools administrators should handle curriculum delivery. These units engage in various quality assurance activities some of which are frequent while others are occasional and may take years to repeat. Guga (2019).

Determinants of Curriculum Implementation: Azikwe (2009) listed the following factors as determinants of Curriculum Implementation:

1. The society
2. The learner/student
3. The teacher
4. Knowledge of the disciplines

5. Availability of resources
6. Textbooks authors/subject specialist
7. Classroom organization
8, Time allocation
9, Method of teaching
10 Economy or finance

The Society

A society is usually perceived as a collection of individuals who have organized themselves into a distinct group in relation to their natural and social environment. Such a group is usually a distinct one with several things which are held in common in order to make everyone belong. Those things which are common to the group and which also ensure togetherness of such a group are the things which makeup the culture of the group. Culture therefore, becomes the total shared ways of life of a given people. This comprises their characteristics, habits, ideals, modes of thinking, acting, feelings, child rearing practices, religion, land, language, any customs as well as material products like type of house, cloth and tool and so on. (Azikiwe,2009).

Different societies have different cultures and a knowledge of that is important for educational programmes to be culturally biased. Since culture preserves a given society by educating the young on its norms and values, it is imperative that educational programmes or curriculum should be culture dependent. Therefore, curriculum designed for any given society should essentially reflect societal needs, goals, value systems, aspirations, expectations, general pattern of life and culture of people. (Azikiwe,2009).

The Learners/Students

The learner is at centre of any educational programme. This being the case, any curriculum planning must give adequate consideration to the learner. The whole idea of curriculum planning and development will be meaningless if the learners who are directly

involved in the curriculum implementation processes are not taken into account. A curriculum that is adequately planned, useful and relevant, must clearly reflect the fundamental issue of learner's needs interests, peculiarities, other physical and psychological characteristics and so on. (Azikiwe, 2009).

The Teacher

A teacher can be considered as the heartbeat of the curriculum. For a teacher to be effective and efficient in the performance of his duties, he/she must have good knowledge of the subject matter. Added to a teacher's qualification is his experience and perception of his role in the teaching/learning process. A teacher who cares less about the success of his students is not likely to perform well. Therefore, success or failure of any given curriculum will be determined to a reasonable degree on the commitment and dedication of a teacher to his professional role. (Azikiwe,2009).

Knowledge of the Discipline

The tremendous increase in existing knowledge has great influence on curriculum planning and development. Aspects of knowledge that are most worthy will have to be selected for learners in the school system. For instance, it is an established fact that knowledge in the disciplines, especially in the sciences has given rise to the problem of what to select from the various items of knowledge. At every point in time, selection of the kind of learning that is of most worth should always be considered.

Availability of Resources

Availability of human and non-human resources is another major determiner of the curriculum implementation. Human resources include the teacher and any other person or group of persons that have some contributions to the successful implementation of a given curriculum. Non-human resources include; facilities, equipments and materials. In some schools today, there appear to be inadequate resources for use by teachers. In situations where materials are not

available in large quantities to meet the demand, implementation of a curriculum that requires the use of the materials will be hampered. (Hass,2002).

Textbooks by Subject Specialists

Textbook authors usually determine the scope of content and the logic of subject matter. They, in addition, determine the authenticity or truthfulness of the information the school system will be exposed to. If, for instance, the information in a textbook is shallow, misleading and not authentic, learners will be exposed to wrong information. It is necessary that authors and specialist make effort to ensure that the most relevant, the most useful and the most functional information is included in the textbooks. Textbooks should also be reviewed from time to time to reflect any change in knowledge. (Hass,2002).

Classroom Organization

The organization of classes in schools has great effect on the implementation of the curriculum. The school head should ensure that teachers attend their classes punctually. There should also be effective in monitoring what goes on in the classroom for teaching and learning to be meaningful and rewarding.(Ogunsanya, 2002).

Time Allocation

Time available on the time table for teaching any particular subject is a measure of attention the educational managers attach to that subject. The time allocated to each subject should be adequate for the teacher to carry the learners along. If the time is too short, the teacher may tend to rush through the scheme of work not caring whether he is carrying the students along or not.(Ogunsanya, 2002).

Method of Teaching

There are so many methods used in transmitting and sharing knowledge with learners. These include lecture, discussion, discovery, inquiring, field trip/excursion, role playing, demonstration, play way etc. No one method has all the essentials and no one method is superior

to another. What dictates the choice of a particular method depends on the nature of the content that is to be taught (Meziobi 2008).

Economy or Finance

The economy or state of finance of any country is one or the most significant influencing factors of curriculum implementation. The economic situation or financial standing of any country determines to a very large extent the quality, content and even the method of education of that country. It determines the orientation of the educational philosophy, scope of the educational objectives, the range of school subjects and learning experiences, the mode of evaluation adopted, the quality of infrastructure for implementing the curriculum and the quality of teachers. (Ebiringa, 2012).

In Nigeria, the state of the economy during the era of oil boom greatly affected the curriculum in a positive direction. But presently, lack of funds as a result of the country's dwindling economy is one of the reasons why the federal government cannot expedite action on teachers' demands for salary increase thereby leading to incessant strike actions by the teachers.

2.6.3 The Roles of Teachers in Curriculum Implementation

Analysing the role of teachers in curriculum development, Albert (1990) re-echoed the dogma that no educational system can rise above the quality of its teachers. A good teacher is an embodiment of all kinds of skills without which the learners" achievement will be low. The role of the teacher therefore is very important in curriculum evaluation, interpretation and implementation, especially when it comes to measuring the gains in education. One of the primary roles of a teacher in any curriculum interpretation and implementation is that of passing message to the learner. The teacher plays other encompassing roles such as:

a) participating in curriculum planning, guiding and learning;
b) organizing students to meet their set objectives, and

c) understanding and assisting in bridging the gap between theory and practice in education (Barrow, 1996).

The effective discharge of these functions helps learners to grow in depth and dimension. The role of teachers in the implementation of the curriculum is multifaceted as they assume the position of guidance and counsellors and parent's substitutes especially at the lower levels of education. They are also involved in directing the students" thought, shaping their ideas and motivating them to aspire to greater heights in life. Therefore, the most important single determinant of what happens in the classroom is the teacher. However good the lesson notes are, the management of curriculum depends on the sophistication and appropriateness of teaching aids ,and the teacher's transactional skills; which are a reflection of his/her training and experience (Onwuka, 1984). The ability to communicate effectively will also depend on the teacher's interpersonal relationship with the students. Such relationship can be cultivated through participation and co-operation.

Effective implementation of the curriculum depends tactfully on effective and efficient planning by the teacher, who decides what the learners will do and how to do it. The malfunction of curriculum implementation easily manifests in indiscipline and disruptive behaviours of learners not concentrating on their studies. The roles and qualities of the teachers without curriculum implementation will be seemingly impossible if there is no adequate teachers' participation in curriculum planning and the use of appropriate teaching aids.

2.6.4 The Roles of Students in Curriculum Implementation

On the role of students in curriculum implementation, emphasis is placed on individual student's development, therefore, their needs and interests are considered in the implementation of the curriculum. In this guise, Ukah (2014), acknowledged that the organization of the curriculum for a group of learners depends on the perceived needs, problems and interests of the learners; the sequence of which depends upon where the learners are and how far they can

overcome the problems and situation that may arise from the implementation. A notable feature of curriculum activities is the interest in students growth through visible active experience. These are structured with the learners‟ interest at heart (Tyler, 1989). The curriculum calls for very extensive planning by the teacher if it must be successfully implemented (Onwuka, 1984). It is hoped that this research would alert classroom teachers on the need to make preparation towards the successful implementation of the curriculum.

2.7 Nature, Relevant and Scope of Basic Science and Technology curriculum for JSS in Nigeria

All over the world, attention has been focused on science and technology so that there can be social, economic and even political development. Nigeria is no exception to this drive. The National Policy on Education (FRN 2013), and the Universal Basic Education (UBE) Act of 2004 reflect this global desire. Indeed the UBE Act 2004 (p 16) stipulated that:

> "Every learner who has gone through nine years of basic education should have numeracy, manipulation , communities and lifelong skills; as well as ethical, Moral and civic values needed for laying a solid foundation for lifelong learning;

As the basic for scientific and reflective thinking"

The National Policy on Education (FRN 2013), and the UBE both provide for 6 years of primary school and 3 years of junior secondary school. One of the subjects through which the aim of education could be achieved in the first six years is Basic Science and Technology. Science is simply the study of our environment. This body of knowledge has two components - the process skills and the content. The process skills involve the ways by which the knowledge is gathered and these are observation, inference, measurement, classification, prediction and communication. The knowledge gathered make up the content of the subject to teach is to help someone acquire skill, attitude, knowledge, appreciating information and ideas. Teaching includes provision of conditions that can promote the

building of attitudes, skills development and other aspects of learning. Unless learning takes place as a result of some efforts, we

Cannot conclude that teaching has taken place, In the teaching - learning process, both the teacher and the learner must be active. Basic Science and Technology is the foundation upon which the bulk of present technological breakthrough is built. It is through the application of Basic Science and Technology that man ensures the longevity of his existence. Basic Science and Technology teachers should always seize the opportunity of making pupils appreciate the fact of the subject as a means of achieving technological development and economic survival (Ewesor 2015).

This Research work would therefore addressed the following headings:

1. what is Basic Science and Technology Education
2. Objectives of Basic Science and Technology Education in Nigeria.
3. Developmental role in Basic Science and Technology Education in Nigeria
4. Teaching Basic Science and Technology Education in Nigeria
5. Conclusions

1. What is Basic Science and Technology Education?

Basic Science and Technology Education is the way in which children /learners in primary/ junior secondary schools tries to learn and understand their environment, observed and explores the world around them. Science should be introduced to children even before they get to primary school in order for the children to learn fast when they are in primary school. Children between the age of birth and eight learn rapidly using all their senses and the whole body to take sensation and to experience the world around them. In this period of their lives, they engage in play which they spend most of their waking time on. Through play activities, their exploration cuts across areas of development, like social, emotional, motor, language and physical developments.

Wynneled (2018) declared that the brain of the child has to be developed in order to learn science that will help him/her to understand the world around them. Concenzio and French (2002) categorically declared that children are biologically prepared to learn the world. They are inquisitive and eager to satisfy their curiosity at the slightest opportunity. As observed by Ogunsanwo (2004), children play with water, mud, insects, whatever they can touch, smell or hear. As they play with these things, a lot of scientific skills such as observing and making references are learnt.

Objectives of Basic Science and Technology Education in Nigeria: Basic Science and Technology Education in Nigeria intended to:-

I. Help pupils observe and explore the environment

II. Make pupils develop basic science process skills including observing, classifying, experimenting and manipulating.

III. Develop a functional knowledge of basic science concepts and principles.

IV. Develop scientific attitudes; including curiosity, honestly, perseverance, willingness to change, opinion and critical reflection.

V. Develop self - confidence and self reliance through problem - solving activities in science.

VI. Develop functional awareness of sensitivity to the orderliness and beauty in nature.

VII. Develop attitudes and values consistent with the management and conservation of life.

VIII. Lay a good foundation for the learning of science in the future.

IX. Enable the child develop the ability to apply the knowledge and skills gained in science to solving everyday problems in his/her environment.

X. Enable the child keep pace with technological advancement.

XI. Adaptation of the child to desirable changes around him/her.

Scientific literacy acquired through science - learning enhances the production of citizens who can effectively participate in and contribute to the life of the society. While objectivity, open -mindedness and honesty are some of the values which are cultivated by those who learn science, the better appreciation and understanding of the environment developed desire and ability to adapt. As part of such adaptation, children develop early in life correct or sound attitudes towards problems and problem -solving. The mechanical skills acquired through science - learning includes manipulation and ability to handle things. Also, science - learning provides children with useful experiences which enhance and facilitates mental development.

Developmental Role of Basic Science and Technology Education in Nigeria

In Nigeria, Science teaching has its roots in the primary schools unlike most Western countries where science started from the universities and extended to high schools. The Mission Schools were regarded by their founders as centres for teaching the bible and for promoting Christianity and because of these, science teaching was completely not in existence in primary schools during the early days of formal

Education in Nigeria, This could be as a result of the nature of the real goals and objectives of the missionaries and the colonial government, the prevalent status of Basic Science and Technology Education in Europe at that time and the personal conviction of some key persons in the colonial administration.

In 1964, Babs A. Fafunwa organized a series of primary science workshops at Nsukka, where he was then the Dean of Education with funds from the Ford Foundation. He started the Elementary Science project. In Nigeria, APSP (African Primary Science Programme) was promoted through various workshops organized by the then Nigeria Educational Research Council (NERC) and some very good materials gotten from these workshops. The workshops now gave rise to some popular primary science of the primary education improvement programme at

the Institute of Education, Ahmadu Bello University, Zaria. Another is series of science is the discovery of the Bendel State Primary Science Programme (BPSP) which was initially called Midwest Primary Science Programme (MPSP). These programmes, at the ABU and in Bendel State, were UNESCO/UNICEF sponsored. There was also the Nsukka group under Professor Fafunwa, which emphasized the use of locally available materials for primary science teaching. This group developed a few units which were tried out in the local schools around Nsukka. Although, their materials have not survived in their original form but they become very useful in the later years of primary science development in various programmes all over the country. The materials are suitable for both pre-service and serving teachers, workshops for training teachers of the in-service type, have been held all over the country. Lastly, the Science Teachers' Association of Nigeria (STAN) as a body had promoted primary science very much and it has a curriculum committee on primary science as well as devoting some of the annual conference to the issues of primary science education in Nigeria today.

