

TITLE PAGE

**ASSESSMENT OF TEACHERS' EFFECTIVENESS IN TEACHING
BASIC SCIENCE AND TECHNOLOGY IN PRIMARY SCHOOLS IN
FEDERAL CAPITAL TERRITORY OF NIGERIA**

BY

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DEDICATION

This Ph.D thesis is dedicated to Almighty God who has seen me through the period of this study.

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TABLE OF CONTENTS

TITLE PAGE	i
APPROVAL PAGE	ii
CERTIFICATION	iii
DEDICATION	iv
ACKNOWLEDGEMENT	v
TABLE OF CONTENTS	vii
LIST OF FIGURES	x
LIST OF TABLES	xi
LIST OF APPENDICES	xiii
ABSTRACT	xv
CHAPTER ONE: INTRODUCTION ONE	
Background of the Study	1
Statement of the Problem	14
Purpose of the Study	15
Significance of the Study	16
Scope of the Study	18
Research Questions	19
Hypotheses	19
CHAPTER TWO: REVIEW OF LITERATURE	21
Conceptual Framework	22
Concept of Basic Education	
Concept of Basic Science and Technology	
Concept of Teacher	30
Concept of Gender	35
Concept of Assessment	37
Theoretical Framework	41
Competency Based Teacher Theory by McDonald (1974)	41

Stufflebean's Context, Input, Progress and Product (CIPP) Model (1971)	42
Review of Empirical Studies	43
Studies on Skills Required of Basic Science Teachers in Teaching Basic Science and Technology.	43
Studies on Extent to which Learning Objectives are Effectively Used to Plan Lessons in Basic Science and Technology	45
Studies on Extent to which Appropriate Teaching Methods are Used in Teaching Primary School Basic Science and Technology.	47
Studies on the Extent to which Instructional Resources are Used for Effective Teaching of Basic Science and Technology	49
Studies on the Extent to which Teachers Encourage School Pupils/Students to Participate in Basic Science and Technology Lessons	51
Studies on the Influence of Teachers' Qualification on Effectiveness in Teaching Basic Science and Technology	53
Studies on the Influence of Teachers' Gender on Effectiveness in Teaching Basic Science and Technology	55
Summary of Literature Review	57
CHAPTER THREE: RESEARCH METHOD	60
Design of the Study	60
Area of the Study	60
Population of the Study	61
Sample and Sampling Technique	61
Instrument for Data Collection	62
Validation of the Instrument	62
Reliability of the Instrument	63
Method of Data Collection	63
Method of Data Analysis	64
CHAPTER FOUR: RESULTS	65
Summary of Findings	78

CHAPTER FIVE: DISCUSSION OF FINDINGS, CONCLUSION AND SUMMARY OF THE STUDY	80
Discussion of the Findings	80
Conclusions	86
Educational Implication	86
Recommendations	87
Limitations of the Study	88
Suggestions for Further Studies	89
Summary of the Study	89
REFERENCES	92
APPENDICES	105

LIST OF FIGURE

1: Schematic Representation of the Conceptual Framework Showing the Interrelationship among the Variables in the Study	39
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LIST OF TABLES

1:	Mean Ratings of Respondents on the Extent to which Male and Female Primary School Teachers Possess the Required Skills for Teaching Basic Science and Technology	65
2:	Mean Ratings of Respondents on the Extent to which Primary School Teachers possess the required Skills for Teaching Basic Science and Technology Based on Qualification	67
3:	Mean Ratings of Respondents on the Extent to which Learning Objectives are effectively used by Male and Female Primary School Teachers to plan Lessons in Basic Science and Technology	68
4:	Mean Ratings of Respondents on the Extent to which Learning Objectives are effectively Used by Primary School Teachers to Plan Lessons in Basic Science and Technology Based on Qualification	70
5:	Mean Ratings of Respondents on the extent to which Appropriate Teaching Methods are Used by Male and Female Primary School Teachers in Teaching Basic Science and Technology.	71
6:	Mean Ratings of Respondents on the Extent to which Appropriate Teaching Methods are used by Primary School Teachers in Teaching Basic Science and Technology Based on Qualification.	72
7:	Mean Ratings of Respondents on the extent to which Instructional Resources are Used by Male and Female Primary School Teachers for Effective Teaching of Basic Science and Technology.	74
8:	Mean Ratings of Respondents on the extent to which Instructional Resources are Used by Primary School Teachers for Effective Teaching of Basic Science and Technology based on Qualification	75
9:	Mean Ratings of Respondents on the extent to which Male and Female Primary School Teachers Encourage School Pupils to Participate in Basic Science and Technology Lessons.	76
10:	t-test Analysis of the Significant Difference on the Extent to which Male and Female Primary School Teachers Possess the required Skills for Teaching Basic Science and Technology	77

LIST OF APPENDICES

A:	Introductory letter to Respondents	105
B:	Observational Schedule for Assessing Teachers' Effectiveness in Teaching Basic Science and Technology (OSATETBST).	106
C:	Reliability Computation using Cronbach Alpha.	108
D:	Distribution of Teachers in Universal Basic Education Commission (UBEC) Schools in the Federal Capital Territory, Nigeria.	111
E:	Planning and Research Department, Universal Basic Education Commission (UBEC), 2017	112

ABSTRACT

This study was aimed at assessing Basic Science and Technology teachers' effectiveness in teaching Basic Science and Technology in FCT Abuja, Nigeria. five (5) specific purposes, five (5) research questions and five (5) null hypotheses guided the study. The study adopted the ex-post-facto research design. The population of the study comprised of all the 9193 (4439 male and 4754 female teachers) Universal Basic Education Commission (UBEC) schools teachers in the 570 UBEC schools in FCT Abuja. A sample of 1120 public primary school teachers teaching Basic Science and Technology was drawn for the study using multi-stage sampling procedure. The instrument for data collection for the study was an observation schedule titled: 'Observational schedule for Assessing Teachers' Effectiveness in Teaching Basic Science and Technology (OSATETBST). Three experts all from Faculty of Education, University of Nigeria, Nsukka validated the instrument. The reliability coefficients of 0.83, 0.87, 0.85, 0.80 and 0.87 were obtained for clusters A, B, C, D and E respectively. The overall reliability index was .85. Data collected were analyzed using mean and standard deviations to answer the research questions while the hypotheses were tested using t-test statistic at 0.05 level of significance. The findings, based on the research questions, among others indicated that: Both male and female primary school teachers possess the required skills for teaching Basic Science and Technology to a great extent; learning objectives are effectively used by both male and female primary school teachers to plan lessons in Basic Science and Technology to a great extent; among others. Based on the findings and implication of the study, it was recommended, among others, that: every primary school teacher should be periodically exposed to symposiums to sustain their teaching efficiency and to strengthen them on the area of their deficiency such as ability to carry out experiments, interpret result of the experiment, improvisation by constructing things, grouping pupils to accomplish a given task, consideration for individual difference, ability to set induce the pupils to new ideas, ability to generate desirable learning feedback, ability to cover the three behavioural objective of learning, simulation method, peer tutoring method and cooperative learning method among others; practical Basic Science and technology needed equipments should be supplied by the government for the teaching of Basic Science and Technology practical; parents and pupils should be sensitized on effective and functional study habits and factors that encourage learning to compliment the efforts of teachers in achieving the expected objective of science and technology.

CHAPTER ONE

INTRODUCTION

Background of the Study

Education is the priority sector for every well-meaning society. It is a process by which individuals acquire knowledge, skills and attitudes, which enable them to develop their faculties in full. Quality education enables individuals to contribute to the development of the quality of their lives, communities and the nation as a whole. This is why in Nigerian, education is regarded as an instrument of excellence for effecting national development (Federal Republic of Nigeria, FRN, 2004). Danmole (2011) noted that education has remained an instrument of change and national development. Education is therefore a social process and medium for the acquisition of relevant knowledge, skills and attitudes for survival in a challenging and changing world.

Educational system in Nigeria has undergone different changes of which Universal Basic Education is one. The Universal Basic Education programme has been initiated into the Nigerian education system so as to provide functional and effective education for its citizenry and also as a way of eradicating illiteracy, ignorance and poverty among Nigerians (Yusuf & Ajere, 2009). Universal Basic Education Programme is an educational reform programme of the Federal Government of Nigeria introduced to serve as a catalyst for achieving free, compulsory and universal 9-year education for every Nigerian child of school age (Federal Republic of Nigeria, 2012; Danmole, 2012). As a result, the existing curricula for primary and junior secondary schools were reviewed, restructured and re-aligned to fit into a 9-year Basic Education Programme (Obioma, 2007). The Primary Science for 6 years primary education was restructured into Basic Science and Technology (BST) for lower basic level primary 1-3 and middle basic level (primary 4-6) and integrated science to Basic Science (BS) for upper basic level (JSS 1-3) (Adeniyi, 2007 & Danmole, 2011).

Basic Science and Technology is one of the subjects for every Nigerian school child at the primary education level. It is a product of the restructuring and integration of four primary and junior secondary school curricula namely Basic Science, Basic Technology, Physical and Health Education and computer studies/Information technology communication (NERDC, 2012). The NERDC outlined the objectives, as to develop interest in science and technology, acquire basic knowledge and skill in science and technology. Others are to apply scientific and technological knowledge and skills to meet contemporary societal needs, take advantage of the numerous career opportunities provided by science and technology, become prepared for further studies in science and technology, avoid drug abuse and related matters and safety and security consciousness. Basic Science and Technology is defined as a subject that offers students the onset and preliminary knowledge and training to acquire the necessary skills in applied science, technology, agricultural, industrial, commercial, economic development among others and to afford students with early basic scientific awareness to solve problems.

Basic science and technology is a very important subject that can promote national development. This is because no nation can develop without recording successes in science and technology. According to Kaplan (2002), electricity, aircraft, telephone, television, computers and other form of machinery could not have been invented without basic science and technology. In this sense, modern gadgets in all aspect of human comfort are inventions of science and technology. This therefore implies that a nation that lacks the necessary basic science and technology will have to depend on other developed nations for the existence of its people. Such a nation cannot be said to be independent because it has to depend on the whim and caprices of other nation with the necessary basic science and technology. A nation without basic science and technology will experience difficulties in feeding its people because even agriculture requires the application of basic science and technology (Omatayo,

Ihereme & Maduewesi, 2008). Thus, the importance of science and technology to national development cannot be underestimated.

Science and technology are two concepts that seem very interrelated. According to Esseysafe (2017), science is the study of knowledge which can be made into a system and which depends on seeing and testing facts, while technology is the practical application of scientific knowledge. Basic Science and Technology has been defined by some researchers. According to Omiko (2016), Basic Science and Technology is an introductory course to the study of the sciences in senior secondary schools. It involves the study of elementary biology, anatomy, earth/solar system, ecology, genetics, chemistry, physics and engineering as a single science subject in the Junior Secondary school (Nwafor, 2012). This implies that, Basic Science and Technology is a subject that prepares the students for the study of core science subjects like Physics, Chemistry and Biology at the senior secondary school level.

Basic science and technology offers the basic training in scientific processes and skills required for human survival, societal transformation and sustainable development. These skills according to Kearsely (2005), include: subject mastery skill, observational skill, questioning skill, communication skill, feedback skill, experimentation skill, result interpretation skill, problem analysing skill, organization skill and improvisation skill, which the author identified to be paramount to the success of teaching and learning of Basic science and technology. FRN (2004) identified the scientific skills to include observation, manipulation, classification, communicating, inferring , hypothesizing, experimenting, interacting with data and formulating models; Given that Basic science and Technology has continually brought about positive changes in our society and the world as a whole, even our everyday life appears to be controlled by science and technology. Hence sustainability of scientific skills required for teaching Basic science of technology is of great important. That is why today children require a wider scope of knowledge and competence to cope with the changes at a time when there are persistent deficiencies in Nigerian educational system

(Omofonmwan, 2007; Omatayo, Ihereme & Maduewesi, 2008; Onyeachi, 2008; Jaiyesba, 2009; & Alaba, 2010).

These deficiencies have been identified by Onyeachi (2008); Ololube, Egbezor and Kplovie (2008), to include insufficient and unqualified teachers; lack of practical materials such as measuring cylinder, test tube and chemicals. Also Agboghoroma (2009) reported that basic science and technology teachers show preference to conventional methods of teaching as against inquiry, activity and discovery method which yield better result. Adora (2003), supported by Ajayi (2001) further said that population explosion, insufficient desks, overcrowded classrooms, inadequate learning materials, preponderance of unqualified teachers, poorly educated and ill-motivated teachers characterize the entire school system of which primary education is inclusive.

In spite of the overwhelming importance of Basic Science and Technology and the laudable curriculum that has been designed for the subject at the basic education levels, the nature, practice and product of Basic Science and Technology education as reflected in pupils' academic achievement has continued to be discouraging (STAN, 2002; Omatayo, Ihereme & Maduewesi, 2008). According to Akpan (2012), the structures and appropriate activities that foster effective implementation of the curriculum are either inadequate or lacking in Nigerian schools. Furthermore, Afuwape and Oriola (2017) observed that among the myriad of challenges of Basic Science and Technology teaching in Nigeria are the issues of teacher quality and development, lack of enough specialist teachers; dearth of relevant support materials for teachers and inadequate supervision and mentoring of teachers. Consequently, the academic achievement of pupils in basic science and technology has been underwhelming. In the Federal Capital Territory (FCT), Abuja Nigeria for instance, evidence gathered on the academic achievement of pupils transiting to junior secondary school (JSS) shows that only 48%, 44%, 45%, 38% and 41% of the pupils passed well or had good results to be given admission into junior secondary schools and basic science was one of the subjects

that recorded higher number of failures from 2013-2017 (Primary Education Board, Statistics Unit, FCT Abuja, 2017). The cause of this higher number of failures may be as a result teachers or learners related factor but to the best of the researcher knowledge is yet to be figured out. This trend of below-average performance has become a serious issue for all stakeholders to ponder on.

Consequently, if the desired aim of a scientifically and technologically literate citizenry is to be achieved in Nigerian schools, then steps must be taken to arrest the undesirable situations. One important step to take can be to assess the standard of teaching of the subject which has to do with teachers' effectiveness in teaching Basic Science and Technology at the primary education level. This is because the primary education level lays the foundation for secondary and tertiary education. Therefore, for individual to be able to study any single or combined science subjects at the secondary school level and beyond successfully, such a person must have been well-grounded in Basic Science and Technology during primary school education.

Primary school education is the level of education recognised for developing in children literacy and numeracy skills (Nzeribe, 2004). It lays the foundation upon which other levels of education are built. Therefore, any inadequacy at this level may affect the successful completion or otherwise of the other levels of education. The Federal Republic of Nigeria in her National Policy on Education (FRN, 2004) indicated that primary education is the key to the success or failure of the educational system. The policy defined primary education as the education given in institutions for children aged 6-11 years plus. The policy also outlined the objectives of primary education as to: inculcate permanent literacy and numeracy and the ability to communicate effectively; lay a sound basis for scientific and reflective thinking; give citizenship education as a basis for effective participation in and contribute to the life of the society. Others are to mould the character and develop sound attitude and morals in the child; develop in the child the ability to adapt to the child's

changing environment; give the child the opportunity for developing manipulative skills that will enable the child function effectively in the society within the limits of the child's capacity; and provide the child with basic tools for further educational advancement, including preparation for trades and crafts of the locality (FRN, 2004: 14). In this study Primary school education is defined as the foundation level of education that develops in the children literacy and numeracy skills.

Thus, the importance of primary education cannot be overemphasized. According to Akinbote, Odu-oluwa and Lawal (2001), the period of primary education is crucial in the life of an individual in particular and the society in general. Therefore, the introduction of Basic Science and Technology at the primary education level exposes the pupils to logical thinking and scientific methods. This prepares the pupils for higher aspirations in the field of sciences and determines to a large extent, their likeness or otherwise for science and technology related courses or disciplines in further academic pursuits. However, the extent to which pupils achieve from the teaching and learning of Basic Science and Technology may depend largely on teachers' effectiveness in teaching the subject.

Teachers' effectiveness may tell a lot about how children develop in Basic Science and Technology. This is because no matter how laudable a curriculum is planned, its success will depend mainly on the characteristics of the teacher as they determine what happens during teaching and learning (Igbokwe, 2009). Kolawole (2011) asserted that for children to show interest or not, like or dislike any subject, it depends on the teachers and how effective the teachers are. Kolawole further explained that the implementation of any curriculum depends on the quality of teachers and their effectiveness in the teaching and learning process.

Teachers are instrumental in the curriculum implementation process. Iherebere (2010) views teachers as trained individuals that translate educational objectives to the pupils

through teaching and learning process. According to Iherebere, the teacher is also expected to interpret the contents and learning experiences as stated in the curriculum. In this study, teachers can be viewed as individuals who are trained in the theory and practice of the teaching profession to be able to impart knowledge to the learners. High learning outcomes can be regarded as an indication of teachers' effectiveness.

Teachers' effectiveness is a recurrent concept in education literature. Teacher effectiveness, according to Altaf (2012) typically refers to a collection of characteristics, competencies and behaviours of teachers at all educational levels that enable learners or students to achieve desired learning outcomes, which may include the attainment of specific learning objectives as well as the broad goals. In the same vein, Prasad and Prasad (2005) views teachers' effectiveness as the attribute of teachers who possess the capacity or potential of having positive impact on students' learning, behaviour and attitudes. To Mattero (2015), an effective teacher must possess the qualities of creating a learning environment and ability to successfully deliver instruction. Good and Brophy (2003) described an effective teacher as one who is committed work, manages the classroom well and provides a positive role model for the students to identify with. For the purpose of this study, teacher effectiveness is the teacher's ability to be creative, organise, stress key ideas and have a holistic control of classroom activities.

An effective teacher is enthusiastic, shows warmth, works towards self-improvement in teaching, possesses skills in human relationships and can adapt his or her skills to achieve specific instructional objectives (Anderson, 2001). From these definitions and explanations, teacher effectiveness has to do with the abilities and competencies exhibited by the teacher during teaching and learning in order to promote learning outcomes and consequently, achieve some predetermined objectives or goals. Effective teachers are those that possess the knowledge and skills needed to attain the goals and must be able to use that knowledge and

those skills appropriately if these goals are to be achieved. According to Bern (2004), an effective teacher is one who adequately plan the lesson to deliver and who employs appropriate teaching methods and strategies in transmitting the right knowledge, skills and abilities to learners in expectation of higher learning outcomes. Anderson (2001) also reasoned that teachers must ask themselves not only what they are going to teach but also what their students should be learning; how they can help them learn it; and why it is important to learn it.