The primary/Junior secondary school teacher who is engaged in the teaching of basic science and technology needs to be very careful because this is the age or level where children come across science and technology for the first time in their life. The teacher also needs to design ways of making children develop interest in science and thus, overcome any negative influence towards their learning of science. The teacher must strive to develop teaching materials that will be highly motivating to catch the interest of the children when they are still young. The teacher should aim at developing the cognitive, affective and psychomotor abilities of the child because education is supposed to effect the development of the child. That is why science should not be taught with a chalk-talk method alone. The teacher needs to be familiar with the reasons for teaching science at the primary/junior secondary school

level, and should also make the pupils and their parents to get to know this since they are to work together to ensure effective teaching and learning of the subject.

Reasons for teaching Basic Science and Technology at primary/JSS Level

It is because it:-

a. helps pupils/students to explain events in nature

b. enables pupils/students to think and reasons in a logical manner

c. Teach pupils/students to solve simple problems they encounter on a daily basis.

d. Helps pupils/students to develop social skills e.g. establishing friendship while working co-operatively in groups.

e. Helps pupils/students satisfy their natural curiosity through opportunities in carrying out scientific investigations.

f. Helps pupils/students to employ scientific knowledge and concepts to better their environment

g. Helps pupils/students to use their brain and hands

h. Helps pupils/students to develop positive attitude towards work, makes work easier and productive.

i. Encourage critical thinking and creativity (National Teachers Institute 2006): 69 - 70

In addition to taking cognizance for teaching Basic Science and Technology, the teacher should try to give the pupils/students opportunities to:

1. Observe and explore the environment;

2. Develop basic science process skills including observing, manipulating, classifying, communicating, inferring, hypothesizing, interpreting data and formulating models.

3. Develop a functional knowledge of science and science concepts and principles;

4. Explain simple natural phenomena;

5. Develop a scientific attitude including curiosity, critical thinking and objectivity;

6. Apply the skill and knowledge gained through science in solving everyday problems in his/her environment.
7. Develop self-confidence and self -reliance through problem solving activities in science; and
8. Develop a functional awareness of sensitivity to the orderliness and beauty in nature (FME 1998): 70

The Basic Science and Technology education has its own peculiar nature and demands that while teaching it, the teacher should take note of the student's feelings, beliefs, attitudes, integrity, cleanness, punctuality and respect for elders. Science is discovery while technology is doing or ways of doing something, and not just saying, (i.e. Active learning has to take place).

2.7.1 Content Coverage in Basic Science and Technology Curriculum

Scheme of works are simplified curriculum, while curriculum is the totality of learning activities to be achieved in a year. Scheme of work are curriculum broken down into terms and weeks. The scheme of work comprises the term to term, week by week learning activities to be delivered by the teacher to the student and is usually, further broken down into lesson periods by the teacher in a bid to bring about specific objective(s) per lesson period and ensure effective coverage of the subject content. According to the National Council on Education (NCE) approved a new curriculum in basic science in 2006 to suit the present system of Education: 9 years of Universal Basic Education (UBE), 3 years of Senior Secondary Education (SSS) and 4 years tertiary education. In the new curriculum the 9 years basic education was subdivided into 3 structures namely: Lower Basic Education Curriculum (Primary 1-3); Middle Basic Education Curriculum (Primary 4-6); Upper Basic (NCE 2006).

This new curriculum was prepared in a way in which it ensures continuity and flow of themes, topics and learning experiences from primary to Junior Secondary Schools levels. This implies that any topic or content that is not covered at any stage will hamper the understanding

of the next topic in the upper stage. The important thing in terms of teaching and learning of Basic Science and Technology is the coverage of subject since the quality of education does not depend on the structures but how well the students are being taught. With the advent of Universal Basic Education on 29thSeptember 1999, the system of education changed from 6334 (that is, six years of primary education, three years of junior secondary education, three years of senior secondary education and four years of tertiary education) to nine years of universal basic education known as UBE, three years of senior secondary education and four years of university educational system (9-3-4). This also led to the change of the name from integrated science to Basic Science and Technology (for science concepts in the Junior Secondary School Curriculum), in the same vain the content and scheme of work of integrated science was modified. The coverage of integrated science scheme of work is a task that involves the learner, the teacher and the entire school system. The schools even organize extra-lessons, extension of classes and holiday lessons to ensure that the scheme of work is covered objectively. The Basic Science and Technology curriculum came as an alternative syllabus for integrated science in JSS 1-JSS 3 secondary schools. Its content coverage spans across biology, chemistry and physics: this was treated as a single subject to prevent the deficiencies such as low readability of the textbooks, difficulty of the topics, inadequate teaching facilities and so on.

2.7.2 Methods of Teaching Basic Science and Technology (BST)

There are various methods for teaching BST. The use of a variety of instructional methods is necessary for effective and efficient curriculum implementation process. Ukah (2014) listed the following methods of teaching Basic Science and Technology;

1. Field Trip/ Excursion Method
2. Project Method
3. Inquiry Approach
4. Process-Based Teaching Method

5. Demonstration Method
6. Laboratory/Experimental Method
7. Role Play Method

Field Trip/Excursion Method

This is the act of taking pupils outside the classroom so that they can learn some science and technology concepts and themes as they occur in actual situations. The pupils usually have first-hand experience in nature and technological settings. The experiences gained during field trips are long lasting and vivid. Some possible sites for field trip/excursion and related science and technology concepts are school farm/garden, playground, mechanical, blacksmith, electronics and electrical workshops and cyber café, streams, ponds and various industries.

The teacher should give learners opportunity to select any of scientific and technological interest for the field trip. The teacher should visit the site for the field trip before the date of excursion and make necessary and adequate arrangements. The science and technology concepts to be learnt should have relevance to the curriculum and the learners should have sufficient time to observe and ask questions. When the learners return, the teacher should ask them to discuss and make a report of the trip.

Project Method

In this approach, a central theme, problem or idea (known as a driving question) is selected by the teacher, the learners or both the teacher and the learners. The task is further divided into sub- themes, problems or ideas. The learners are encouraged to investigate, collect specimens or materials, analyse and construct things on their own. The teacher acts as a guide in facilitating the students learning. The learners can work individually or in groups. At the end of the investigation, the reports on the project are collected and discussed with the whole class.

Ukah (2014), gave examples of projects in Basic Science and Technology as follow:

1. Investigation on the different methods of conserving and improving soil fertility,
2. Making a simple weighing balance,
3. Making a simple models of machines (levers, pulleys),
4. Making a simple see-saw for the school playground,
5. Moulding of objects using clay,
6. Beautifying objects by painting using different colours.
7. Constructing shape using cardboard,
8. Making and flying of kite.

Project method is an activity oriented method of teaching. Some of its activities can best be carried out outside the school classroom. This makes it appropriate for teaching topics that require activities in Basic Science and Technology curricula.

Inquiry Approach

In the inquiry approach, the learners are given opportunity to carry out the search and discovery of facts about events and scientific and technological ideas. The learners should be made to observe carefully, ask questions, measure, classify, predict and communicate their findings. Inquiry entails practicing of attitudinal skill such as honesty, open-mindedness and perseverance when carrying out science and technology tasks. Inquiry can be open-ended or close-ended. It could also be done in the classroom or outside the classroom.

Process-Based Teaching Method

Process-based approach lays emphasis on helping the students develop process skills through practice or hand-on activities. These activities can take place inside the school classroom or outside. The teacher is to encourage the students to learn how to observe objects or events more closely as they use their senses to gather information about the objects or events. The teacher should make sure that the information learners obtain are qualitative by describing what

they have actually observed. An example of process-based learning is illustrated in the case of grouping (classification) and observation. For example, Ukah, (2014) identified the similarities and differences of objects and events such as:

1. Learners to identify common weeds in their environment,
2. Learners to identify disease infested crop materials in their environment,
3. Learners to identify types of building and differentiate between each of the buildings in their environment.

Demonstration Method

Demonstration in Basic Science and Technology class involves carrying out science and technology activities to illustrate science and technology concepts or ideas. Demonstration can be carried out by the teacher alone; the teacher and the learner(s); the child who is knowledgeable in the activity; and an invited guest. Demonstration can be carried out to show:

1. That water evaporates when heated;
2. The process of getting clean water from dirty water through filtration in a water cooperation;
3. How to make door mat;
4. Application of pulleys in construction sites, quarry sites etc;
5. The use of inclined plane in construction sites; and
6. Friction in metal fabrication workshop.
7. In carrying out demonstration, the following should be noted:
8. Purpose of the demonstration must be clear to all participants (learners);
9. All learners should see every part of the demonstration;
10. Involve the learners as much as possible; and
11. Use simple and readily available apparatus and materials for demonstrations.

This method can be combined with field trip/excursion method. This is because some of the activities that take place in field trips/excursions are first demonstrated to the learners by the teachers or the resource persons in the course of explanation. (Ukah 2014).

Laboratory/Experimental Method

The laboratory method can be referred to as activity carried out by particular students or a group of students which is more of personal observations of processes, products or events. This method is mostly used in the teaching-learning of science subjects. Laboratory Method is characterized by two procedures. Laboratory exercises which usually consists of activities that are carried out so as to provide practice in designing, operating and interpreting experiments. The other procedure known as experiment consists of operations or procedures used for testing a supposition, confirming the known, and by this a child learns. Furthermore, since freedom and free activity promote learning, a sort of play in teaching will incorporate them. Play has been referred to as any pleasurable activity. (Meziobi 2008).

Role Play Method

The role play method usually involves the children or learners in dramatization of real life situation. It is a process in which problems are dealt with through action. Usually, a problem is identified, acted out, and discussed, with some learners playing roles and others observing. In classroom situation, if a problem area is buying and selling, then it can be role played by having some learners representing traders and other customers. The teacher provides money and various articles for the role playing exercise. (Meziobi 2008).

However the researcher is of opinion that the Basic Science and Technology teachers are expected to select any teaching method that is appropriate in teaching a particular topic or a combination of methods where necessary in their instructional deliveries. These teaching methods can be combined to make the Basic Science and Technology classes a worthwhile exercise.

2.7.3 Assessment Techniques in Basic Science and Technology

The primary and basic aim of assessment is to find out how much knowledge students have, how much progress is being made which helps to reveal the extent to which the objectives of the programme are being achieved. Assessment plays an important role in many facts of the school program. It contributes directly to the teaching and learning process of the classroom instruction, curriculum development, making and reporting, guidance and counselling, school administration and research. Okoro (2005) stated that assessment is useful in examination. If students consistently do badly in examinations, it could be that the teacher has been incompetent and has not presented and taught his lesson in an interesting way. Norman (2001) stated that teachers' observation and judgments of students' behaviour are of special value in those areas where the behaviour is readily observable and the teacher special competencies to judge. It is therefore unnecessary to say that assessment is the appraisal of the worth or value of a thing or action and making of appropriate decision on the basis of such appraisal (Okoro, 2005). The author alleged that assessment has to do with collection of data and use of such data to assess the effectiveness or quality of performance or programme.

It is therefore essential for teacher of Basic Science and Technology to develop the necessary competence needed for the effective use of assessment techniques. According to Houston (2001) information from carefully developed assessment technique can also be used to assess and improve instruction. Okoro (2005) also stated that assessment of students' performance can be categorized into the following:

1. Context assessment- which involves the assessment of course and program objectives
2. Input assessment- which helps to evaluate the teacher's ability and effectiveness.
3. Process assessment – which involves the assessment of
4. Instructional methods and determination of the level of knowledge or skill possessed by students if done at the formative stage of the teaching and learning process

5. Product assessment- which determines the level of knowledge or skills possessed by students if done at the summative stage of the teaching and learning process.

According to Ogwo and Oranu (2006) assessing the input provides information on programme needs in terms of facilities, funds, equipments, materials, personnel and other resources involved in a programme. Process assessment on the other hand is a technique which provides periodic feedback on the quality of implementation of a programme and determines if there are any defects in the implementation process. It also provides information for interpreting programme outcomes (Olaitan and Ali, 1997). Product assessment on the other hand is an evaluation not of procedure adopted but of final product itself (Okoro, 2005). Product assessment is not interested in the procedure adopted in answering a performance test but in the product on objective produced. Therefore, for teachers to use these assessment techniques effectively they must have the skill required competencies and experiences.

2.7.4 Evaluation of Basic Science and Technology Curriculum

Basic Science and Technology formerly known as Integrated Science is the first form of science a child comes across at the secondary school level. Basic Science and Technology is a core subject in the National curriculum at the upper basic level (Kim, 2008). All students from upper basic I-III classes must offer and study the subject. Basic Science and Technology is considered the bedrock of all science subjects at the senior secondary school (SSS) level. The subject prepares students at the upper basic level for the study of core science subjects (biology, chemistry and physics) at the senior secondary school level (Olarewaju in Oludipe (2012). That is why Oludipe (2012) further emphasised that for a student to be able to study single science subjects at the senior secondary level successfully; such a student has to be well grounded in Basic Science and Technology at the upper basic level. Based on this, it is generally taught as a single science subject, until in the SSS level, and then split into specialized science subjects (Biology, Chemistry and Physics). It is expected that those students who achieve well in Basic

Science and Technology should be given the opportunity to study the separate science subjects at the SSS level

According to Trustees of Princeton University (2013), Basic Science and Technology is a revolutionary new introductory science curriculum developed at Princeton intended for students considering a career in science. Basic Science and Technology emphasizes scientific literacy and research oriented learning (Eyles, 2009). The subject encourages exploration of student's immediate environment. As a result, Basic Science and Technology teachers continue to learn along with their students. The teaching of Basic Science and Technology is therefore, based on the philosophy of active learner-participation in the process whereby, students are encouraged to learn by constructing their own knowledge based on what they already understand as they make connections between new information and old information, guided or facilitated by the teacher (Piaget, 1956). Under this philosophy, students are encouraged and led to discover concepts and generalizations based on their experiments.

Though the curriculum of Basic Science and Technology specifies "hands-on" and "minds-on" activities and skill acquisition, most students are not exposed to these real situations in the schools (FRN 2004). Emaikwu (2012), in his research discovered that basic science is generally taught using conventional strategy which does not follow the theories put forth by Kolb (1984) and the theory of learning process.