In order to address these questions, it demands that teachers must be familiar with children and their developmental stages, and know something about events occurring outside the classroom, and about what the society needs. They must also have good knowledge of the subject they teach in order to distinguish what is peripheral from what is central and must be guided by the philosophy and principles of teaching to promote learning (Bern, 2004). Despite the great role played by teachers in the teaching and learning process in order to achieve preset educational objectives and goals, some researchers (Lawal, 2003; & Kpolovie, 2008) observed that many primary school teachers are still not adequately prepared to teach Basic Science and Technology. Studies also reported that poor preparation, inadequate trendy science material resources and equipment to enhance teaching, the use of inappropriate teaching methods, among others have resulted to poor achievement of the objectives of Basic Science and Technology (Lawal, 2003; Ololube, Egbezor & Kpolovie 2008; & Ihereme, 2010).

However, Moghadam and Cheraghia (2009) argued that the academic achievement of pupils in basic science and technology is affected by other factors which are not teacher related. In furtherance the authors identified learners study habit, intrinsic motivation, interest in science, and gap between what happens in school and at home to be some of the factors that assert strong influence on academic achievement of the learners. For instance, John (2010) and Nikky (2013) submitted that at times academic performance of learners may not

reflect the effectiveness of the teachers as a result of poor study habit, lack of interest to learning among others.

Other researchers, among other things, observed that the teaching of Basic Science and Technology, Mathematics and other science related subjects that require innovative techniques still tend to be traditional and devoid of some innovations (Clough & Olsan, 2004; Agboghoro, 2005; & Agboghoro, 2009). Agboghoro (2009) asserted that the much valued scientific attributes and skills can only be inculcated in the children if they are actively involved in exploring their environment. Adore (2003) adduced that the present weakness in Basic Science and Technology education in Nigeria seems to be related to, among others, unconducive learning environment, unmotivated teachers and inadequate teaching and learning materials as well as ineffectiveness in teaching the subject on the part of the primary school teachers. Consequently, to ensure full realization of the objectives of Basic Science and Technology at the primary school level, there may be need to periodically carry out proper assessment on teachers' effectiveness in teaching the subject. This is because such assessment may help to provide useful insights into the areas of strength and weaknesses in the teaching and learning of Basic Science and Technology.

Assessment is an essential component of teaching. Assessment, as a concept is viewed as the process of collecting information for decision making in education about students, curricular, programmes and educational policies (Afemikhe, 2007). According to Okunrotifa (2007), assessment involves the provision of information through selection of criteria, collection of data and analysis for the sake of facilitating decision making. Furthermore, Johnson (2009) defined assessment as the use of a variety of procedures to collect information about learning and instruction. Assessment is also considered as a systematic process of gathering data from variety of sources in order to understand, describe and improve learning (Nworgu, 2015). In this study assessment is the process of gathering evidence to make useful decisions. This implies that assessment here is aimed at collecting

information from different aspects of teachers' activities in order to understand, describe and improve the learning of Basic science and technology.

Thus, the rationale for assessment is to provide feedback for teachers to modify subsequent learning activities. Accordingly, Ohuche and Akeju (2007) outlined four main objectives of assessment to include: giving account of how far the objectives of programmes have been achieved; giving guidance as to what step to be taken next; making educational decision and making value judgement. In other words, assessment of teachers' effectiveness in teaching Basic Science and Technology can be done by seeking useful information as regards to: the extent to which the objectives of the subject have been achieved and the extent to which teachers adequately and appropriately utilized relevant instructional resources in teaching the subject in order to achieve the learning objectives. It also involves determining the extent to which appropriate methods have been used by teachers to promote pupils' understanding and learning in the subject and the extent of learning outcomes in the subject. Based on this premise, the present study sought to assess teachers' effectiveness in teaching Basic Science and Technology in FCT Abuja.

Teachers as a factor are an issue that affects pupils or students' effective learning which has however received a lot of attention by researchers, but with mixed findings. Studies have revealed that teachers' variables such as years of teaching experience, level of academic attainment or academic qualification, teachers-students ratio, teachers attitude, teachers' job satisfaction, motivation and remuneration affect learning outcome (Adesoji & Olatunbosun, 2008; Ewetan, 2010; Akinsola, 2010; Odiri, 2011; Akpo, 2012; Daso, 2013;). In addition, Tella (2008) also reported that teachers' educational qualification is another variable that is seen to affect learning outcomes. Nonetheless, other studies found that these teachers' variables have no significant influence on learning outcomes (Ayodele & Ige, 2012; Yara & Surumo, 2012). This contradiction in the findings therefore necessitates other

research efforts in order to provide enough empirical evidence for drawing reasonable conclusion about these variables. For instance, among the variables, teachers' qualification has been adduced to have seriously influenced the teaching and learning process.

Teachers' qualification is characterized by the level of education attainment and certificate acquired by teachers that qualify them to teach at a given level of education. Abe and Adu (2013) and Wiki (2013) viewed teachers' qualification as a number of academic and professional certificates and or degrees that enables a person to become a registered teacher in primary or secondary school and even tertiary institution. A study by Illugbusi, Falola and Daramola (2007) showed that teachers' qualification counts significantly with respect to improving students' learning. Adeyemi (2008) also reported that higher teachers' qualification increases their awareness of diversifying search for new ideas, new commitments and new pedagogies that will facilitate teaching and learning. Furthermore, Okey (2012) observed that teachers' qualification is directly related to teachers' ability to plan lessons, address divergent students' responses, teaching effectiveness, teaching methods and their ability to stimulate learning among learners. This implies that teachers' qualification may influence the teaching and learning of Basic Science and Technology.

Since, teachers' qualification has been viewed as the certificates or degrees obtained by teachers after undergoing necessary educational programmes and trainings to become teachers, probably the variations in the qualifications of primary school teachers may affect their effectiveness in teaching Basic Science and Technology. Moreover, in Nigeria, both teachers who are academically qualified and those that are professionally qualified are employed to teach at the primary and post primary school levels (Ahiazu & PrinceWill, 2011). Academically qualified teachers, according to Edu and Kalu (2012) are those who have academic training as a result of enrolment into educational institution and obtained qualifications such as HND, B.Sc, B.A. and M.A. among others while professionally qualified teachers are those who got professional training that gave them professional

knowledge, skills, techniques, aptitudes as different from the general education. Such teachers certificates include TCII and NCE or and degrees like B.Ed., B.Sc. Ed, B.A. Ed, and M.Ed, among others. These differences in qualifications may likely influence the teaching of Basic Science and Technology positively or negatively. Thus, it becomes necessary in a study like this to find out the moderating influence of teachers' qualification on their effectiveness in teaching Basic Science and Technology at the primary school level. Teachers' qualification can be referred to as the highest certificate acquired by a teacher or the highest level of education attained by the teacher upon which he or she is employed to teach. Apart from teachers' qualification, another variable that may influence teachers' effectiveness is their gender.

Gender influence in teaching and learning has become a recurrent issue in education literature generally. The concept has been defined by researchers with slight variations. Bravo-Baumann (2000), Okoh (2007) and Igboegwu and Okonkwo (2012) defined gender as a socially constructed definition of women and men. According to these authors, gender is defined in relations to the ways in which a culture or society defines rights, responsibilities and identities of men and women in relation to one another. Similarly, according to Yang (2010), gender refers to the social attributes and opportunities associated with being male and female and the relationships between women and men; girls and boys, as well as the relations between women and men. Furthermore, Mlambo (2011) viewed gender as a cultural construct that distinguishes the roles, behaviour, mental and emotional characteristics between males and females as developed by a society. This implies that gender differences are defined by the society based on its norms and values.

These socially defined attributes that distinguishes the roles, behaviour and emotions of males and females may also influence teachers' activities in the classroom. A study by Akiri and Ugborugbo (2008) revealed that there was a significant relationship between teachers' gender and learning outcomes. Olagunju and Abiona (2008) revealed that male

teachers were more effective in teaching based on their students' achievement than their female counterparts, while Khurshid and Zahur (2013) revealed that female teachers were more effective in teaching than the male teachers. On the other hand, Dee (2007) examined whether teachers' gender affects students' outcome and found that teachers' gender was not a significant factor in this respect. This inconsistency in the findings raises questions about the state of affairs that currently exist on this issue, particularly the extent to which gender influences teachers' effectiveness in teaching Basic Science and Technology at the primary school level.

Most literature have however, shown that most primary school teachers are not usually adequately prepared for teaching Basic Science and Technology (Oloube, Egezor & kpolovie, 2008; & Onyeachi, 2008; & Easton & David, 2009). Some literature said that some primary school teachers are equipped in teaching Basic Science and Technology (Kearsley, 2005, Mcber, 2000). Some researchers have also mentioned that despite all the effort and expenditure made by the government of Nigeria and other relevant stakeholders in the education sector for proper implementation of school curriculum, the teaching of Basic Science and Technology in primary schools has been poor and disappointing (Agboghome, 2005; Agboghome, 2009). This could be due to teachers' lack of the required skills or abilities for effective teaching of Basic Science and Technology at this level of education which can have negative effect on pupils' learning in the subject. However some researchers have argued that poor achievement of pupils in Basic Science and Technology could be as a result of learners factors (Moghadan, 2009, John 2010, Nikky 2013).

Worthy of note is that, poor foundation in Basic Science and Technology at the primary school level of education will likely lead to failure or poor achievement of students in science subjects and disciplines at the secondary and tertiary levels of education. Hence, considering the critical role played by teachers in the teaching and learning process and particularly in the teaching of Basic Science and Technology at the primary school level, it

becomes necessary to periodically conduct an assessment of teachers' effectiveness in teaching the subject, which is the essence of this research.