Basic Science and Technology is a concept in science teaching in Nigeria that came to replace integrated science. A study by Chukwuneke and Chinkwenze, (2012) revealed that the scientific, vocational and technological aspects of education are not effectively implemented in the school system. Based on this, Basic Science and Technology curriculum review became a necessity. This led the Federal Government of Nigeria to take the decision to introduce the 9-year of basic education and the need to attain the Millennium Development Goals (MDGs) by the year 2015 together with the need to meet the critical target for the National Economic

Empowerment and Development Strategies (NEEDS), summarized as follows; value reorientation, poverty eradication, job creation, using education to empower the people among others (FRN 2004).

As documented by Chukwuneke and Chinkwenze (2012), it became necessary for the existing curriculum for the upper basic level to be reviewed, restructured and realigned to fit into the 9-year basic education programme. With this, the National Council on Education (NCE) therefore in her meeting in 2005 directed the NRDC to ensure the review which also approved the new curriculum. This restructuring and curricular review took effect from September 2007 (Duada & Udofia, 2010). It was during this restructuring and review of curricular that Basic Science and Technology replaced integrated science.

During this time, human rights education, family life, HIV/AIDS education, entrepreneurial skills, globalization, ICT were fused into the 9-year basic education curricular (FRN 2004) while the following themes were fused into the Integrated Science curriculum to form the Basic Science and Technology curriculum:

1. Environmental education
2. Drug abuse education
3. Population and family life education
4. Sexually transmitted infection (STI) including HIV (FRN 2004)

Basic Science and Technology is basic training in scientific skills which are required for human survival, sustainable development and societal transformation (Chukwuneke & Chinkwenze, 2012). Basic science is expected to make Nigerians scientifically literate.

There are various objectives of Basic Science and Technology as identified by Bilesanmi-Awoderu & Oludipe, (2012), which are the reasons for which Nigerian government started Basic Science and Technology teaching in Nigerian upper basic level:

1. Basic Science and Technology provides students at the upper basic level, a sound basis for continuing science education in single science subject.
2. It enhances the scientific literacy of the citizenry.
3. It allows students to understand their environment in its totality rather than in fragments.
4. It allows students to have a general view of the world of science.
5. The processes of science serve as unifying factors for the various science subjects.

The importance of Basic Science and Technology in everyday life can never be overemphasized. It serves as the bedrock which provides the required training in scientific skills to meet the growing needs of the society. It is the fundamental knowledge acquired through Basic Science and Technology at the upper basic level that leads to the transformation of the world through dramatic advances in almost all fields including medicine, engineering, electronics and aeronautics among others (Guyana 2009).

The application of scientific knowledge acquired through Basic Science and Technology, as reported by Guyana (2009), that helped many countries like China and India to transform from poor feudal type economies to become economic and industrial power houses and in several ways compete effectively with developed countries. Basic Science and Technology is of great importance because early experiences in science help students to develop problem-solving skills that empower students to participate in an increasingly scientific and technological world (Guyana Chronicle, 2009).

Basic Science and Technology is the type of science which provides unique training of students in observation, reasoning and experiment in the different branches of science; it also helps students to develop a logical mind (Prakash, 2012). Basic Science and Technology enables students to be systematic and enables them to form an objective judgment. Basic science, if taught according to its philosophy, equips students with the necessary introductory scientific and technological knowledge and skills necessary to build a progressive society. This forms the

bedrock on which scientific and technological studies rest, Adejo and Idachaba in (Ochu&Haruna, 2014). In Nigeria, although Basic Science and Technology have been of great value both to individuals and society globally, but however, students have been performing poorly in the subject especially in Kaduna State (Ochu & Haruna, 2014). The poor performances might be as a result of the following challenges:

The teacher as the curriculum user has been identified as the most important factor in curriculum delivery. His/her level of competence and teaching strategies is very important. Many Basic Science Teachers cannot guide their students to apply what they learned in the classroom to real life situation. They ignore this aspect completely, it has been observed that some science teachers (Basic Science and Technology) lack training in instrumentation to enable them to detect and repair faulty instruments (Ogunleye, 1999). Many Basic Science and Technology teachers are not yet computer literate. The teachers are hardly creative in terms of exploring the environment for the purpose of identifying and using resources for teaching Basic Science and Technology. Instead they bombard these students with facts using lecture method and overload the students with notes and assignments. Most Basic Science and Technology teachers are not dedicated to their jobs. This could be as a result of the issue of salaries.

The salary issue is a peculiar challenge, where the income is insufficient to live reasonably, teachers are no longer motivated to teach, some teachers lack interest in the job, which can lead to disengagement of most teachers in the field of Basic Science and Technology. It is interesting to note that teachers' salaries are not adequate and not paid on time. Teachers do not enjoy regular promotions as at when due. It is because of this that Hamza and Mohammed (2011) lamented that the ugly situation considering the importance of the teachers, especially in Basic Science and Technology where conducive atmosphere should be created for teaching and learning.

Wasagu in Wushishi and Kubo (2011) identified some factors that pose challenges to effective teaching of Basic Science and Technology in secondary schools. They enumerated as follow; poor exposure to student teachers to teaching practice, poor classroom management and control, poor computer skills, inability to communicate effectively, lack of self-confidence, entrepreneurial skills and poor attitude to work, inadequate laboratory equipment, poor medium of instruction and lack of students interest.

Inadequate supply of infrastructures has jeopardized the effective teaching of Basic Science and Technology. Insufficient supply of electricity power generation is the major problem for most of the schools, especially where there is no stand-by generator. Electricity that would have been used for the equipment in the laboratory or workshop for effective use of electrical equipment is not readily available (Odu, 2011). In the same vein, Aderounmu (2006) also observed that lack of facilities and teachers were some of the factors contributing to poor performance of students in Basic Science and Technology.

Teachers Qualification

The study observed that most of the junior secondary schools in Kaduna state have inadequate qualified Basic Science and Technology teachers, on a visit to these schools, the researcher observed that Chemistry, Geography teachers are assigned to teach Basic Science and Technology. The issues of Basic Science and Technology teachers qualifications cannot be overstressed.

Many teachers in sub-Saharan Africa, including are not able to apply modern information technologies in teaching due to computer illiteracy hence they mostly rely on lecture method of teaching (Haambokoma, 2002) in Adenipekaan (2009). Failure to expose learners to hands on experiences has resulted in their low academic achievement in the SMT subjects namely Mathematics, Biology, Chemistry, Physics and Agriculture.

A study by Adeogun (2001) in HajiyaAlhaji REM (2008) in Nigeria found that the quality of any education system depends on the quality of teachers. Review of related literature indicates that the most important school- based determining factor of students' achievement is the teacher quality (Harris and Sass, 2008).

Therefore, there is need to assess the characteristics of the secondary school teachers in terms of qualification, experience and teaching methodology in order to ensure quality of education given to the youths. The teachers of SMT should be in-serviced where gaps are indentified to enable them to cope with the Requirements of the dynamic school curriculum (Murunga, 20013).

According to Usman (2012), a qualified teacher can be defined as one who holds a teaching certificate and or licensed by the state, owns at least a bachelor's degree from a four year institution and well qualified in his /her area of specialisation. Moreover, Usman quotes the ministry of Education officials who described a qualified teacher as one who possesses knowledge of the subject matter, human growth and development, ethical values, instructional planning and strategies, assessment, learning environment, communication and advocacy, collaboration and partnership, continuous professional development, code of conduct and skilful use of information communication technologies.

The educators, government, parents and society in general have constantly been interested in the academic achievement of students (Lydiah and Nasongo, 2009;Yusuf and Adigun, 2010). According to Adeyemi (2010), teachers play an important role in determining the students' academic achievement. Researchers have reached a consensus on the specific teacher factors that influences students' achievement (Rivkin, 2005) in Imhabekhi ((2011). Some studies found that teachers' experience and educational qualifications significantly influenced students' academic achievement (Ugbe and Agim, 2009: Asikhia, 2010; Yala and Wanjohi, 2011; Olaleye, 2011). When conducting research on factors contributing to under achievement of Zambian

female students in O-Level physics examinations, Maguswi (2011) found that lack of qualified teachers of Physics had a significant contribution. Moreover, a study one by Adaramola and Obomanu (2011) in Nigeria found that lack of qualified teachers led to consistent poor performance of students in SMT subjects. Studies done by other scholars found that teachers professional qualifications and teaching experience are not significantly related to students' academic achievement (Rivkin, 2005: Buddin and Zamarro, Mbugua, 2012: Kimani, 2013; Musau, 2013. Furthermore, a study done by Feng and Sass (2010), found that in- service professional development for teachers has little effect on their ability to increase the achievement gains of students. Aaronson 2007 found little or no difference in teacher effectiveness among Chicago Public School teachers with different college majors.

2.7.5 Problems and Prospects of Curriculum Implementation

Ekpo and Osam (2009), stated the following as a major problems in the implementation of school curriculum:

a) Language of instruction

b) Funding

c) Manpower

d) Leadership

Language of Instruction

Nigeria is a multi-linguistic society. This situation has made it difficult for the school to adopt a lingua franca for instruction. It should be noted that language is a basic tool for the communication of learning experience in schools. In Nigeria, English language is a second language as such it is the tool for instruction in schools. The policy of using English language as medium of instruction in schools is a colonial legacy and it has hindered the smooth implementation of school curriculum. For instance, teachers and learners have the problem of understanding the meaning of various concepts they intend to teach and learn.

The National Policy on education has made provision for teaching at the basic education (1-6 years) level to involve the initial use of the local language, while, English is taught as a subject, at a later stage, English would be used as a language of instruction while local language would be taught as a subject. However, the policy tends to be implemented at the wish of the schools

Funding

The problem of funding curriculum implementation is a serious matter. The success of the entire components of the curriculum in schools depends on adequate funding. For instance, the training of manpower and their remuneration, materials, monitoring and supervision all require adequate and regular funding. In Nigeria, the policy of funding education is faulty, for instance, the federal government could provide instructional materials and funds for staff development but could not fund recruitment of teachers and other supporting staff; this is a contradiction and misplacement of priority in curriculum implementation. It should be made clear that the success of curriculum implementation depends on proper and adequate funding.

Manpower

The proper implementation of the school curriculum requires specific reference to manpower provision. Education planners lack up to date statistics to guide their projection of manpower needs. In most of the states in Nigeria, classrooms have shortage of qualified and skilled manpower. In states where the quantity and quality exist, the manpower is not motivated interns of conditions of service and on the job training. This tends to negatively affect curriculum implementation.

Leadership

This component of curriculum implementation is a major concern because it distorts the entire system of the school. Leadership problem is manifested in the degree of corruption that pervades the society in general and the education sector in particular. In the process of implementing the school curriculum, funds released for such purpose in most cases, do not get to

their destinations. In cases where they do, a large percentage of the fund would have been diverted for purposes they were not meant for.

The leadership would have to present itself as a model that would provide exemplary leadership and ensure smooth and effective implementation of the curriculum. Such a leadership would ensure the timing of the implementation of the curriculum and monitor the evaluation procedures of effective feedback. It is important at this point to note that these problems should be regarded as challenges to education problems rather than attacks on their personalities. There is no programme implementation exercise that does not have inherent problems, what is required is the will that confront these problems objectively. (Azikiwe, 2009).

2.8 Empirical Studies

This section review related studies conducted in the area of this research, as this will shed more light on the phenomenon under this study. Ishaya (2014), carried out a study on the assessment of the implementation of Integrated Science curriculum in Junior Secondary Schools in Kaduna State. The objectives of the study are: to determine the extent of achievement of the objectives Integrated Science Curriculum at Junior secondary Schools in Kaduna State; examine the qualification and training received by Integrated Science teachers in the implementation of Integrated Science Curriculum at the Junior Secondary Schools in Kaduna State and examine adequacy of the methods and technique used by Integrated Science teachers for lesson delivery in Junior secondary Schools in Kaduna State. Survey research design was adopted for the study.

The researcher used 150 Integrated Science teachers as population and sample. The instrument for data collection was questionnaire titled: Questionnaire for views of Teachers on Effectiveness of Teaching and Learning Integrated Science at the Junior Secondary School in Kaduna State. Stratified sampling technique was used to select the respondents. Simple percentage statistical tool was used to analyse the bio-data, while statistical mean was used to analyse the research questions and the hypotheses were tested using t-test statistical analysis.

Test retest method was used to establish the reliability index at 0.55 reliability coefficient. The findings of study revealed that there is a significant difference between male and female Integrated Science teachers in their views on the achievement of the lesson objectives of Integrated Science curriculum in junior secondary schools and educational qualification of teachers has a significant effect on the implementation of Integrated Science curriculum in junior secondary schools in Kaduna State. The study further recommended that teachers should be well trained and qualified in other to achieve maximum teaching and learning of Integrated Science curriculum at the Junior Secondary schools.

The research is also relevant to present study because the population, research design and instrument used in the study are similar to the current study. The differences in the studies are; the current study is on evaluation of the implementation of Basic Science and Technology curriculum in junior secondary schools while Ishaya's study is on the assessment of the implementation of integrated science curriculum in junior secondary school. The current study intends to employ ANOVA as statistical tool for analyzing the hypotheses while Ishaya employed T-Test to analyze the hypotheses in his study. The present research work is unique because, the study is on the evaluation of Basic Science and Technology curriculum which encompasses integrated science and other science related subjects taught in junior secondary schools.

Aremu (2015), examined Competency Improvement Needs of Technology teachers in the Implementation of Basic Technology in Kogi State. The objectives of the study include the following; Competency Improvement Needs of Teachers of Technology in Planning Instruction for the Implementation of Basic Technology; Competency Improvement Needs of Teachers of Technology in Classroom Management for the Implementation of Basic technology; Competency Improvement Needs of Teachers of Technology in Teaching Content of Basic technology. The research design adopted for the study was descriptive survey research design.