Statement of the Problem

The importance of proper teaching of Basic Science and Technology at the primary school level cannot be overemphasized. This is because no nation in the world can develop in science and technology without laying a good foundation in Basic Science and Technology at the primary school level or its equivalent as it prepares her young citizenry for careers in science and technology related fields. Hence, many developing nations, including Nigeria are expected to lay much emphasis in proper teaching and learning of Basic Science and Technology.

However, despite the overwhelming importance of Basic Science and Technology and the laudable objectives of the subject as stated in the curriculum, some researchers have reported that the structures and appropriate activities that foster effective implementation of the curriculum are still either inadequate or lacking in Nigerian schools and this makes the teaching of the subject to be poor and disappointing. Some literatures tend to show that most primary school teachers are usually not adequately prepared for teaching Basic Science and Technology. Some researchers have mentioned the myriad of challenges of Basic Science and Technology teaching in the country to include the issues of teacher quality and development, lack of enough specialist teachers, dearth of relevant support materials for teachers, inadequate supervision and inadequate mentoring of teachers. While other researchers opined that learners' factors such as poor study habits, lack of interest, lack of motivation and home influence could also lead to poor academic achievement of pupils in learning of Basic Science and Technology in FCT in Abuja. These among others factors could have affected the academic achievement of pupils in Basic Science and Technology particularly in FCT Abuja and this has become a serious issue to all relevant stakeholders.

The question then is whether teachers are effective enough in teaching the subject. Many researchers have adduced that teachers' qualification and gender have high influence on the teaching of Basic Science and Technology whereas others reported in disagreement. This disagreement in findings calls for further research in order to generate more empirical evidences on this issue.

Generally, one major concern is that poor foundation in Basic Science and Technology at the primary level of education will likely result to failure or poor achievement of students in science subjects and disciplines at the secondary and tertiary levels of education. Considering the poor achievement of pupils in Basic Science and Technology, and the critical role played by teachers in the teaching and learning process, and the overwhelming importance of Basic Science and Technology, the question then is; what is the extent of teachers-effectiveness in teaching Basic Science and Technology at the primary school level? To provide an answer to this question, the researcher deemed it necessary to carry out a study aimed at assessing teachers' effectiveness in teaching Basic Science and Technology in FCT Abuja.

Purpose of the Study

The main purpose of the study is to assess Basic Science and Technology teachers' effectiveness in teaching Basic Science and Technology in primary schools in FCT Abuja. Specifically, the study sought to determine the extent to which:

1. Primary school teachers possess the required skills for teaching Basic Science and Technology;
2. Learning objectives are effectively used by male and female primary school teachers to plan lessons in Basic Science and Technology;
3. Appropriate teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology;

4. Instructional resources are used by male and female primary school teachers for effective teaching of Basic Science and Technology;
5. Male and female primary school teachers encourage pupils to participate in Basic Science and Technology lessons;

Significance of the Study

The study has both theoretical and practical significance. Theoretically, the findings of this study will add credence to McDonald's competency based teacher theory and the Stufflebeam's Context Input Process Product Model upon which the study is anchored. McDonald's competency based teacher theory holds that teachers' possession of knowledge, skills, and attitudes enables them to recognize and solve complex problems in their domain of study or future work, which could mean their skills for effectiveness in teaching Basic Science and Technology at the primary school as in case of this study. Hence, the findings will lend support to this theory. The Stufflebeam's Context Input Process Product Model considers assessment as a tool which helps to make programmes work better for the people they are meant to serve. The CIPP model adopts the criteria of internal and external validity, reliability, objectivity, relevance, importance, scope, credibility, timeless, pervasiveness and efficiency. It stresses the clarification of goals and objectives and advocates structured observation as a means of discovery whether the goals and objectives have been achieved or not. Therefore, findings from this study could add credence to this model.

When published or when kept in the libraries, the findings of the will also have practical significance to some beneficiaries. The following stand to benefit from the findings of this study when published. They include Basic Science and Technology teachers, primary school pupils, and Basic Science and Technology textbooks writers, ministry of education and teacher education institutions.

The finding of this study will create awareness to Basic Science and Technology teachers on the various and appropriate methods and techniques for teaching Basic Science

and Technology. This awareness will make pupils to be taught Basic Science and Technology by the teachers using the appropriate methods and techniques. Teacher of Basic Science and Technology will also find the finding of this study as an unavoidable guide in their daily teaching business. It is believed that the study will make them professionally balanced in discharging their duties and in result-oriented approaches.

Useful information accessed by the teachers in journals and during workshop for science teachers will be transmitted to the pupils. With this information, pupils will not only appreciate Basic Science and Technology education but also will have good background knowledge, natural and applied Basic science and technology. They will learn Basic Science and Technology well and also in internal and external examination and will be able to compete favourably with other pupils both within and outside Nigeria. At the end, they can be experts and professionals in Basic Science and Technology and other related disciplines and professions in meeting the needs and aspiration of the society.

It is expected that the study will highlight findings in the area of Basic Science and Technology teachers' effectiveness, preparedness as well as the method adopted which will be made available to ministers of education, UBEC, school administrators, supervisors and inspectors when published in Journals online or when kept in the libraries. This will provide information on the actual problems on ground regarding the factors hindering Basic Science and Technology teachers' effectiveness in teaching Basic Science and Technology. It is also expected that the study will yield data which will enable the government, through her agencies, to take appropriate steps toward ensuring that Basic Science teachers are well equipped to teach Basic Science and Technology.

The study would also reveal to government and school management, through conference proceedings about the areas that need attention and intervention and the appropriate intervention required. It would also provide information whether there is need to

embark on training of teachers through workshops, more conferences, seminars, and fellowship grants.

The finding of study would also help teacher education institution and their teaching staff to reform their programme and ensure quality assurance in education, in order to meet the challenges facing the teaching of basic Science in Nigeria. The study would contribute to the overall school improvement and education evaluators could draw up an adequate evaluation schedule that will be useful to both external and internal evaluation. The study would also help for uniformity of purpose at arriving at quality judgment on the state of teaching and learning of Basic Science by teachers and pupils in Nigeria.

Finally, the study would serve as a source of information for others who may wish to embark on research from a related perspective in this field of study. This work would provide them direction and guideline for their study and indeed serve as an additional reference material for further studies.

Scope of Study

The study sought to assess teachers' effectiveness in teaching Basic Science and Technology in primary schools in FCT. Precisely, the focus of this work will be on Basic Science and Technology for lower basic (1-3) and middle basic (4-6) in primary schools in FCT. The primary school is the focus because it is the foundation level of education. The study will focus on assessment of the skills required of Basic Science teachers in teaching Basic Science and Technology in Federal Capital Territory Abuja, Nigeria with specific interest on: Required skills for teaching primary school Basic Science and Technology; Learning objectives effectively used to plan lessons in Basic Science and Technology; Appropriate teaching methods used in teaching primary school Basic Science and Technology; Instructional resources used for effective teaching of Basic Science and Technology; and Encouragement of school pupils to participate in Basic Science and

Technology lessons, taking into consideration the moderating influence of teachers' qualification and gender on these variables.

Research Questions

The following research questions guided the study:

1. What is the extent male and female primary school teachers possess the required skills for teaching Basic Science and Technology?
2. What are the extent learning objectives are effectively used by male and female primary school teachers to plan lessons in Basic Science and Technology?
3. What is the extent appropriate teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology?
4. What are the extent instructional resources are used by male and female primary school teachers for effective teaching of Basic Science and Technology?
5. What is the extent male and female primary school teachers encourage school pupils to participate in Basic Science and Technology lessons?

Hypotheses

The following null hypotheses guided the study and were tested at 0.05 levels of significance:

- H0₁:** There is no significant difference in the extent male and female primary school teachers possess the required skills for teaching Basic Science and Technology.
- H0₂:** There is no significant difference in the extent learning objectives are effectively used by male and female primary school teachers to plan lessons in Basic Science and Technology.
- H0₃:** There is no significant difference in the extent appropriate teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology.

- H0₄:** There is no significant difference in the extent instructional resources are used by male and female primary school teachers for effective teaching of Basic Science and Technology.
- H0₅:** There is no significant difference in the extent male and female primary school teachers encourage school pupils to participate in Basic Science and Technology lessons.

CHAPTER TWO

REVIEW OF LITERATURE

This chapter focused on the review of literature. The literature was reviewed under the following subheadings: conceptual framework, theoretical framework, review of empirical studies and summary of literature review.

Conceptual Framework

Concept of Basic Education

Concept of Basic Science and Technology

Concept of Teacher

Concept of Gender

Concept of Assessment

Theoretical Framework

The Competency Based Teacher Theory by McDonald (1974)

Stufflebeam (1971) Context Input Process Product Model

Review of Empirical Studies

Studies on the required skills for teaching primary school Basic Science and Technology

Studies on the extent learning objectives are effectively used to plan lessons in Basic Science and Technology

Studies on the extent appropriate teaching methods used in teaching primary school Basic Science and Technology

Studies on the extent instructional resources are used for effective teaching of Basic Science and Technology

Studies on the extent teachers encourage school pupils/students to participate in Basic Science and Technology lessons

Studies on the influence of teachers' qualification on effectiveness in teaching Basic Science and Technology

Studies on the influence of gender on teachers' effectiveness in teaching Basic Science and Technology

Summary of Literature Review

Conceptual Framework

Concept of Basic Education

Education is an encompassing term. In Nigeria, education has many levels of which basic education is one. According to Nzeribe (2004), basic education refers to the base level of education designated to satisfy at least the minimum learning needs of individuals in the society. It creates a foundation for members of the society to have lifelong learning. This means that basic education must address the three *3Rs*, namely reading, writing and arithmetic by the generality of members of the society (Presidential Summit on Education, 2010). The provision of basic education should meet the needs of effective communication and numeracy skills, as well as promote the level of social effectiveness of people by equipping them with the capacity to view issues of the environment with better objectivity.

Basic education is the education given to children aged 0-15 years and encompasses the early childhood education (0-5) and 9 years of formal schooling (FRN, 2014). The 9-Year Basic Education Curriculum was particularly developed to promote the attainment of the Education for All (EFA) goals, the critical targets of the National Economic Empowerment and Development Strategies (NEEDS) and the Millennium Development Goals (MDGs). This was developed in response to Nigeria's need for relevant, dynamic and globally competitive education that would ensure that learners at the Basic Education level are capable to compete favourably anywhere in the world in terms of knowledge, skills, techniques, values and aptitude (Igbokwe, 2015). Basic Education Curriculum is based on the Philosophy that every learner should acquire appropriate levels of literacy, numeracy, manipulative, communicative and life skills as well as the ethical, moral and civic values needed for laying

a solid foundation for a life-long learning; as a basis for scientific and reflective thinking (Obioma, 2012).

The Universal Basic Education programme was first of all launched on 30th September, 1999 in Sokoto by President Olusegun Obasanjo. This launching was the first attempt to get education to the generality of Nigerians. The Universal Basic Education scheme is expected to provide qualitative, free and compulsory education to every Nigerian child from primary school to junior secondary level (Nzeribe, 2004). This means that every Nigerian child should benefit a total of 9 years qualitative, free and compulsory education. This type of primary education must be functional and serve a functional role in the life of recipients after school. It also covers literacy education, special education and extension education. Special need education in UBE is such that addresses the need and caters for the interest of disadvantaged members and sectors of the society- the handicapped, the gifted, the nomadic and the migrant fishermen (Presidential Summit on Education, 2010). Extension education is designed to target the adult population, both literate and illiterate in order to equip them to face the challenges of an ever increasing world of knowledge to meet their needs.

The UBE is designed to serve as a people's scheme which emphasises the objectives of the intellectual development of recipients as precursor to all-round development. It is aimed at getting all Nigerian children, youth and adults, irrespective of geographical location, to receive basic and functional education. Government direct involvement in provision of pre-primary education is not listed in the scope of UBE scheme. This is regrettable since about 75% of intellectual capacity of the individual has taken place by the age of statutory entry into formal schooling in Nigeria.

The Universal Basic Education scheme stipulates that: Education should be viewed as a process that integrates both formal and informal processes in developing the human potentials of the Nigerian society; that education should transcend orthodox education

agencies and be that which requires the input of other socio-economic developmental sectors and that education should be more than government business to include the active enterprise of non-governmental organisations and the involvement of society at large. It also stipulates that education should be for effective learning which translates into acquisition of basic literacy and essential life skills and that education should inculcate the notion of learning being a lifelong process as the most valuable end result and reward of education (Federal Republic of Nigeria, (FRN, 2014).

It is hoped that the launching of the Universal Basic Education programme in 1999 should expand the focus of the Universal Primary Education scheme of 1976 which was allegedly abandoned by subsequent administrations that have ruled the country. The Federal Ministry of Education (2000) Implementation Guidelines states that Basic Education is aimed at equipping the individuals with such knowledge, skills and attitude that will enable them to: Live meaningful and fulfilling lives; contribute to the development of the society; derive maximum social, economic and cultural benefits from the society; and discharge their civic obligations competently.

The goals and objectives of Universal Basic Education are: to universalize access to Basic Education; to engender conducive learning environment; to eradicate illiteracy in Nigeria within the shortest possible time; develop in the entire citizenry a strong consciousness for education and a strong commitment to its vigorous promotion; the provision of free, universal basic education for every Nigerian child of school age; reducing drastically the incidence of dropout from the formal school system through improved relevance, quality and efficiency. The goals and objectives of Universal Basic Education also include: catering for the learning needs of young persons who for one reason or another have had to interrupt their schooling through appropriate forms of complementary approach to the provision and promotion of basic education; ensuring the acquisition of the appropriate levels of literacy, numeracy, manipulative, communicative and life skills as well as the ethical,

moral and civic values needed for laying a solid foundation for lifelong learning (FRN, 2014). In this study, basic education is defined as the foundational education given to children of school age in order to inculcate in them basic literacy and numeracy skills that are relevant to daily life.

Concept of Basic Science and Technology

Basic Science and Technology is a term that combines the fundamentals of both science and technology in one concept. According to Science and Technology Curriculum (Revised, 2012), science is defined as the knowledge attained through experimentation in order to provide explanations about natural phenomenon. It is also viewed as an organized body of knowledge people have gained using observation and experimentation to describe and explain natural phenomena (Lawal, 2003). On the other hand, technology has been defined as a body of knowledge devoted to creating tools, processing actions and extracting materials, and the application of science in order to resolve problems (FRN, 2012). Thus, science and technology can be considered as two terminologies that work hand-in-hand to accomplish specific tasks or resolve problems.

Basic Science and Technology is the foundation upon which all technological breakthroughs are built. According to Afuwape and Oriola (2017), Basic Science and Technology is a subject that exposes children /learners to primary schools leaning content that enable them to learn and understand their environment, observe and explore the world around them. Basic Science and Technology is also viewed as a subject that provides background knowledge on manpower training in applied science, technology and commerce, to provide preliminary knowledge and acquisition of skills necessary for physical, agricultural, industrial, commercial and economic development, to provide students with early basic scientific knowledge to the improve and provide solutions to environmental problems (Ewesor & Itie, 2015). Furthermore, Basic Science and Technology is perceived as an introduction of children to elementary biology, anatomy, earth/solar system, ecology, genetics, chemistry,

physics and engineering as a single science subject in the primary school (Nwafor, 2012). Basic Science and Technology is defined as a subject that offers students the onset and preliminary knowledge and training to acquire the necessary skills in applied science, technology, agricultural, industrial, commercial, economic development among others and to afford students with early basic scientific awareness to solve problems. From these definitions, Basic Science and Technology is a foundational subject that exposes children to the study of sciences in an integrated manner.

Basic Science and Technology in the Nigerian education system came as a result of the 9-year Universal Basic Education (UBE) reform and restructuring made in the curricula for primary science and junior secondary school integrated science. As stipulated in the 9-year Universal Basic Education (UBE) reform, the Basic Science and Technology Curriculum cover the lower and middle Basic Education levels (Obioma, 2012). The overall objectives of Basic Science and Technology include: to help pupils observe and explore the environment; make pupils develop basic science process skills including observing, classifying, experimenting and manipulating; develop a functional knowledge of basic science concepts and principles; develop scientific attitudes; including curiosity, honesty, perseverance, willingness to change, opinion and critical reflection; and to develop self-confidence and self reliance through problem - solving activities in science.

Others are to develop functional awareness of sensitivity to the orderliness and beauty in nature; develop attitudes and values consistent with the management and conservation of life; lay a good foundation for the learning of science in the future; enable the child develop the ability to apply the knowledge and skills gained in science to solving everyday problems in his/her environment; enable the child keep pace with technological advancement; and adaptation of the child to desirable changes around him/her (Federal Ministry of Education, FME, 2012). These objectives are geared towards sustainable scientific and technological

growth and development of the nation. In this study, Basic Science and Technology is considered as a teaching subject that exposes children to the knowledge of sciences and technology in an integrated manner.

Teaching involves the provision of conditions that can promote the building of attitudes, skills, abilities and other aspects of learning. In the Nigerian education system, according to Ewesor (2015), the primary school teachers who are involved in the teaching of Basic Science and Technology, need to be very careful because this is the age or level where children come across Basic Science and Technology for the first time in their lives. Ewesor further stated that 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 as well as strive to develop teaching materials that will be highly motivating to catch the interest of the children when they are still young. According to Ewesor (2015), the teachers need to be familiar with the reasons for teaching science at the primary school level. Ewesor and Itie (2015) explain that the teaching and learning of Basic Science and Technology has its own peculiar nature and demands that while teaching it, the teacher should take note of the pupils' feelings, beliefs, attitudes, integrity, cleanliness, punctuality and respect for elders. Thus, the teaching of Basic Science and Technology at the primary school ought to involve observing pupils' behaviours on tasks and in line with those, commonly require functioning in the world outside the school.

However, it is important to note that the teaching and learning of Basic Science and Technology in Nigeria has suffered series of setbacks. According to Akpan (2012), the structures and appropriate activities that foster effective implementation of the Basic Science and Technology curriculum are either inadequate or lacking in Nigerian schools. Afuwape and Oriola (2017) observed that among the myriad of challenges of Basic Science and Technology teaching in Nigeria are the issues of teacher quality and development, lack of enough specialist teachers; dearth of relevant support materials for teachers and inadequate

supervision and mentoring of teachers. Thus, to realize the ideals of the 9-Year BEC, relevant support materials that will aid the effective delivery of the curricula content in schools are being provided. Such materials include computers, functional laboratories, learner- centred textual materials prepared by National Education and Research Development Council, (NERDC) and some publishers to generate learners' interest and challenge them in innovative and creative thinking.