The population of the study was 1008 Basic Technology teachers and supervisors selected in junior secondary schools and colleges of education in Kogi State in which simple random sampling technique was used to select 344 teachers and supervisors for the study. The instrument for this study was a structured questionnaire titled; Competency Needs of Teachers Questionnaire (CNTQ). The statistical employed in the study include; Weighted Mean and Improvement Index(INI) which was employed to analyse data from the competency cluster questionnaire and T-test was used to analyze the hypotheses at the 0.05 level of significance. The internal consistency of the instrument was determined using Cronbach Alpha reliability coefficient method. The findings of the study revealed that there is no significance difference mean responses of teachers and supervisors of Introductory Technology on the Competency Improvement Needs on planning instruction for the implementation of Basic Technology, in teaching the content of Technology Curriculum to students in junior secondary schools and in classroom management for the implementation of basic technology. The study further recommended that workshops and seminars should be organised for teachers of technology in order to build their capacity for implementation of Basic Technology curriculum in Kogi State. The two studies are related because both studies employed descriptive survey design as a research design method and also basic technology is a component of Basic Science and Technology. The differences in the studies are in term of scope and statistical tool used in conducting the studies. The current study intends to be conducted in junior secondary schools in Kaduna State while Aremu's study was conducted in both junior secondary schools and colleges of education in Kogi state.

The current intends to use ANOVA to analyze the null hypotheses while the previous study used T-test statistical tool to analyze the null hypotheses. Secondly, the current study intends to use simple to answers research questions while the previous study used weighted mean and improvement index to analyze data gotten from competency cluster questionnaire. The

present research work is unique because, the study is on the evaluation of Basic Science and Technology curriculum which encompasses basic technology and other science related subjects taught in junior secondary schools.

Chukwuemeka (2014), evaluated the Implementation of Social Studies curriculum in Junior Secondary schools in Enugu State. The main objective of the study was the implementation of social studies curriculum in junior secondary schools with emphasis on: teachers' qualification, teaching methods effectiveness and availability of instructional materials. The research designed employed is a survey design. The population covered all the 200 social studies teachers in the six educational zones in Enugu State. A sample of 20 junior secondary schools was selected in which 25 social studies teacher were randomly drawn from the entire population using simple random sampling technique. Two instruments were used tilted: Structured Systematic Observation schedule Details and Social studies Evaluation Questionnaire Details. Statistical mean and Standard Deviation were used to answer research questions while hypotheses were tested using ANOVA at 0.05 level of significance.

The reliability index was established using Cronbach Alpha at 0.98 coefficient of reliability. The study findings revealed that teachers' qualification is not significant in the usage of instructional materials. Teacher qualification is not significant in the implementation of social studies curriculum. Teacher qualification is not significant in the coverage of Social Studies syllabus. The study further recommended that social studies teachers should endeavour to be learners' centred and be encouraged to use leaner centred strategies in teaching and learning so that students will concentrate to achieve the objective of the curriculum. The relationship between the two studies are :(1) Both studies are involved in the evaluation of the implementation of curriculum in junior secondary schools (2) Both studies also employed descriptive research design. The only difference identified is that the present study is on the evaluation of the implementation of Basic Science and Technology curriculum in junior

secondary schools in Kaduna State while Chukwuemeka's study was on the evaluation of the implementation of social studies curriculum in junior secondary schools in Enugu State. The present research work is unique because, the study intends to proffer solutions and measures in solving curriculum implementation problems encountered by teachers in junior secondary schools in Nigeria.

Ukah (2014), examined teachers' utilization of outdoor science educational activities in teaching Basic Science and Technology. The objectives of the study include; to determine the extent of teacher utilization of outdoor science educational activities in teaching Basic Science and Technology curriculum that require outdoor science educational activities; influence of teachers qualification on the use of outdoor science education activities in teaching the topics in Basic Science and Technology curriculum that require outdoor science educational activities; influence of teachers experience on the use of outdoor science educational activities in teaching Basic Science and Technology curriculum that require outdoor science educational activities. Descriptive survey was adopted as the research design. The population comprises of 10,526 Basic Science and Technology teachers distributed across the three educational zones in Ebonyi State. 1,056 teachers were drawn from the population as sample for the study.

The instrument was a questionnaire titled: Basic Science and Technology Teachers Utilization of Outdoor Science Educational Activities Questionnaire (BSTTOSEAQ). A multi-stage sample technique was adopted to select the respondents. Mean score and standard deviation were used to answer the research questions while the hypotheses were tested using the T-test statistical analysis. The internal consistency of the reliability of the instrument was obtained using Cronbach Alpha reliability index at 0.89 reliability coefficient. The findings of the study showed that most teachers often utilize outdoor science educational activities in Basic Science and Technology curriculum; qualification does not influence teacher on the utilization of outdoor science educational activities in teaching the topic in Basic Science and Technology curriculum

that requires outdoor' activities; years of experience influences teacher on the use of outdoor science educational activities in teaching in Basic Science and Technology curriculum that requires outdoors activities.

The study recommended that regular conferences, seminars and workshop should be organized by the ministry and board for the in service Basic Science and Technology teachers to create of outdoor educational activities in the curriculum and acquaint them with necessary skills. The relationships between the two studies are: both studies employed descriptive survey as their research design; both studies also used questionnaire as a means of data collection. Finally both studies are carried out in junior secondary schools on Basic Science and Technology curriculum. The differences noticed in the studies are; the current study is purely on implementation of Basic Science and Technology curriculum while Ukah's study was on outdoor science educational activities on Basic Science and Technology curriculum. The statistical tools in data analyses also differ; while the current study intends to use ANOVA to analyze the null hypotheses, Ukah's study used T-test statistical tool to analyze the null hypotheses. The present research work is unique because, the study intends to create a template for curriculum implementation in junior secondary schools in Nigeria.

Ajala (2010), studied the effect of field study on learning outcome in Biology. The study was to determine the effects of field experiences on students' knowledge of process of science and biology achievement. The design of the study was experimental, 2 x 2, pre-test, post-test control group design. The population of the study was 2,340 biology students. The sample of the study consisted of 100 biology students in two intact classes. A self test item was used to elicit response from the student on the subject matter. Simple random sampling technique was used to select the students. Four research questions and four hypotheses guided the study. Mean and standard deviation were used in answering the research questions. The first three hypotheses were tested with t-test statistics at 0.05 level of significance. The fourth hypothesis was tested

with Pearson Product Moment Correlation Statistic. The reliability of the test item was ascertained using spilt half reliability coefficient at 0.56 index level. The major findings of the study included a significance difference in process of science scores between pre-test and post-test of field trip students; a significant difference in process of science test scores between students exposed to field trip experiences and those who were not exposed; a significant difference in Biology achievement test scores between students exposed to field trip experiences and those who were not; and a strong correlation between process of science score and Biology achievement score.

It was concluded that field trip experiences enhanced students' understanding of process of science, improved students' attitude towards biology and significantly influenced their Biology achievement. The study recognized field trip as one of the outdoor science educational activities. Despite carrying out the study in science education like the current study, the researcher used senior secondary school biology students while the current study is at the Basic education level with interest in the implementation of Basic Science and Technology curriculum. The present work is unique because the current study intends to lay foundation as a prerequisite for teaching and learning any science related subjects at the senior levels. The present research work is unique because, the study intends to create a template for curriculum implementation in junior secondary schools in Nigeria.

Miller, Bakare and Ikatule, (2010) carried out a study on capacity building for effective teaching of Basic Technology in junior secondary schools in Lagos State. The main objective is to determine the professional capacity building needs of teachers for effective teaching of basic technology curriculum to students in junior secondary schools in Lagos State. A survey research design was employed for the study. The population for the study was 550 teachers of basic technology for junior secondary schools. Random sampling technique was used to obtain 250 teachers for the study. Three sets of structured questionnaire items were developed and used to

collect data from the teachers of basic technology in junior secondary schools. Data collected were analyzed using weighted mean and improvement needed index (INI). Cronbach alpha reliability method was adopted to determine the internal consistency of the questionnaire items; values of 0.80, 0.84 and 0.81 were obtained for the sets of questionnaire respectively. It was found out in the study that teachers need capacity building in all areas of instruction in the junior secondary schools Basic Technology curriculum content.

It is therefore recommended that the findings of this study be used to organize either workshops or short duration courses for capacity building of teachers of basic technology for teaching in junior secondary schools in Lagos State. The two studies are related because both studies employed descriptive survey as a research design method and also basic technology is a component of Basic Science and Technology. The differences in the studies are in term of scope and statistical tool used in conducting the studies. The current study was conducted in junior secondary schools in Kaduna State while Miller, Bakare and Ikatule's study was conducted in junior secondary in Lagos state. The current study intends to use ANOVA to analyze the null hypotheses while the previous study used weighted mean and improvement need index (INI) to analyze the data. The present research work is unique because, the study is on the evaluation of Basic Science and Technology curriculum which encompasses basic technology and other science related subjects taught in junior secondary schools.

Victor (2014), in his study on "Teachers' Utilization of Outdoor Science Education Activities in Teaching Basic Science and Technology". The main purpose of the study is to ascertain the efficiency of teacher utilization of outdoor service in the implementation of Basic Science and Technology curriculum. While other objective is to ascertain whether teachers qualification has influence on the utilization of outdoor science educational activities in teaching Basic Science and Technology curriculum. The study adopted a descriptive survey research design, the population for the study 10,526 while the sample was 1,056. The instrument for this study was a

structured questionnaire titled; Teachers' Utilization of Outdoor Science Education Activities in Teaching Basic Science and Technology Questionnaire (UOSEATBSTQ). The study adopted a simple random sampling technique. The statistical tools employed in the study include; statistical mean and standard deviation was used to answer research questions, while T-test was used to analyze the hypotheses at the 0.05 level of significance.

The internal consistency of the instrument was determined using Cronbach Alpha reliability coefficient method. The study revealed that teachers less often utilize the outdoor science educational activities in teaching Basic Science and Technology curricular and qualification does not influence teachers on the utilization of outdoor science educational activities in teaching Basic Science and Technology curricular. The study recommended that regular conferences, seminars and workshop should be organized for Basic Science and Technology teachers to ensure smooth outdoor educational activities in curriculum implementation. The study is relevant to the present study because it deals with the appropriate method to be used in teaching/learning process of Basic Science and Technology which is the concern of the present research work. The present study basically focuses on evaluation of implementation of Basic Science and Technology curriculum while Victor's researched focused on teacher's utilization of outdoor science educational activities in teaching Basic Science and Technology curricular.

Sambo (2014), studied the assessment of the implementation of Basic Science programme in junior secondary schools in Nasarawa West Senatorial District. The major objective of the study is to prepare students to acquire adequate laboratory and field skills (2) inculcation of meaningful and relevant knowledge in Basic Science (3) ability to apply scientific knowledge to everyday life. Descriptive survey design was adopted for the study. The population includes 28,766 respondents (principals, Basic Science and Technology teachers, and Chemistry, Physics and Biology teachers). The sample of 20 senior secondary schools was drawn from all

the secondary in Nasarawa west senatorial district where simple random sampling technique was used to select the respondents. Statistical mean and standard deviation were used to answer the research questions while T-test was used to analyze the null hypotheses. Cronbach Alpha reliability index was used to ascertain the consistency of the instrument.

The findings revealed that there is a significant difference between the mean responses of respondents on the availability of the facilities for the implementation of Basic Science and Technology in Nasarawa west senatorial zone. Having examined the assessment of Basic science programme in junior secondary in Nasarawa west zone, the study recommended that instructional materials, teaching aids and other facilities should be provided by the ministry of education in conjunction with Nasarawa state government. This study and the recent research are related because both studies are involved in the implementation of Basic Science Curriculum in junior secondary schools. The identified differences are; the recent research was carried out in Kaduna state while the previous research was carried in Nasarawa state; the recent research is on the implementation of Basic Science and Technology curriculum while the previous study was on basic science programme. The present research work is unique because, the study intends to create a template for curriculum implementation in junior secondary schools in Nigeria.

Mayinoluwa (2015), studied the implementation of revised 9 years Basic Education Curriculum (BEC) in Benue State. The objectives of the study are: (1) to ascertain the level of awareness of teachers and other stakeholders in implementing the revised 9 year BEC; to ascertain how well equipped the teachers are implementing the 9 year BEC; to identify ways of improving the implementation of 9 year BEC. Descriptive design was adopted. 1,572 educational stakeholders in Benue state served as the population. A sample of 3 educational zones from 7 LGAs using multi-stage sampling technique. Three instrument developed for this study were: SOME/SUBEB Officials Questionnaire (SOQ) ; Principals/Teachers Questionnaire (PTQ) and PEC-TG Checklist. A simple random sampling technique was used to select the respondents.

Inter-rater reliability coefficient of 0.81 1nd 0.72 were obtained for SOME/SUBEB Officials Questionnaire and Principals/Teachers Questionnaire respectively.

The study showed that the level of awareness of educational stakeholders is adequate (2) The study also revealed that BEC/TG were not assessable to the teachers and they have not been the trained in the use of BEC and TG. (3) The study revealed that revised 9 year BEC for effective implementation of the programme were not readily available in the various subjects in the sampled schools. It was recommended that SOME/SUBEB should endeavour to monitor the distribution of the revised BEC in the Nigeria Basic Science. Both studies are related because they embarked on the implementation of basic science curriculum and used questionnaire a means of data collection. The only difference identified is in the limitation of the studies; the current research is limited to junior secondary school students in JSS 2 while this study is on the revised 9 year basic education curriculum. The present research work is unique because, the study created a template for curriculum implementation in junior secondary schools in Nigeria.

Ozoji and Mankilik, (2015), carried out a study on the assessment of conceptual demands of Basic Science curriculum and students cognitive development in Plateau state. The main objective of the study was to assess the conceptual demands made of Basic Science curriculum. The study also investigated the levels of cognitive development of the JSS three students and the relationship between the levels of conceptual demands of the basic science curriculum and students' cognitive development in Plateau State. The study employed the descriptive survey design. The population of the study comprised 5763 JSS three students distributed among 272 public junior secondary schools in three senatorial districts of Plateau State.