But there are many ways to promote effective teaching and learning of Basic Science and Technology in Nigerian primary schools. According to Ewesor & Atomatofa (2009), the government must ensure that all teachers in primary schools are professionals and also put in place an effective and efficient framework for monitoring the teaching and learning process of Basic Science and Technology in primary schools in order to enhance the learning of the subject. This is in consonance with Baikie (2002), who asserted that only the teachers who possess the necessary technical competence and professional skills can rise to meet the challenges of educational changes. In addition, Ewesor (2015) asserted that focus must be on teaching of Basic Science and Technology by providing modern/current science textbooks based on the curriculum for primary schools in order to enhance the teaching and learning process of the subject.

Furthermore, for effective teaching and learning of basic science and technology to take place, Afuwape and Oriola (2017) opined that the learning environment of the pupils must be taken into consideration. According to these authors, the environment contributes in no small way to sharpen nature of the children and so in order to stimulate the interest of the pupils in school activities, the government, individuals and corporate bodies should collaborate to create a conducive atmosphere for the pupils to learn better. The authors also noted that the school environments have classrooms in adequate number, well lit and ventilated school furniture in the right quantity and quality; safe water provided. This may be

due to the fact that when any of these is not in place; learning becomes a bigger challenge to both pupils and teachers.

Literature has also laid emphasis on the need for the provision of necessary teaching and learning materials to enhance the teaching and learning of basic science and technology. As stated by Federal Ministry of Education, FME, (2013), it is vital to make available appropriate teaching and learning materials that can help the teacher and enable concrete learning processes for the learners. In this case, the FME advocated for the use of learning kits to help pupils understand more concepts, processes and the meaningfulness of Basic Science and Technology. To accomplish this, teachers must be trained in the use of the kits and also how to manage the classroom. This is expected to shift the teacher profile from teacher to being a facilitator. In this case, the pupils will be doing the major part of the work while they are supervised and guided by the teacher. Hence, the role of the teacher will not be to teach the pupils, but to carefully plan his or her lesson to include activities that will make the pupils participate actively rather than being passive. The FME maintained that the teacher needs to communicate in a clear and simple language what he or she wants the pupils do in order to achieve the objectives of the lesson as stated by visibly demonstrating to the entire class and if class is large, to small groups of not more than ten pupils the competencies to acquire. In this context it is expected to ask well thought out and provocative questions at intervals in order to retain and sustain the pupils' interest and excitement to learning and allow pupils participate more. This may likely promote learning among pupils. From the foregoing, in this study, the teaching and learning of Basic Science and Technology in primary schools can be considered as the presentation and acquisition of basic knowledge of science and technology at this level.

Concept of Teacher

The role of the teacher in the teaching and learning process cannot be underestimated. According to Mbise (2008), a teacher is a person who is capable of creating behavioural change in terms of cognitive, psychomotor as well as affective domain of other people. The teacher is also viewed as a person who is specially trained to impart knowledge and shape the youth to the wider scope of knowledge (FRN, 2004). As defined by Cuevas (2003), a teacher is an expert who is capable of imparting knowledge that will help learners to build, identify and to acquire skills that will be used to face the challenges in life. A teacher is a person who is specially trained to impart knowledge and cause behavioural change which would be cognitive, psychomotor and affective domain in students. In this sense, teacher can be considered as a person who helps others to acquire knowledge, competencies, abilities or skills for worthwhile living. It is important to note that though teachers are one of the key assets in any school, without effectiveness in teaching, learning may not be maximized. Effectiveness, according to (Ugbede, 2007) is the power or capacity to produce desired effects with great efficiency. This therefore implies that for teaching and learning to be maximized, teachers' effectiveness must be emphasized in the school or non-formal education settings.

Teachers' effectiveness, as a concept, has been defined by many authors and researchers. For example, Oluremi (2013) defined teachers' effectiveness as the competencies shown by teachers in terms of controlling classroom factors, such as teaching methods, learning expectations, classroom organization and using classroom resources in order to make positive impact on students' performance. According to Byrd and Rasberry (2011), teacher effectiveness is generally referred to in terms of the focus on student outcomes and the teacher behaviours and classroom processes that promote better learning outcomes. Cuevas (2003) perceived teacher effectiveness as the teacher's ability to organize and emphasize

important concepts, clarify ideas and point out relationships, motivate students, pose and elicit useful questions and examples, think creatively and perfect control of classroom activities. In the same vein, Cashin (2005) opined that teacher effectiveness involves a teacher's exhibition of qualities such as good knowledge and organization of the subject matter, skills in instruction and personal qualities and attitude that are useful when working with students. This implies that teachers' effectiveness has to do with the ability of the teachers to promote learning outcomes and other desirable behaviours. For the purpose of this study, teacher effectiveness is the teacher's ability to be creative, sort out and stress key ideas and have a holistic control of classroom activities.

However, some authors view teacher effectiveness in a broader sense. They adopt criteria that seem to encompass the duties that are seen to be part of the wider role of teachers. This is because the role of a teacher is rarely restricted to instruction only. In many countries, a teacher's work has extended beyond the instructional or pedagogical role in the classroom. Thus a teacher may be facilitating his/her colleagues' teaching, engaging in broader leadership roles in the school, enhancing the quality of his/her teaching through his/her own reflection or engaging in professional development programmes (Aina, Olanipekun & Garuba, 2015). For this reason, Aina, Olanipekun and Garuba broadly defined teachers' effectiveness as the ability of teachers to set clear instructional goals, to be knowledgeable about curriculum content and the strategies for teaching it, communicate to their students what is expected of them, make expert use of existing instructional materials in order to devote more time to practices that enrich and clarify the content. The authors further mentioned that it involves having good knowledge about their students, adapting instruction to their needs and anticipating misconceptions in their existing knowledge, teaching students meta-cognitive strategies and giving them opportunities to master them, addressing higher and lower-level cognitive objectives, monitoring students' understanding by offering regular

appropriate feedback and integrating their instruction with that in other subject areas as well as accepting responsibility for student outcomes. This definition is broad and covers other roles of teachers that are outside the classroom setting.

Furthermore, teachers' effectiveness has also been looked at to embrace aspects of effective teaching such as having a positive attitude, developing a pleasant social and psychological climate in the classroom, having high expectations of what pupils can achieve, ensuring clarity of lessons, effective time management, strong lesson structuring, employing a variety of teaching methods, using and incorporating learners' ideas and using appropriate and varied questioning techniques (Muijs & Reynolds, 2011). In the view of Darling-Hammond (2010), teachers' effectiveness has to do with the capacity or power of the teachers to realize socially valued objectives agreed for teachers, especially, but not exclusively, the work concerned with enabling students to learn, acquire good character, attitude and values. To Rowe (2006), teacher effectiveness is the attribute of a teacher who has the capability or potential of having a positive impact on students learning, behaviour and attitudes. Thus, in the context of this study, teacher effectiveness has to do with the abilities and competencies exhibited by the teacher during teaching and learning in order to promote learning outcomes and consequently achieve some predetermined objectives or goals.

Researchers' interest in the influence of teachers' qualifications on students' learning outcome has been intensified in over the years. Abe and Adu (2013) and Wiki (2013) opined that a teaching qualification or teacher qualification is one of a number of academic and professional degrees that enables a person to become a registered teacher in primary or secondary school. Such qualifications include but are not limited to, the Postgraduate Certificate in Education (PGCE). The Professional Diploma in Education (PDE), Bachelor of Education (B.Ed) and Nigeria Certificate in Education (NCE). According to Oloube (2005) and Dahar, Dahar, Dahar and Faize (2011), teachers' qualifications are of two kinds; those that are academically qualified and those professionally qualified. Oloube asserts that in

Nigerian schools, teachers who are academically qualified and those that are professionally qualified are engaged in teaching. Olude went further to explain that academically qualified teachers are those who have academic training as a result of enrolment into an educational institution and obtain qualifications such as OND, HND, B.Sc, B.A, M.Sc, M.A among others. On the other hand, the professionally qualified teachers are those who get professional training that give them professional knowledge, pedagogical skills, techniques, aptitude as different from general education.

Such teachers obtain qualifications such as B.Sc.Ed, B.A.Ed, B.Ed, M.Ed etc. Dahar et al (2011) stressed that the basic skills and abilities of the teaching and learning process are developed in a teacher through professional qualification and it is the preparation for life long journey into the teaching profession. This is expected to help the teacher acquire subject content knowledge and the pedagogical skill required for appropriate lesson delivery. Furrugia in Abe (2014) perceived a professional teacher as one who possesses professionally based knowledge in the theory and practice of education as well as find job satisfaction in the belief that he/she is making an important contribution to the social, cultural and economic development of his/her country. Such a teacher should equally be able to understand students' abilities to exploit educational benefits of the social context within which he/she lives unlike the academically qualified teachers.