The sample for the study consisted of 622 JSS three students selected from 3 out of 24 schools that had comparable facilities, such as, science laboratories and qualified science teachers. Two instruments were used for data collection, namely, a Curriculum Analysis Taxonomy (CAT) and Science Reasoning.

Tasks II (SRTs 11). The students were selected using the proportional stratified sampling technique. The independent ratings of the CAT showed a consensus of 87.00% while the reliability index of the SRTs 11s was 0.72. The finding showed that that there was a significant relationship between the levels conceptual demands of the basic science curriculum on JSS three students and their cognitive development.

The study recommended that Basic Science teachers should employ effective and innovative instructional techniques which are capable of enhancing the thinking capacities of students to such an extent that they would learn formal concepts in the Basic Science curriculum.. Both studies are related because they embarked on the implementation of Basic Science curriculum and used questionnaire a means of data collection. The only difference identified is that the current study was on the evaluation of the implementation of Basic Science and Technology curriculum while the pervious study was on the assessment of conceptual demands of Basic Science curriculum and students cognitive development. The present research work is unique because, the study encompasses Basic Science and other Science related subjects taught in junior secondary schools.

Also Ezemenaka (2009),evaluated the implementation of the Integrated Science Curriculum in Anambra State. Specifically, the study investigated the status of physical facilities, teaching methods utilized by Integrated Science teachers and students achievements in this subject. To guide the study, seven research questions were posed five hypotheses were formulated and tested. Four instruments were used for the collection of data relevant in this study. They are Integrated Science Achievement Test (ISAT); Student's Extent of Achievement of Objectives Curriculum Rating Scale (SEAORS); Teachers Evaluation of Integrated Science Curriculum Questionnaire (TEISCO) and Checklist of Facilities and Behaviours (COFAB). The internal consistency of TEISCO was 0.81 using Cronbach Alpha (α). The data obtained were analysed using means and standard deviations for answering research questions, while the

hypotheses were tested at 0.05 level of significance, using t-test and ANOVA. Both studies are related in that they are on evaluation of curriculum implementation and both make used of ANOVA as inferential statistics, but differs in location and subject. The present research work is unique because, the study encompasses basic science and other science related subjects taught in junior secondary schools.

Also, Ifeobu, (2014), carried a study on Evaluation of the Implementation of National Curriculum for Secondary School Biology in Anambra State. Evaluation research design was adopted in the study. The evaluation model used was Context, Input, Process Product and Constraints (CIPPC) model. The three sets of population for the study were 300 biology teachers and 45,739 Biology students in 179 state owned senior secondary schools in Anambra State. 2287 Biology students were drawn through stratified random sampling technique from the 90 senior secondary schools in the 6 education zones in the state. A structured response questionnaire which was validated by experts and experienced personnel both in Biology teaching and programmes was used to collect data. The internal consistency of the instrument was determined using Cronbach Alpha. Six research questions guided the study. Mean and standard deviation were used to answer the research questions. Both studies are related as they are on evaluation and implementation of curriculum, both studies also make used of the CIPP model but differs in location, subject and sample size. The present research work is unique because, the study encompasses basic science and other science related subjects taught in junior secondary schools.

Musa, (2006) evaluated the Integrated Science and Introductory Technology curricula contents as well as their implementation in secondary schools in Benue State. Twelve research questions were answered and six hypotheses tested in this study. The study employed a survey design and six instruments were used to collect data from 50 secondary schools selected from 246 schools in the State using the Probability Proportionate

to Size (PPS) sampling technique, 10 experts each in the fields of Integrated Science and Introductory Technology using the purposive sampling technique and all the Integrated Science and Introductory Technology teachers in the selected schools. The instruments were Classroom Observation Schedule (COS), Programme Evaluation Instrument for Teachers (PEIT), Introductory Technology Resource Assessment Checklist (ITRAC), Integrated Science Resources Assessment Checklist (ISRAC), Integrated Science Curriculum Contents Evaluation Instrument (ISCCEI) and Introductory Technology Curriculum Contents Evaluation Instrument (ITCCEI). Descriptive Statistics like frequency counts and simple percentages were used to answer the research questions while t -test for independent samples was used in testing the hypotheses. Both studies are related as they are on evaluation of curriculum implementation, but differs in location, subject, and the inferential statistics used in the study. The present research work is unique because, the study encompasses basic science and other science related subjects taught in junior secondary schools.

Agungbesan, (2012) evaluated the Implementation of Basic Science Curriculum component of Universal Basic Education Programme in South-west, Nigeria. The study adopted descriptive survey design using Stake's countenance Antecedent Transaction Outcome model. Participants were ministry officials (33), principals of schools (89), year tutor/heads of department (166), classroom teachers (269) and JSS III students (588). These were selected by stratified random sampling technique from ten local government areas each from the six south-western states. Five research instruments: Science Programme Objectives Rating Scale (r = 0.72); Basic Science Course Material Assessment Questionnaire (r = 0.81); Basic Science Classroom Observation Schedule (r = 0.73); Basic Science Achievement Test (r = 0.69) and Students' Attitude Questionnaire (r = 0.58) were used. Eleven research questions were answered. Data were analysed using descriptive statistics and multiple regression at 0.05 level of significance. The programme objectives were rated as very good (x= 3.76, max 5).Infrastructural

facilities (x= 2.33, max 5) and students achievement in basic science (x= 8.76, max 20) were inadequate and course materials for basic science were available (x= 2.66, max 5). Students possessed positive attitude towards basic science (x= 3.04, max 5), most teachers of basic science were not professionally qualified to teach the subject (66.5%) and many teachers prefer to use lecture method (31.4%) to other methods. Composite contribution of antecedent and transaction variables to the variance of students' achievement in basic science was 10.7% and they contributed 24.7% to the variance of students' attitude towards science. Both studies are related as they are on evaluation on curriculum implementation but differs in the following, location, subject and inferential statistics used in the study. The present research work is unique because, the study encompasses basic science and other science related subjects taught in junior secondary schools.

Baba (2015), assessed the Social Studies Curriculum Implementation in Junior Secondary Schools in Yobe State, Nigeria. The study was conducted using five objectives which were translated in to research questions and hypotheses. Descriptive survey design was adopted with 5660 population using the sample size of 200, respondents were randomly selected across the 10 junior secondary schools out of 18 junior secondary schools in Nguru Inspectorate Educational Zone. The instruments used for data collection were questionnaire titled Assessment of Social Studies Curriculum Implementation Questionnaire (ASSCIQ) and interview. Mean, standard deviation and bar chart were used for descriptive analysis and chi-squire was used for inferential analysis. The research findings from this analysis reveals that: there is no significant difference in the extent to which social studies curriculum content is being implemented in Junior Secondary Schools in Yobe State and the respondents' view shows that, social studies curriculum content is not being properly implemented in junior secondary schools in Yobe State, there is no significant difference in the pedagogical methods used by social studies teachers in implementation of social studies

curriculum in Junior Secondary Schools in Yobe State, and most of the social studies teachers are using conventional method of teaching, there is no significant difference in the teachers‘ used of instructional materials in the implementation of social studies curriculum in Junior Secondary Schools in Yobe State, and in most of the schools lacked instructional materials, there is no significant difference in the problems identified with the implementation of social studies curriculum in Junior Secondary Schools in Yobe State. Both studies are related in that they both make used of descriptive survey methods and questionnaire as an instrument for data collection, but differs in location of the study, subject and inferential statistics used in the study. The present research work is unique because, the study encompasses basic science and other science related subjects taught in junior secondary schools.

2.9 Summary

The study examined the evaluation of the implementation of Basic Science and Technology curriculum in Junior Secondary Schools in Kaduna State. The study observed that Basic Science and Technology is an improvement of integrated science and introductory technology in the junior secondary curriculum with the aim of abridging the gaps identified in the implementation of the curriculum of both subjects. The study further examined major concepts and other sub concepts relevant to the objectives of the research. On the empirical studies, the work of Ishaya, (2014), Aremu (2015), Chukwuemeka, (2014), Ukah, (2014), Ajala, (2010), Victor, (2014), Sambo, (2014), Mayinoluwa (2015), and others were reviewed and major gaps which the study will fill were identified. Conclusively, science teaching at the junior secondary school should involve observing pupils behaviour on tasks resembling those commonly require functioning in the world outside the school.

CHAPTER THREE
METHODOLOGY

3.1 Introduction

This chapter explained the procedure used in carrying out this study. It is presented under the following sub-headings: research design used, population of the study, sample and sampling techniques, instrumentation, validity of the instrument, reliability of the instrument, others are procedure for data collection and procedure for data analysis.

3.2 Research Design

The researcher used descriptive survey design. This research design was chosen because according to Dada (2016), stated that a descriptive survey research design is a most basic type of enquiry that aims to observe (gather information on) certain phenomena, typically at a single point in time. the 'cross sectional 'survey. The aim is to examine a situation by describing important factors associated with that situation, such as demographic, socio-economic, and health characteristics, events behaviours, attitude , experiences ,and knowledge. Descriptive studies are used to estimate specific parameters in a population (example, the prevalence of infant breast feeding). Design was considered appropriate because the study was selected and studied with a sample from the population from which generalization was made. The above design was useful in evaluating the implementation of Basic Science and Technology curriculum in junior secondary schools in Kaduna state.

3.3 Population of the Study

The target population of this study consist of all JSS 2 students offering Basic Science and Technology in both Public and Private Junior Secondary Schools in Zaria Education Zone, Kaduna State with the Students, Teachers and Principals which give the total figure of 2484.

Table 1: Population Distribution of Respondents in Zaria Education Zone.

Respondents	Public Junior Sec. Sch	Private Junior Sec. Sch	Total
1. Principal	49	73	122
2. Teachers	860	146	1006
3. Students	927	429	1356
Total	1836	648	2484

Source: Kaduna State Ministry of Education (2018)

3.4 Sample and Sampling Techniques

The sample size of this study is 322 respondents comprising 122 Principals, 1006 Teachers and 1356 Students which was selected from the above Zone. The sample size was selected in line with Research Advisor 2006. The authority recommended that a study that have a population of 2000-2500, at a confidence level of 95% and a margin error of 0.05%, a sample size of 322 was used, representing 13% of the study population. However, simple random sampling technique was used to select 31 junior secondary schools (12 public junior secondary schools and 19 private junior secondary schools) out of the entire 122 junior secondary schools representing 25 percent of the entire schools.

Table 2: Sample Distribution of Respondents in Zaria Education Zone.

Respondents	Public Jr Sec. Sch.	Private Jr Sec. Sch.	Total
1 Principal	6	10	16
2 Teachers	40	90	130
3 Students	66	110	176
Total	**112**	**210**	**322**

Source: Kaduna State Ministry of Education (2018)

3.5 Instrumentation

The instrument used for the collection of Data was self structured questionnaire titled: Questionnaire for the Evaluation of the Implementation of Basic Science and Technology Curriculum (QEIBST) in junior secondary schools Kaduna state, and Observation Schedule. The questionnaire was structured into two parts, section one (A) solicited for biographical or personal information of respondents, while section two (B) sub divided into section C,D,E,F,G each of the sub sections have 10 items Statement, given a total of 50 items Statement. Items on the views of respondents on the evaluation of the implementation of Basic Science and Technology curriculum in public and private junior secondary schools in Kaduna State. The questionnaire covers objectives of the study, qualifications for Basic Science and Technology teachers, methods of teaching Basic Science and Technology and assessment process used to determine the achievement of students.

Responses to the items on the questionnaire was on five (5) points Likert Scale of Strongly Agree (SA) 5, Agree (A) 4, Undecided (U)3, Disagree (D) 2, Strongly Disagree (SD) 1. The respondents are expected to choose one of the options.

Observation Schedule, in addition, the study used observation schedule to get the opinion of Basic Science and Technology teachers and students concerning some of the variables in the study, the observe schedule was fashion in a Likert Scale of 4, 3,2 and 1, with the following .

4 - meet expectation in all respects

3 - meet expectation in most respects

2 - meet expectation in some respects

1 - meet expectation in few or no respects

And in addition the Likert Scale of

5 - used very regular

4 - used often

3 - used occasion

2 - not used at all

1 - Unavailable

The entire instrument that was used in the study was collected and analyzed.

3.5.1 Validity of the Instrument

The content and construct validity of the instrument was validated by the researcher's supervisors in the Department of Educational Foundations and Curriculum (Curriculum and Instruction Section) and experts in the field of Science Education Department, test and Measurement and Evaluation all in Ahmadu Bello University Zaria. It examined the items in the questionnaire in relation to the objectives, research questions and hypothesis raised for the study.

3.5.2 Pilot Study

In order to ascertain the reliability of the instrument by the researcher, a pilot test was conducted by the researcher in two junior public and private secondary schools, TudunJukun and Nasara Baptist Secondary School Using 20 copies of questionnaire, The researcher took a period of 2 days to conduct the pilot study. The researcher personally went to the 2 schools and administered the entire questionnaires to the respondents; all the 20 questionnaires administered to the respondents were all retrieved from the respondents.

3.5.3 Reliability of the Instrument

In order to determine content and construct validity of the instrument developed by the researcher, the collected data from the pilot study was subjected to reliability analysis using cronbach alpha formula to calculate the reliability of the instruments at reliability index of 0.839 coefficients. According to Ajayi (2000), instrument are reliable if they consistently measure what is planned to measure, Based on the research of this instrument developed in this study which yielded a reliability index of 0.839 shows that the instrument was high enough to measure what it planned to measure.

3.6 Procedure for Data Collection

The researcher collected an introductory letter from the Head of Department of Educational Foundations and Curriculum, faculty of Education, Ahmadu Bello University Zaria. This enabled the researcher had a hitch free exercise. The researcher and two trained research assistants were engaged in the administration of the instrument on respondents. This enabled the researcher had the opportunity to vividly give an explanation on the instrument to respondents and field assistants who yielded high rate of returned and reduced errors or misconception about the research questionnaire.

3.7 Procedure for Data Analysis

The data collected was used to answer the research questions and tested the hypothesis stated. Frequency, Percentages, mean and standard deviation was used at descriptive level to analyse the responses of the research question. All the hypotheses were tested using non-parametric statistics that is, kruskal wallis Htest at 0.05 level of significance .This was because the data that was generated used ordinal discrete in nature. Hence, all the null hypotheses formulated for the study were tested at 0.05 alpha level of significance.

CHAPTER FOUR
DATA PRESENTATION AND ANALYSES

4.1 Introduction

This chapter presents results, analysis and discussion of data. The data are based on issued raised in the study. Five hypotheses were formulated and tested using Kruskall-Wallis H-Test at 0.05 level of significance. Therefore, the issues relate to extent of Content Coverage, Variety of instructional Methods, instructional materials, Variety of Assessment Techniques, and Qualification of Teachers in Teaching Basic Science and Technology Curriculum between Public and Private junior Secondary Schools in Kaduna State, Nigeria. The data are presented in figures, tables and percentages to give survey description. Therefore, Responses of respondents are presented in line with issues raised on the study.

4.2 Description of study Variables

This section presented the frequency and percentage of the study variable. The summary is presented in table 3.

Table 3:Frequency and percentage of respondents based on status

Status	Frequency	Percentage
Principals	16	04.97
Teachers	130	40.37
Students	176	54.66
Total	**322**	**100.0**

Table 3 shows a total of 16 Principals, equivalents to 4.97% were used for the study with 130 or 40.37% are Teachers used for the study while 176 or 54.66% are Students who were also used for the study. This shows that Students had the highest frequency and percentage in the study.

Table 4: Gender of the Respondents

Status	Frequency	Percentage
Male	199	61.8
Female	123	38.2
Total	**322**	**100.0**

Table 4 shows that a total of 199, equivalents to 61.8% were the male used for the study, while 123 or 38.2% are the female respondent used for the study. This shows that the male respondents had the highest frequency and percentage in the study.

4.3 Analysis of Response to Research Questions

Research Question One: What is the extent of content coverage in the implementation of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria

The research question was analyzed using mean and standard deviation to analyze responses to research questions, item 1-10. The summary of the analysis is presented in Table 5;

Table 5: Mean and standard deviation on the assessment of the extent of content coverage

Items	Descriptive Statistic Schools	Mean	SD
Basic Science and Technology Curriculum content are adequately covered within stipulated period	Public School	1.87	.753
	Private School	4.36	.678
Topics in the curriculum contents are designed to encourage learner-centered teaching	Public School	1.82	.774
	Private School	4.21	.710
Students' background affect full implementation of the Basic Science and Technology curriculum content	Public School	1.55	.499
	Private School	3.77	.936
Availability of textbooks encourages full implementation of Basic Science and Technology curriculum content	Public School	1.82	.385
	Private School	3.54	.998
Basic Science and Technology teachers' competence and academic qualification influence curriculum implementation in Junior Secondary School	Public School	1.82	.738
	Private School	4.22	.700
Basic Science and Technology curriculum objectives are too broad to cover within the stated periods	Public School	1.95	.351
	Private School	3.88	.853
Frequent closure of school do not allow Basic Science and Technology teachers to cover all the content in the syllabus at the stipulated time	Public School	1.93	.259
	Private School	3.90	.902
Basic Science and Technology Teachers are not able to cover all the content in the syllabus at the stipulated time	Public School	1.96	.444
	Private School	3.93	.847
Basic Science and Technology scheme of work are taught and covered within the stipulated term	Public School	1.88	.744
	Private School	4.31	.675
Teachers' instructional methods such as lecture method, dramatization, assignments allows content to be covered within the stipulated time	Public School	1.96	.776
	Private School	4.25	.655
Constant Mean		3.0	

A careful observation of table 5 above reveals that there is an extent of content coverage between public and junior secondary schools in Kaduna State. However, Basic Science and Technology curriculum Contents is implemented most in private schools than Public schools showing the mean score above.the constant mean 3.0 compared to the counter parts secondary schools (public schools which indicated the mean scores less than constant mean score.

Table 6: Utilization of Instructional Materials

Items	Descriptive Statistic		
	Schools	**Mean**	**SD**
Basic Science and Technology teachers use instructional materials during teaching in my school.	Public School	1.97	.716
	Private School	4.19	.731
Teachers improvise instructional materials for effective teaching and learning of Basic Science and Technology in my school.	Public School	2.42	.653
	Private School	4.47	.500
Instructional materials are available for effective teaching and learning of Basic Science and Technology.	Public School	1.68	.469
	Private School	3.73	.926
Instructional materials used by teacher in teaching Basic Science and Technology are relevant to the content/concept being taught.	Public School	2.42	.718
	Private School	4.50	.547
Instructional materials used by teachers in teaching enhance the achievement of the Basic Science and Technology objectives.	Public School	2.28	.660
	Private School	4.31	.659
The instructional materials are provided for teaching and learning Basic Science and Technology.	Public School	2.11	.620
	Private School	4.18	.740
Pictures of the historical events in sciences are among the instructional materials used by teachers of Basic Science and Technology to enhance teaching and learning	Public School	2.05	.551
	Private School	4.17	.770
Diagrams are among the instructional materials used by Basic Science and Technology teachers in the teaching and learning process	Public School	2.48	.710
	Private School	4.54	.499
Relevant charts are used to teach Basic Science and Technology during lessons	Public School	2.16	.679
	Private School	4.47	.572
Projected materials like films strips, micro projector, opaque projector and overhead projector are hardly used as instructional materials in teaching basic science	Public School	2.13	.686
	Private School	4.29	.675
Constant Mean		**3.0**	

Based on the analysis of the utilization of instructional materials, the study indicated that private schools utilized instructional materials adequately in the implementation of Basic Science and Technology curriculum which reveals the means score above the constant mean 3.0. In public

schools, the items recorded the mean scores less than the constant mean. This indicate there is lack of utilization of the instructional materials by the public comparing the means scores with their counterparts private schools in Kaduna State

Table 7: Variety of Instructional Methods

Items	Descriptive Statistic School	Mean	SD
Instructional methods adopted by Basic Science and Technology teachers are relevant to instructional materials	Public School	1.96	.709
	Private School	4.26	.685
Instructional methods adopted by teachers are relevant in implementing Basic Science and Technology curriculum	Public School	1.91	.705
	Private School	4.18	.740
Instructional methods employed by Basic Science and Technology teachers are relevant to students' population	Public School	1.69	.466
	Private School	3.89	.893
Methods of teaching employed by teachers facilitate the achievement of Basic Science and Technology objectives	Public School	1.95	.669
	Private School	4.21	.666
Instructional methods used by Basic Science and Technology teachers are relevant to learners needs and background	Public School	2.18	.726
	Private School	4.42	.607
Instructional methods of teaching is relevant to each topic during lesson delivery	Public School	2.17	.683
	Private School	4.30	.665
Basic Science and Technology teachers use resource persons in order to enhancing understanding during lesson delivery	Public School	1.82	.647
	Private School	4.13	.726
Basic Science and Technology teachers always use modern instructional methods like game, role play, and micro- teaching to teach the students	Public School	2.01	.678
	Private School	4.26	.699
Basic Science and Technology teachers are flexible enough to change their teaching strategies	Public School	1.64	.481
	Private School	3.59	.995
Traditional teaching methods such as assignment, lecture methods are not used by Basic Science and Technology teachers during teaching	Public School	1.74	.440
	Private School	3.80	.927
Constant Mean		3.0	

On the table above, the mean and standard deviation on the utilization of instructional methods on the implementation of Basic Science and Technology curriculum shows that private schools engaged much in the utilization of the instructional methods with the mean scores recorded above the constant mean 3.0. Comparing with public schools, the analysis shows that publics had the mean scores less than the constant mean scores which shows that public schools do not utilize instructional methods in the implementation of Basic Science and Technology curriculum.

Table 8: Variety of Assessment Techniques

Items	Schools	Descriptive Statistic Mean	SD
Regular supervision and inspection facilitate Basic Science and Technology curriculum implementation in junior secondary schools	Public School	2.13	.637
	Private School	4.30	.699
Keeping of up-to-date records of work by Basic Science and Technology teachers foster curriculum implementation	Public School	2.21	.663
	Private School	4.38	.661
Teachers employ diagnostic evaluation technique like previous knowledge, assignment, in knowing the students level of understanding of the subject matter	Public School	2.96	.805
	Private School	4.62	.487
Teachers use class work and assignment to evaluate students' performances	Public School	2.97	.788
	Private School	4.64	.480
Teachers use both evaluation technique like continuous assessment test, in achieving the objectives of Basic Science and Technology curriculum.	Public School	3.20	.815
	Private School	4.66	.476
Effective use of appropriate evaluation techniques enhances adequate implementation of the curriculum content	Public School	2.41	.637
	Private School	4.50	.564
Teachers usually ask the students to repeat to the class what they have taught them in the class	Public School	2.24	.701
	Private School	4.29	.675
Teachers uses group work for assessing the students	Public School	1.79	.686
	Private School	4.28	.720
Appropriate continuous assessment is used to evaluate the students' academic work	Public School	2.13	.686
	Private School	4.24	.692
Basic Science and Technology teachers use questioning skills to probe the knowledge and understanding of students concerning the topics or concepts	Public School	2.21	.659
	Private School	4.23	.683
Constant Mean		**3.0**	

Comparing the mean scores on the above table, those item indicating mean score above the constant mean scores show the level of variety of assessment employed in the implementation of the Basic Science and Technology curriculum. However, private schools revealed mean score above the constant mean 3.0. But in item that teachers use both evaluation technique like continuous assessment test, in achieving the objectives of Basic Science and Technology curriculum, here pubic schools indicate the mean score above 3.0 the constant mean.

Table 9: Teachers Qualification in Basic Science and Technology

Items	Descriptive Statistic School	Mean	SD
10% of the teachers of Basic Science and Technology do not possess the requisite certificate	Public School	1.96	.629
	Private School	4.17	.718
The number of qualified Basic Science and Technology teachers are adequate	Public School	1.72	.449
	Private School	3.75	.889
Most Basic Science and Technology teachers possess NCE as the minimum qualification for teaching the subject	Public School	2.03	.741
	Private School	4.27	.717
Most of the teachers of Basic Science and Technology attend seminar, workshop short training to upgrade their knowledge concerning the subject once in 6 months	Public School	2.26	.668
	Private School	4.35	.683
Most of the teachers lack knowledge of the subject matter because of their unqualified status	Public School	1.76	.450
	Private School	3.87	.851
Most of the teachers of Basic Science and Technology do not carry along the student during lesson delivery	Public School	1.81	.392
	Private School	3.75	.850
Most of the teachers do not write their lesson plan daily well because they are not often retrained	Public School	1.74	.460
	Private School	3.78	.812
Teachers' qualification and training enhance the achievement of Basic Science and Technology objectives	Public School	2.13	.686
	Private School	4.29	.695
Teachers qualification improves students performances in the subject	Public School	2.98	.838
	Private School	4.61	.489
Teaching and learning of Basic Science and Technology is highly motivated by experienced and qualified teachers	Public School	2.28	.830
	Private School	4.50	.501
Constant Mean		3.0	

Comparing the mean scores on the above table, the item indicating mean score above the constant mean scores show the level of teachers' qualification in the implementation of the Basic Science and Technology curriculum. However, private schools revealed mean score above the constant mean 3.0. It is therefore clearly indicated that private school considers teachers'

qualification in terms of implementation of the Basic Science and Technology curriculum in Kaduna State.

4.4 Hypotheses Testing

Hypotheses one: there is no significant difference on the extent of content coverage in the implementation of Basic Science and Technology Curriculum between public and private junior secondary schools in Kaduna State, Nigeria.

The hypotheses was analysed using Kruskal-Wallis H-test. The summary of the analysis is presented in Table 10

Table 10: Krustal Wallis H-test on the extent of content coverage in the implementation of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria

Df	H-cal	H-crit	α	P-value	Decision
2	216.03	4.714	0.05	.000	Rejected

The test of hypothesis on table above indicated that, there is significant difference on the extent of content coverage in the implementation of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State. This as a result of H-cal is 216.03 while H-crit is 4.714. The p-value is .000<0.05 alpha level of significant at df 2. The null hypothesis, which stated that there is no significant difference on the extent of content coverage in the implementation of Basic Science and Technology curriculum between public and private junior secondary schools, is rejected.

Hypotheses two: there no is significant difference in instructional materials used by teachers in the implementation of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria

The hypotheses was analysed using Kruskal-Wallis H-test. The summary of the analysis is presented in Table 11.

Table 11: Kruskal-Wallis H-test computation in the implementation of Utilization of instructional material in teaching Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria

Df	H-cal	H-crit	α	P-value	Decision
2	215.302	4.714	0.05	.000	Rejected

In the test of hypothesis 2, the result shows that there is significant difference on the extent of the utilization of instructional material by the teachers of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State. This as a result of H-cal is 215.302 while H-crit is 4.714. The p-value is .000<0.05 alpha level of significant at df 2. The null hypothesis therefore is rejected

Hypotheses three: there no is significant difference in the utilization of instructional methodsused by teachers in the implementation of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria

The hypotheses was analysed using Kruskal-Wallis H-test. The summary of the analysis is presented in Table 12

Table 12:Kruskal-Wallis H-test computation in the implementation of Variety of instructional methods in teaching Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria

Df	H-cal	H-crit	α	P-value	Decision
2	216.032	4.714	0.05	.000	Rejected

In the test of hypothesis above, H-cal is 215.032 while the H-crit is 4.714 at df 2. The p-value is 0.000<0.05 alpha level of significant. The null hypothesis that said there is no significant difference in the Utilization of instructional Methods used by Basic Science and Technology

teachers and the implementation of Basic Science and Technology curriculum between public and private junior secondary schools has been rejected.