In Nigeria, apart from the professional training received by teachers from the various tertiary institutions they attended, Anugwu (2012) noted that a lot of initiatives are embarked upon by the Teachers Registration Council of Nigeria (TRCN) to put up professional standards for the Nigerian teachers in terms of knowledge, skills, values, attitudes, conduct and membership obligation with emphasis on teachers' qualification and training. According to the Federal Republic of Nigeria (FRN, 2004), a minimum qualification for the Nigeria Certificate of Education (NCE) is prescribed for teachers at the Universal Basic Education (UBE), that is, the primary and junior secondary school levels. In the senior secondary school

level, teachers with Bachelors Degree in Education or teachers that have Bachelors degree in other fields but are with a teaching qualification are recommended. Akinbote (2007) implies that by this, no teacher in the primary school in Nigeria is expected to possess a teaching qualification lower than the NCE. This is because the philosophy of Primary Education Studies (PES) of the NCE programme is aimed at training students to become teachers with sufficient knowledge of the Primary School Curriculum, skills, attitude and methods to enable them teach in all the classes in Primary school as contained in the National Policy on Education.

The objective is to produce teachers that can teach the primary school subjects in the 9-Year Basic Education Curriculum; demonstrate school management skills and supervisory roles; implement the curriculum, write lesson plan, and teach effectively; improvise/produce instructional aids using local materials; and develop the attitude to continue learning (Primary Education Studies [PES]: 1). Basic Science and Technology(BST) is one of the compulsory courses offered at each level of the 3-year PES-NCE programme. In Nigeria today, teachers with NCE are not the only teacher that teach in primary schools but there are also those with degrees. These teachers with degrees are trained with respect to subject specialisation.

There is literature evidence that links students' achievement to the qualifications of teachers (Goldhaber & Brewer 2000). One of the main findings concerning teacher qualifications has been the relatively high incidence of teachers teaching subjects outside their areas of subject matter training and certification (Ingersoll, 2000). Moreover, the incidence of out-of-field teaching has been shown to vary by subject and by grade level. Goldhaber and Brewer (2000) examined data on the postsecondary degrees and certification status of teachers and their students' performance in Mathematics and Science. The authors observed a positive relationship between teachers' degrees and students' performance was consistent with earlier findings. These findings provide a foundation for further examinations of out-of-field teaching data. One of the most significant studies in this area was also

performed by Hanushek (2000) who surveyed the results of 113 teachers on the impact of teachers' qualifications on their students' academic achievement. Eighty-five percent of the studies found no positive correlation between the educational performance of the students and the teachers' educational background. Although 7 percent of the studies did find a positive correlation, 5 percent found a negative impact. Those that push for legislation requiring certain teacher qualifications for homeschoolers have no research to support the necessity of such standards. The results of these 113 studies are certainly an indictment on proponents of certain teacher standards for homeschoolers. Higher teacher qualification does not make better students.

On the other hand, there are studies that have found no significant relationship between teachers' educational qualification and students' academic achievement. For instance, Igwe in Abe (2014) investigated the influence of teachers' qualification on academic performance of students in science subjects in Kano State. The researcher found no significant relationship between teachers' qualification and students' performance. Izumi and Evess (2002) stated that teacher quality is the most important among other critical factors like quality curricula, funding, small class size and learning situation. George (2004) attributed poor achievement of students in Mathematics to teacher qualification, inadequacy of materials as well as administrative factors. Abe argued that no one gives what he/she does not possess. Abe further said that no matter how good a course curriculum is, if we do not have well trained, qualified and motivated teachers, we may not achieve the desired goals. Apart from teachers' qualification, another variable that may likely influence teachers' effectiveness in teaching basic science and technology is their gender.

Concept of Gender

Gender is a socio-cultural construct defined based on the roles, behaviour, mental and emotional characteristics that differentiate females and males. According to Ezeh (2013), gender refers to one's subjective feeling of 'maleness' and 'femaleness' irrespective of one's

sex. It is generally classified into masculine or feminine and concerned with the attitudes, behaviours, values relative power, influence, roles and expectation (femininity and masculinity) that society ascribes to the two sexes on the differential basis. Akani (2008) viewed gender as a set of relationship that show what being a man or woman within the society is. In the same vein, Cotter (2004) defined gender as social attributes and opportunities in being female or male and the relationship between males and females. Umoh (2003) defines gender as a psychological term used in describing behaviours and attributes expected of individuals on the basis of being born as either male or female. According to Okeke (2003), the study of gender is not just mere identification of male and female sexes. Scholars have gone further to identify responsibilities assigned to opposite sexes and to analyze the conditions under which those responsibilities are assigned. Furthermore, Okeke (2003) specifically notes that the study of gender means the analysis of the relationship of men and women including the division of labour, access to resources and other factors which are determined by society as opposed to being determined by sex. It further involves the study of the socio-cultural environment under which responsibilities are assigned and the relationships emanating from it.

The concept of gender in feminist writings and other sociological discourses became popular in the early 1970. In simple terms, gender explain the differences between men and women in social terms as men, and as what a man can do; as woman, and as what a woman can or cannot do. Therefore, gender is an analytical category that is socially constructed to differentiate the biological difference between men and women. The term gender is also used to describe the differences in behaviour between men and women which are described as masculine and feminine. Feminist writings focus on this aspect and claim that these differences are not biological but are social constructions of patriarchal society.

Gender is also perceived as a socially constructed definition of women and men; it is not the same as sex (biological characteristics of women and men) (Okoh, 2007; Igboegwu

and Okonkwo, 2012). Ezeudu and Obi (2013), asserted that gender relations are the ways in which a culture or society defines rights, responsibilities and identities of men and women in relation to one another. Gender equally projects the properties that distinguish and classify organisms on the basis of their reproductive and culturally expected roles. It relates to the cultural and psychological attributes of men and women through their socio-economic contributions, expectations and limitations. Thomas (2006) investigated the effect of teacher's gender using the National Education Longitudinal Survey (NELS), the result showed that a teacher of same gender does have large effects on students' test performance. Similarly, Dee (2007) examined whether teachers' gender affects students' outcome and found that teacher's gender was not a significant factor in this respect. Olagunju and Abiona (2008) revealed that male teachers were more effective in teaching based on their students' achievement than their female counterparts, while Khurshid and Zahur (2013) revealed that female teachers were more effective in teaching than the male teachers. It is evident that there is no conclusion yet on the effect of gender on achievement. In this study, gender refers to being a male or female.

Concept of Assessment

Assessment is an important concept in education literature. Assessment may be viewed as the process of gathering evidence of students learning to inform education-related decisions. Afflerbach (2008) perceived that generally, assessment is a systemic process of gathering information from many sources to make appropriate educational decisions. It is viewed as a wide variety of methods or tools that educators use to evaluate, measure, and document the academic readiness, learning progress, skill acquisition, or educational needs of students. It can refer to the process of grading an individual student's achievement on a test or assignment or it can refer to the process of evaluating the quality of an academic program (Stiggins & Chappuis, 2006). According to Okunrotifa (2007), assessment involves the provision of information through selection of criteria, collection of data and analysis for the

sake of facilitating decision making. Furthermore, Johnson (2009) defined assessment as the use of a variety of procedures to collect information about learning and instruction.

The overall purpose of assessment does not focus on an individual student but the teaching and learning process as a whole. Rather, the emphasis is on what and how much an educational programme is contributing to the learning, growth and development of students as a group (Ioannou-Georgiou, 2003). Ioannou-Georgiou mentioned that there are four levels of assessment: classroom assessment (involves assessment of individual students at the course level typically by the class instructor), course assessment (involves assessment of teaching and learning of a given subject), program assessment (involves assessment of academic and support programs and is the focus of this manual), and institutional assessment. Assessment is also considered as a systematic process of gathering data from variety of sources in order to understand, describe and improve learning (Nworgu, 2015). This mean that to understand the teaching and learning process better, one must gather data from multiple sources so that learning can be enhanced.

Assessment can be done at various times throughout a program and a comprehensive assessment plan will include formative and summative assessment (Chappuis, 2009). This means that the point at which the assessment occurs in a program distinguishes these two categories of assessment. Formative assessment according to Chappuis, is often done at the beginning or during a program, thus providing the opportunity for immediate evidence for student learning in a particular course or at a particular point in a program. The purpose of this technique is to improve quality of learning. This can also lead to curricular modifications when specific courses have not met the student learning outcomes (Afflerbach, 2008). On the other hand, summative assessment according to Chappuis (2009) is a comprehensive in nature, provides accountability and is used to check the level of learning at the end of the program. Program goals and objectives often reflect the cumulative nature of the learning that takes place in a program. Thus, Chappuis noted that summative assessment conducted at the

end of the program finds out whether students have met the programme goals and objectives or not. This implies that assessment whether formative or summative aims at collecting information from different perspectives of an issue in order to make informed decisions. Therefore, in the context of this study, assessment is referred to as a systematic process of collecting information or data from different aspects of teachers' activities in order to understand, describe and improve the learning of Basic science and technology. Below is a schematic representation of the conceptual framework of this study.