.**Hypotheses four:** there no is significant difference in variety of assessment techniques used by teachers in the implementation of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria

The hypotheses was analysed using Kruskal-Wallis H-test. The summary of the analysis is presented in Table 13

Table 13: Kruskal-Wallis H-test computation in the implementation of variety of assessment techniques in teaching Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria

Df	H-cal	H-crit	α	P-value	Decision
2	208.480	4.714	0.05	.000	Rejected

The test of hypothesis on the variety of assessment techniques has the H-cal of 208.480 while the H-crit is 4.714 at df 2. The p-value is .000<0.05 alpha level of significant. The null hypothesis that said there is no significant difference between the variety of assessment and the implementation of Basic Science and Technology curriculum has been rejected.

Hypotheses five: there no is significant difference in qualification of teachers in the implementation of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria

The hypotheses was analysed using Kruskal-Wallis H-test. The summary of the analysis is presented in Table 14

Table 14: Kruskal-Wallis H-test computation in the qualification of teachers and the implementation of Basic Science and Technology curriculum between public and private junior secondary school in Kaduna State, Nigeria

Df	H-cal	H-crit	α	P-value	Decision
2	216.553	4.714	0.05	.000	Rejected

The test of hypothesis of the teachers' qualification on the implementation of Basic Science and Technology curriculum has revealed the H-cal of 216.533 while H-crit is 4.714. The p-value is .000<0.05 alpha level of significant at df 2. The null hypothesis that said there is no significant difference between the qualification of teachers and the implementation of Basic Science and Technology curriculum is here by rejected

4.4 Findings of the Study

Based on the analysis of the data collected, the following were discovered. Findings revealed that:

1. There significant difference in the extent of content coverage in Basic Science and Technology curriculum between public and private Junior Secondary School in Kaduna State ,Nigeria (P=0.000<0.05)
2. There was significant difference in the utilization of instructional materials by teachers in the implementation of Basic Science and Technology curriculum between public and private in Junior Secondary School in Kaduna state, Nigeria (P=.000<0.05)
3. There was significant difference in the variety of instructional methods used by teachers for the implementation of Basic Science and Technology curriculum between public and private Junior Secondary School in Kaduna State, Nigeria.(P=0.000<0.05)
4. There was significant difference in the Assessment Techniques used by teachers in the implementation of Basic Science and Technology curriculum between public and private Junior Secondary Schools (like continuous assessment test and group work assignment) in Kaduna state, Nigeria(P=.000<0.05)

5. There was significant difference in the Qualification of teachers in the implementation of Basic Science and Technology curriculum between public and private junior secondary schools do not have the requisite qualification (B.sc Ed and NCE) in the implementation of Basic Science and Technology curriculum Between Public and Private junior secondary school. Kaduna State, Nigeria(P=.000<0.05)

4.5 Discussions of the Findings

This section presents the discussion of findings on the opinions of respondents on all the issues related to the five research questions and hypotheses. The main objective of this study is to evaluate the implementation of Basic Science and Technology curriculum in junior secondary school Kaduna state, Nigeria. The Data collected through the administration of questionnaire and Observation schedule were analyzed using Kruskal-Wallis H-test. The first issue discussed in this study centred on Assessment of the extent of Content Coverage in the implementation of Basic Science and Technology Curriculum between Public and Private Junior Secondary Schools in Kaduna State, Nigeria.

Table 5 shows that H-cal is=216.03 while H crit= 4,714 at Alpha level =0.05 DF=2. As shown, while the p=0.00<0.05 level of significant. Meaning that there is significant difference on the extent of content coverage in the implementation of Basic Science and Technology Curriculum between public and private junior secondary schools in Kaduna State, Nigeria, Therefore, the null hypothesis is rejected. The findings disagree with the findings of Baba (2015) on assessment of the implementation of social studies curriculum in junior secondary school in Yobe state Nigeria. Whose findings reveal that there was no significance difference in the extent to which social studies curriculum content is being implemented in junior secondary school in Yobe state. The disagreement between the two findings is as results of the present study is on evaluation of the implementation of Basic Science and Technology curriculum between public and private junior secondary schools. While the past study is on public JSS in Yobe State, Also

the present study is on evaluation of the Implementation of Basic Science and Technology Curriculum between public and private junior secondary school, Kaduna state.

The findings on research question two shows that H-cal=215.302 while H-crit=4.714 at Alpha level 0.05, Df=2 while the p-value=.000<0.05,meaning that there is significant difference in the utilization of instructional materials in the implementation of Basic Science and Technology Curriculum between public and private junior secondary schools in Kaduna state, therefore the hypothesis is rejected. This findings disagreed with the findings of chukwuemeka (2014) and Ezemenaka (2009),Whose findings revealed that the usage of instructional materials is not significant in the implementation of Social Studies Curriculum. The findings also is in line with Mayinoluuwa(2015),whose findings revealed that Instructional materials has significant effect on the Implementation of revised 9years Basic Education curriculum in Benue State.

Also the findings on research question three shows that H-216.032 while H-crit =4.714 at Alpha level 0.05, Df= 2 while p-value = .000<0.05 meaning that there is significant difference in the instructional methods in the Implementation of Basic Science and Technology Curriculum between public and private junior secondary schools in Kaduna state, therefore the hypothesis is rejected. This findings disagreed with the findings of Sambo (2014),Whose findings revealed that the usage of instructional methods is not significant in the Assessment of the Implementation of Basic Science programme.The finding also is in line with the findings of Agungbesan (2012) whose findings revealed that the instructional method used by the teachers has significant effects on the Implementation of Basic Science Curriculum in south West Nigeria.

Findings on research question four shows that H-208.480 while H-crit=4.714 at Alpha level 0.05, Df= 2 while p-value = .000<0.05 meaning that there is significant difference in the assessment techniques in the Implementation of Basic Science and Technology Curriculum between public and private junior secondary schools in Kaduna state, therefore the hypothesis is

rejected. This findings is inline with findings of Ishaya (2014), whose findings revealed that Assessment techniques has significant effects on the Implementation of integrated science curriculum in Kaduna state.

Findings on research question five shows that H-216.553 while H-crit=4.714 at Alpha level 0.05, Df= 2 while p-value = .000<0.05 meaning that teachers qualification has significant effect on the Implementation of Basic Science and Technology Curriculum between public and private junior secondary schools in Kaduna state ,therefore the hypothesis is rejected, the findings is in line with findings of Ifeobu (2014) whose findings revealed that the teachers qualification has significant effects on the implementation of Biology curriculum in senior secondary schools in Anambra state. The findings disagreed with the findings of Musa(2006) whose findings revealed that teachers qualification has no significant effects on the Implementation of integrated science curriculum in junior secondary school in Benue state.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the study, conclusions based on the findings and requisite recommendations and suggestion for further studies were also given in the chapter. The chapter also suggests some areas for further research.

5.2 Summary

The study is an evaluation of the implementation of Basic Science and Technology Curriculum in junior secondary school in Kaduna State ,Nigeria. The objectives of the study were to Assess the extent of content coverage in the implementation of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna state, Nigeria, identify the implementation of variety of instructional methods used in teaching Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna state, Nigeria. examine the implementation of instructional materials in teaching Basic Science and Technology Curriculum between public and private junior secondary school in Kaduna state, Nigeria, identify the implementation of variety of assessment techniques in teaching Basic Science and Technology Curriculum between public and private junior secondary school in Kaduna state, Nigeria determine the qualification of teachers in the implementation of teaching Basic Science and Technology Curriculum between public and private junior secondary school in Kaduna State, Nigeria ,

Relevant literatures were reviewed in line with the research objectives. literature such as concept of curriculum Evaluation, concept of curriculum implementation, concept of Basic Science and Technology, concept of Curriculum, Theoretical framework, Empirical Studies were all reviewed in line with the research objectives.

The research design adopted for the study was the descriptive survey because the target population of principals, Teachers and students were found to be very large and the instrument used for data collection was a self structured questionnaire and observation schedule designed by the researcher. A total of 322 copies of the questionnaire and observation were administered to three categories of respondents, (Principals, Teachers and Students) in Zaria education Zone, selected for the study and 322 copies of the questionnaire were completed. The data collected were compiled and analyzed using frequency distributions and simple percentages, mean and standard deviation in order to give a description of the data. Also, Kruska-wallis H-test was the statistical tools used to test the hypotheses formulated for the study at 0.05 level of significant. The findings revealed that there is significant difference on the extent of content coverage in the implementation of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria, This shows that P.value (.000) is less than (0.05). Based on this, the Hypothesis is rejected. Meaning that the extent of content coverage relate to the implementation of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria.

The findings revealed that that there is significant difference on the Variety of instructional methodology in teaching Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria. This shows that P.value (.000) is less than (0.05). Based on this, the Hypothesis is rejected. Meaning that Variety of instructional methodology relate to teaching of Basic Science and Technology curriculum between public and private Junior Secondary Schools in Kaduna State, Nigeria. The findings revealed that that there is significant difference on the instructional materials in teaching Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria, This shows that P.value (.000) is less than (0.05). Based on this, the Hypothesis is rejected. Meaning

that instructional materials relate to the teaching of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria,

The findings revealed that that there is significant difference on the variety of assessment techniques in teaching Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria, This shows that P.value (.000) is less than (0.05). Based on this, the Hypothesis is rejected. Meaning that variety of assessment techniques relate to the teaching of Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State,, Nigeria. The findings revealed that that there is significant difference on the qualification of teachers in teaching Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria, This shows that P.value (.000) is less than (0.05). Based on this, the Hypothesis is rejected. Meaning that there is significant difference on the qualification of teachers in teaching Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria

5.3 Conclusions

Based on the findings of the study, the following conclusions were drawn:

Basic Science and Technology as a subject in junior secondary school which helps young individuals to develop into human adults by relating them to their environment and enhance student's problem solving skills through appropriate understanding of their environment and experience. In view of the findings from the study, there is adequate content coverage ,teaching methodology is appropriately used ,instructional materials used are very relevant, the variety of techniques used are effectively ,and teachers with lower qualification needs to upgrade to meet up the standard in other to teach the student well especially in this era.

5.4 Recommendations

In line with the findings, discussions and conclusions, the following recommendations were made.

1. Basic Science and Technology curriculum content should be covered in junior secondary school in Kaduna state ,Nigeria and teachers should be encouraged to maintain the standard so that students will learn more.
2. There is need for available instructional materials in Basic Science and Technology such as computers, projector, chats in public and private junior secondary schools in Kaduna State, Nigeria,
3. There is need for training and re-training of Basic Science and Technology teachers on methodology in teaching of curriculum in public and private junior secondary schools in Kaduna State, Nigeria;
4. There is need for modern and more creative assessment techniques to encourage and motivate students in public and private junior secondary schools in Kaduna State,, Nigeria; and

5, There is need for teachers to be given the opportunity to acquire more qualification to teach Basic Science and Technology curriculum between public and private junior secondary schools in Kaduna State, Nigeria

5.5 Suggestions for Further Studies

It is suggested that further studies be conducted in the following areas:

1. Evaluation of the implementation of Basic Science and Technology curriculum in public and private primary schools in other Zones to justify the findings,

2. Research should also be conducted on the relevance of junior secondary school Basic Science and Technology curriculum contents to the scientific and technological needs of contemporary Nigeria.

3. There is the need to also compare the achievements of students in these programmes taught by professional and non-professional teachers.

4. Researches to be carried out in the area of effecting real syntheses of ideas, concepts and subjects in the Integrated Science and Introductory Technology curricula so that the level of integration will be high.

5.6 Contributions to Knowledge

1 The study revealed that there are no laboratories for junior secondary school level ,Provision of these laboratories will facilitate teaching and learning of Basic Science and Technology students.

2 The study shows that workshop and seminar to be organise for teachers of Basic Science and Technology in other to build their capacity.

3 The study also revealed that after several years of the inception of Basic Science and Technology programmes, the programmes were not being implemented properly in the schools. This poor implementation of these programmes at the junior secondary school level may be responsible for the poor enrolments of students into the science and technology programmes at the senior secondary school level.

4 The community had very little contributions to the development of Basic Science and Technology programmes in few schools in the State. In view of the fact that the government alone may not be able to cope with the demands of education, the community need to also make their contributions to the development of these programmes.

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APPENDIX A: QUESTIONNAIRE

JUNIOR SECONDARY SCHOOL BASIC SCIENCE AND TECHNOLOGY QUESTIONNAIRE

Department of Educational Foundations and Curriculum
Faculty of Education,
Ahmadu Bello University, Zaria.

Dear Respondent,

The researcher is an M.Ed Student of the above named Institution carrying out a research work on the "Evaluation of the Implementation of Basic Science and Technology Curriculum in Junior Secondary Schools in Kaduna State, Nigeria". The Purpose of this study is to evaluate the quality of implementation of Junior Secondary Schools in Basic Science and Technology Curriculum in order to make improvement in teaching and learning process in Kaduna State. The questionnaire items are designed to elicit appropriate responses based on your own objective opinion. The reliability of the study depends on your sincere, honest judgment and response.

You are therefore kindly requested to honestly provide the required information to the best of your ability.

Thank you.

SIGNED

Deborah LA'AH

APPENDIX B

Section A: Bio-data

Instruction: Fill in Section A and answer Section B

Please tick and fill (√) as appropriately

1. Gender: Male [ ] Female [ ]
2. Age: 11-15 ( ) 16-20 ( ) 21-25 ( ) 26-30 ( ) 31-40 ( ) 41-50 ( ) 60 and above ( )
3. Principal ( ) public ( ) private ( )
4. Teacher ( ) public ( ) private ( )
5 Students ( )
6. Highest Qualification: NCE [ ] B.Ed/B.sc/BA [ ],

   M.Ed/M.Sc/M.A [ ], Ph.D [ ],

   Others specify:……..

Section B: Respondents views on the Evaluation of the Implementation of Basic Science and Technology Curriculum in junior Secondary schools in Kaduna State. Please read the statement in this section carefully and indicate your response to each statement by ticking among the alternatives provided in the right hand columns using the five point scale provided, namely: Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) and Strongly Disagree (SD).

Note: Items 21-30 are Students while others are for Teachers and Principals

SN	Assessment of Extent of Content Coverage	SA	A	U	D	SD
1	Basic Science and Technology Curriculum content are adequately covered within stipulated period					
2	Topics in the curriculum contents are designed to encourage learner-centered teaching					
3	Students' background affect full implementation of the Basic Science and Technology curriculum content					
4	Availability of textbooks encourages full implementation of Basic Science and Technology curriculum content					
5	Basic Science and Technology teachers' competence and academic qualification influence curriculum implementation in Junior Secondary School					
6	Basic Science and Technology curriculum objectives are too broad to cover within the stated periods					
7	Frequent closure of school do not allow Basic Science and Technology teachers to cover all the content in the syllabus at the stipulated time					
8	Basic Science and Technology Teachers are not able to cover all the content in the syllabus at the stipulated time					
9	Basic Science and Technology scheme of work are taught and covered within the stipulated term					
10	Teachers 'instructional methods such as lecture method, dramatization, assignments allows content to be covered within the stipulated time					
Utilization of Variety of Instructional Materials		**SA**	**A**	**U**	**D**	**SD**
11	Basic Science and Technology teachers use instructional materials during teaching in my school.					
12	Teachers improvise instructional materials for effective teaching and learning of Basic Science and Technology in my school.					
13	Instructional materials are available for effective teaching and learning Basic Science and Technology.					
14	Instructional material used by teacher in teaching Basic					

	Science and Technology are relevant to the content/concept being taught.					
15	Instructional materials used by teachers in teaching enhance the achievement of the Basic Science and Technology objectives.					
16	The instructional materials are provided for teaching and learning Basic Science and Technology					
17	Pictures of the historical events in sciences are among the instructional materials used by teachers of Basic Science and Technology to enhance teaching and learning.					
18	Diagrams are among the instructional materials used by Basic Science and Technology teachers in the teaching and learning process					
19	Relevant charts are used to teach Basic Science and Technology during lessons					
20	Projected materials like films strips, micro projector opaque projector and overhead projector are hardly used as instructional materials in teaching Basic Science and Technology					
Utilization of Instructional Methods		**SA**	**A**	**U**	**D**	**SD**
21	Instructional methods adopted by Basic Science and Technology teachers are relevant to instructional materials					
22	Instructional methods adopted by teachers are relevant in implementing Basic Science and Technology curriculum					
23	Instructional methods employed by Basic Science and Technology teachers are relevant to students population					
24	Methods of teaching employed by teachers facilitate the achievement of Basic Science and Technology objectives					
25	Instructional methods used by Basic Science and Technology teachers are relevant to learners needs and background					
26	Instructional methods of teaching is relevant to each topic during lesson delivery					
27	Basic Science and Technology teachers use resource persons					

	in order to enhance understanding during lesson delivery					
28	Basic Science and Technology teachers always use modern instructional methods like game, role play, and micro teaching to teach the students					
29	Basic Science and Technology teachers are flexible enough to change their teaching strategies					
30	Traditional teaching methods such as assignment, lecture methods are not used by Basic Science and Technology teachers during teaching.					
Variety of Assessment Techniques		**SA**	**A**	**U**	**D**	**SD**
31	Regular supervision and inspection facilitate Basic Science and Technology curriculum implementation in junior secondary schools					
32	Keeping of up-to-date records of work by Basic Science and Technology teachers foster curriculum implementation					
33	Teachers employ diagnostic evaluation technique like previous knowledge, assignment, in knowing the students level of understanding of the subject matter					
34	Teachers use class work and assignment to evaluate students' performances					
35	Teachers use both evaluation technique like continuous assessment test, in achieving the objectives of Basic Science and Technology curriculum.					
36	Effective use of appropriate evaluation techniques enhances adequate implementation of the curriculum content					
37	Teachers usually ask the students to repeat to the class what they have taught them in the class					
38	Teachers uses group work for assessing the students					
39	Appropriate continuous assessment is used to evaluate the students academic work					
40	Basic Science and Technology teachers use questioning skills to probe the knowledge and understanding of students concerning the topics or concept					

S/N	**Teachers Qualification in** Basic Science and Technology	**SA**	**A**	**U**	**D**	**SD**
41	10% of the teachers of Basic Science and Technology do not possess the requisite certificate					
42	The number of qualified Basic Science and Technology teachers are adequate					
43	Most Basic Science and Technology teachers possess NCE as the minimum qualification for teaching the subject					
44	Most of the teachers of Basic Science and Technology attend seminar, workshop short training to upgrade their knowledge concerning the subject once in 6months					
45	Most of the teachers lack knowledge of the subject matter because of their unqualified status					
46	Most of the teachers of Basic Science and Technology do not carry along the student during lesson delivery					
48	Teachers' qualification and training enhance the achievement of Basic Science and Technology objectives					
49	Teachers qualification improves students performances in the subject					
50	Teaching and learning of Basic Science and Technology is highly motivated by experienced and qualified teachers					

Appendix C

Sample observation Schedule

The variables: It is fashion on likert scale of 4, 3, 2 and 1

Subject _____ Date _____

Name of School_____

Name of Student_____

Instruction: Tick and fill your responses to each of the questions and then add

4 - meet expectation in all respects

3 - meet expectation in most respects

2 - meet expectation in some respects

1 - meet expectation in few or no respects

Tick (√) the option that best describe the instructional usage in teaching and learning Basic Science and Technology

I: examine the implementation of Instructional material in teaching Basic Science and Technology **curriculum in public and private junior secondary school Kaduna state**

S/N	Available instructional usage	Used very often 5	Used often 4	Used on occasions 3	Not used at all 2	Unavailable
1.	Electronic Board					
2.	Overhead projector					
3.	Opaque projector					
4.	Slide projector					
5.	Film strip					
6.	Pc projector					
7.	Multimedia computer					
8.	Computer system					
9.	Internet/web environment					

10.	Television					
11.	Video					
12.	Radio					
13.	Cassette recorder/player					
14.	Video camera/still camera					
15.	Microphone/speaker system					
16.	Telephone/intercom					
17.	Fax machine					

II: Identified the implementation of variety of assessment techniques in teaching Basic Science and Technology **curriculum in public and private junior secondary school Kaduna state**

S/N	Keys	5	4	3	2	1
1.	Basic Science and Technology teachers was well prepared for class					
2.	Basic Science and Technology teacher was knowledgeable about the subject matter					
3.	Basic Science and Technology teacher enthusiastic about the subject matter					
4.	Basic Science and Technology teacher speaks clearly audibly and confidently					
5.	Basic Science and Technology teacher use a variety of relevant illustrations examples.					
6.	Basic Science and Technology teacher make effective use of board and/or visual aids.					
7.	Basic Science and Technology teacher asks stimulating and challenging questions.					

8.	Basic Science and Technology teacher effectively holds classes attention.					
9.	Basic Science and Technology teacher assist the learning of students.					
10.	Basic Science and Technology teacher involves students during lesson delivery.					

Appendix D

Reliability CO-EFFICIENT

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	10	100.0
	Excluded[a]	0	.0
	Total	10	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.839	100

Item Statistics

	Mean	Std. Deviation	N
v1	4.4000	.51640	10
v2	4.3000	.48305	10
v3	3.5000	1.26930	10
v4	4.7000	.48305	10
v5	4.4000	.51640	10
v6	3.9000	.31623	10
v7	4.3000	.82327	10
v8	4.7000	.48305	10
v9	4.3000	.67495	10
v10	4.1000	.56765	10
v11	4.4000	.51640	10
v12	4.1000	.31623	10
v13	4.4000	.51640	10

v14	4.2000	.42164	10
v15	4.2000	.63246	10
v16	4.2000	.78881	10
v17	4.1000	.31623	10
v18	4.1000	.31623	10
v19	4.1000	.31623	10
v20	4.1000	.73786	10
v21	3.9000	.73786	10
v22	4.0000	.00000	10
v23	3.8000	.63246	10
v24	4.2000	.42164	10
v25	4.3000	.48305	10
v26	4.2000	.42164	10
v27	4.3000	.48305	10
v28	4.4000	.51640	10
v29	4.3000	.48305	10
v30	3.8000	.78881	10
v31	3.8000	.78881	10
v32	4.5000	.52705	10
v33	4.5000	.52705	10
v34	4.0000	.94281	10
v35	4.4000	.51640	10
v36	4.2000	.42164	10
v37	4.4000	.51640	10
v38	3.0000	1.15470	10
v39	4.3000	.82327	10
v40	4.4000	.51640	10
v41	4.4000	.51640	10
v42	2.5000	1.17851	10
v43	3.2000	1.31656	10
v44	4.2000	.42164	10
v45	4.1000	.31623	10
v46	2.8000	1.03280	10
v47	4.4000	.51640	10
v48	4.2000	.42164	10
v49	4.4000	.69921	10

v50	2.6000	.69921	10
v51	4.3000	1.05935	10
v52	4.2000	.63246	10
v53	4.2000	.42164	10
v54	4.0000	.00000	10
v55	4.1000	.73786	10
v56	4.0000	.00000	10
v57	4.0000	.00000	10
v58	4.1000	.56765	10
v59	4.2000	.63246	10
v60	4.2000	.42164	10
v61	4.2000	.42164	10
v62	4.2000	.42164	10
v63	4.1000	.31623	10
v64	4.1000	.31623	10
v65	4.1000	.31623	10
v66	4.1000	.31623	10
v67	4.2000	.42164	10
v68	4.4000	.51640	10
v69	4.3000	.67495	10
v70	4.0000	.81650	10
v71	3.8000	.63246	10
v72	3.9000	.56765	10
v73	3.9000	.31623	10
v74	3.8000	.63246	10
v75	4.2000	.42164	10
v76	4.3000	.48305	10
v77	4.5000	.52705	10
v78	4.4000	.51640	10
v79	4.0000	.94281	10
v80	3.9000	1.19722	10
v81	3.0000	1.24722	10
v82	4.0000	.81650	10
v83	3.8000	.63246	10
v84	3.9000	.56765	10
v85	3.8000	.42164	10

v86	4.1000	.31623	10
v87	3.8000	1.03280	10
v88	3.8000	.63246	10
v89	3.6000	.84327	10
v90	4.0000	.00000	10
v91	3.8000	.63246	10
v92	4.0000	.81650	10
v93	3.0000	.94281	10
v94	3.6000	.69921	10
v95	4.0000	.47140	10
v96	3.5000	.97183	10
v97	3.5000	.84984	10
v98	4.3000	.48305	10
v99	4.3000	.48305	10
v100	4.1000	.73786	10

APPENDIX E

RESEARCH ADVISOR TABLE FOR DETERMINING SAMPLES FROM A GIVEN POPULATION

Required Sample Size†

Population Size	Confidence = 95% Margin of Error				Confidence = 99% Margin of Error			
	5.0%	3.5%	2.5%	1.0%	5.0%	3.5%	2.5%	1.0%
10	10	10	10	10	10	10	10	10
20	19	20	20	20	19	20	20	20
30	28	29	29	30	29	29	30	30
50	44	47	48	50	47	48	49	50
75	63	69	72	74	67	71	73	75
100	80	89	94	99	87	93	96	99
150	108	126	137	148	122	135	142	149
200	132	160	177	196	154	174	186	198
250	152	190	215	244	182	211	229	246
300	169	217	251	291	207	246	270	295
400	196	265	318	384	250	309	348	391
500	217	306	377	475	285	365	421	485
600	234	340	432	565	315	416	490	579
700	248	370	481	653	341	462	554	672
800	260	396	526	739	363	503	615	763
1,000	278	440	606	906	399	575	727	943
1,200	291	474	674	1067	427	636	827	1119
1,500	306	515	759	1297	460	712	959	1376
2,000	322	563	869	1655	498	808	1141	1785
2,500	333	597	952	1984	524	879	1288	2173
3,500	346	641	1068	2565	558	977	1510	2890
5,000	357	678	1176	3288	586	1066	1734	3842
7,500	365	710	1275	4211	610	1147	1960	5165
10,000	370	727	1332	4899	622	1193	2098	6239
25,000	378	760	1448	6939	646	1285	2399	9972
50,000	381	772	1491	8056	655	1318	2520	12455
75,000	382	776	1506	8514	658	1330	2563	13583
100,000	383	778	1513	8762	659	1336	2585	14227
250,000	384	782	1527	9248	662	1347	2626	15555
500,000	384	783	1532	9423	663	1350	2640	16055
1,000,000	384	783	1534	9512	663	1352	2647	16317
2,500,000	384	784	1536	9567	663	1353	2651	16478
10,000,000	384	784	1536	9594	663	1354	2653	16560
100,000,000	384	784	1537	9603	663	1354	2654	16584
300,000,000	384	784	1537	9603	663	1354	2654	16586

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APPENDIX F

Manual for Research Assistant (MRA)

This research work is on "Evaluation of The Implementation of Basic Science and Technology Curriculum in Public and Private Junior Secondary School in Kaduna State Nigeria." The researcher will invite four research assistants who will assist in administering the instrument to the respondent.

The training section will last for the period of one day for each sample school.

Procedure for the research work

1. The researcher will explain the research objective to the research assistant.
2. The researcher, will make mention of the respondents in this study: that the principals, teachers and students of sample schools.
3. The researcher, will emphasis on the importance of establishing a good relationship of the entire staff of the sample school when collecting the data specifically from the respondents.
4. The researcher will train the research assistants on how the respondents will indicate their independent choices among the alternatives in the questionnaire.
5. The researcher and research assistant will take the instruments down to the sample schools for distributing it to their respondents.