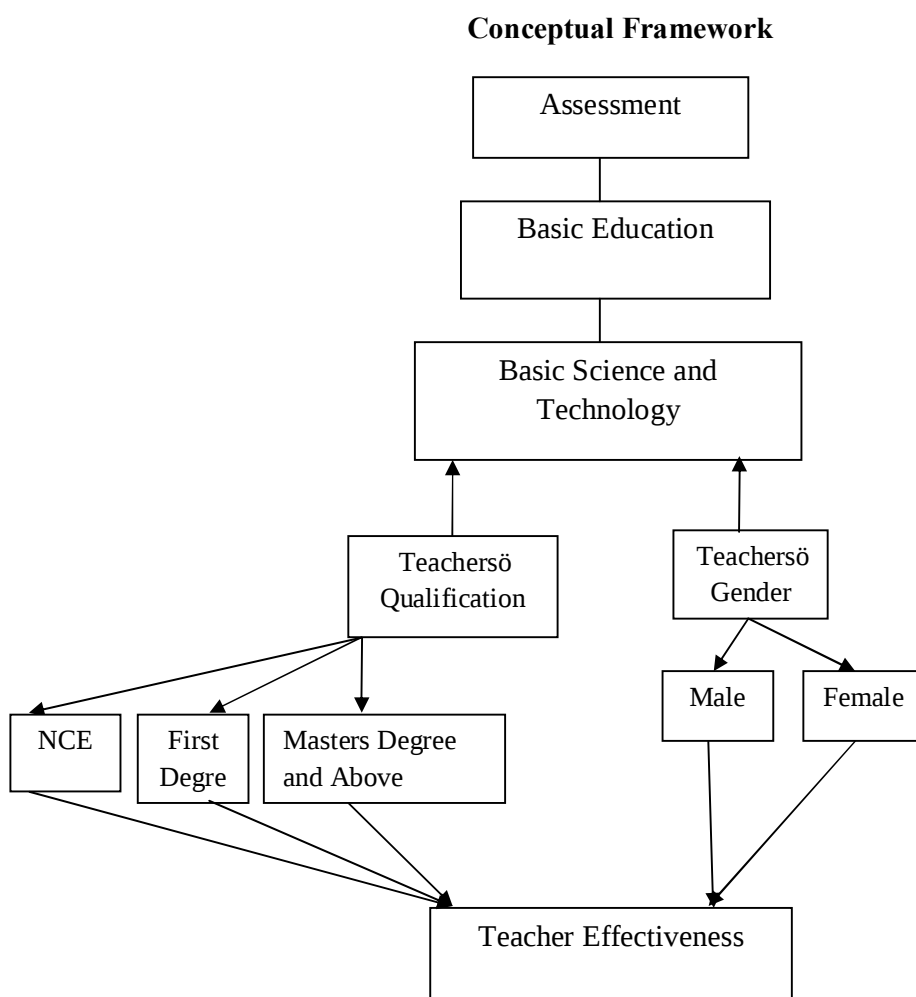


Fig 1: A Schematic Representation of the Conceptual Framework Showing the Interrelationship among the Variables in the Study

The above schema shows the interrelationship among the key concepts/variables in the study. The schema shows that in assessment of basic education particularly basic science and technology teaching and learning in the primary school can be done in order to determine

teachers' effectiveness which may be influenced by teachers' qualification and gender. Hence, teachers' effectiveness in teaching basic science and technology which is the major independent variable and teachers' qualification and gender which are the moderating variables are the independent variables in the study, while teachers' effectiveness is the dependent variable in the study.

Theoretical Framework

The Competency Based Teacher Theory by McDonald (1974)

The competency based teacher theory was propounded by Mc Donald in 1974, which led to the emergence of the concept of Competency Based Teacher Education (CBTE). Competency Based Teacher Education (CBTE) is a type of training that focuses on teachers' acquisition of specific competencies. It is aimed at providing teachers with the knowledge, skills and attitudes that will enable them to recognize and solve complex problems in their domains of study or future work. The CBTE depends on analyzing the learning/teaching process into a group of competencies that every teacher must acquire in order to increase his/her chances of successful achievement of the teaching and learning objectives.

According to McDonald, the roots of competency based teacher education (CBTE) were established in behavioural psychology and learning theories which have two dimensions as: The behavioural dimensions that are based on planning of curriculum by determining the behavioural objectives that can shape and model behaviour and the performance dimensions that are based on determining and measuring performance inclusive of all skills and experiences needed for the achievement of teachers' professional duties.

CBTE is categorized into five stages which include: cognitive competencies, which relate to knowledge and intellectual skills and abilities that are expected of the learners; performance competencies, wherein the learner demonstrates that he or she can do something; consequence competencies, to bring change to others; affective competencies, which are expected attitudes and values that tend to resist specificity and are more difficult to assess than the first three stages; and exploratory competencies, which include activities that provide opportunities for teachers to learn about teaching.

From the foregoing, McDonald's competency based teacher theory becomes relevant to this present work as it advocates teachers' acquisition of specific competencies and exploratory competencies, which include activities that provide opportunities for teachers to

learn about teaching. Thus, the theory helps to explain this present work with respect to teachers' effectiveness in teaching Basic Science and Technology based on acquisition of specific competencies, skills or abilities in order to promote effective teaching and learning of the subject.

Stufflebeam's Context, Input, Process and Product (CIPP) Model (1971)

Stufflebeam developed the context, input, process and product (CIPP) model in 1971. The model aims at assessing the various aspects of educational programs, by assessing and determining the adequacy or otherwise of the various aspects. The CIPP model therefore categorizes the main components and specific aspects of an assessment study by assessing the program in terms of:

1. **Context:** Curriculum provisions and philosophy of education, adequacy of space provided as well as environmental provision and training room.
2. **Input:** infrastructure, workspace, children's access to instructional materials, play, health and nutrition facilities as well as staffing.
3. **Process:** method of students' admission, its organization, methods of instruction, assessment procedures, certification, monitoring and supervision.
4. **Product:** extent of attainment of objectives, quality of performance at the end of the programme.

The purpose of this study is to assess teachers' effectiveness in teaching Basic Science and Technology at the primary school. The CIPP framework would be used to categorize the main components and specific aspects of the teaching of basic science and technology. For each category, the presence of any defects or weakness in the content, input, process and product would be identified and adjustment measures would be recommended. Stufflebeam's CIPP model is therefore appropriate for this study. The choice of the model is informed by the fact that, it is comprehensive, purposeful and acceptable and used by researchers and curriculum experts in undertaking assessment in education in different parts

of the world. For instance, such indicators as effectiveness in teaching, rate of participation, presentation of programmes, instructional materials and organization of programmes are all part of the CIPP model that are categorized into facilities, input, process and product.

Review of Empirical Studies

Studies on the required Skills for Teaching Primary School Basic Science and Technology

A study was conducted by Kearsley (2005) on skills required of Basic Science teachers in teaching Basic Science and Technology in Kenya. Four research questions and four null hypotheses guided the study. The study adopted descriptive survey design. The sample for the study comprised 654 teachers and students drawn from a population of 6553 teachers. An instrument titled 'Basic Science teachers competency skill in teaching basic science and Technology Questionnaire' was used for the study. The research questions were answered using mean and standard deviation while the hypotheses were tested using t-test statistic. The finding of the study majorly showed that the skills required of the teachers include mastery of subject, ability to prepare lesson plan, setting attainable lesson objectives, proper set induction to new topics among others. Kearsley's study is similar to the present study since both studies focus on teaching competencies. However, the difference is in the design, area of the study and the time difference between the two studies.

Another study by Rivkin, Hanushek and Kain (2008) was conducted on the influence of teachers on students' achievement in Basic Science. The study was guided by four research questions and four null hypotheses. Descriptive survey design was adopted for the study. The sample for the study comprised 9871 teachers. An instrument titled 'Influence of Teachers on Students' Achievement in Basic Science Questionnaire' was used for data collection. Mean and standard deviation were used to answer the research questions while the hypotheses were tested using t-test statistic. The finding of the study showed that teachers' abilities, skills or competencies influences students' achievement to a great extent. Rivkin,

Hanushek and Kain's study is similar to the present study since both studies focus on teaching effectiveness and students' achievement in Basic Science. However, the present study rather determined the skills required of Basic Science teachers in teaching Basic Science and Technology in Federal Capital Territory of Nigeria using ex-post facto research design.

Another study was carried out by Akiri and Ugborugbo (2009) to determine the influence of teachers' classroom effectiveness on students' academic performance in public secondary schools in Delta State, Nigeria. It was descriptive in nature and involved 979 teachers, made up of 450 males and 519 females, drawn from 72 out of the total of 361 public secondary schools in the state by stratified random sampling technique. Academic performance records of 50 students per teacher, which is 48,950 students' scores were also used. Two questionnaires and a rating scale were used to collect data for the study. Cronbach's alpha value of 0.98 and 0.79 respectively were obtained from the two questionnaires used for the study. Four hypotheses were tested at the 0.05 level of significance using correlation, simple regression, t-test, and single factor analysis of variance. The result majorly showed that teachers' classroom effectiveness had positive influence to students' performance to a large extent. Akiri and Ugborugbo's study therefore provides useful information to this present study with respect to influence of teachers' effectiveness in teaching of Basic Science and Technology, notwithstanding the areas of the studies, scope of the studies and designs of the studies vary. Therefore, the two studies are not the same which made the present relevant.

Furthermore, a study was carried out by Education Testing Service (ETF) (2009) in South West, Nigeria on teachers' classroom practices that greatly influence students' participation and achievement. The study was guided by eight research questions. Descriptive survey design was adopted for the study. The sample for the study comprised 6875 teachers. The instrument for data collection was titled 'Influence of Teachers' classroom practices on

Participation and Performance Questionnaire. Mean and standard deviations were used to answer the research questions while the hypotheses were tested using t-test statistic. The study found out that teachers' classroom practices greatly influence students' participation in lesson and achievement and that attention needs to be paid to improving classroom practices. Students' achievement increases when students have teachers who are trained in developing higher order thinking skills, who are skilled at implementing hand-on experiences in the classroom and who are trained to work with special populations. The finding supports the need for content specific pedagogy, the "how to teach" portion of teacher development and dispels the idea that only subject matter knowledge is necessary in order to teach effectively. Students of teachers who conduct hand-on learning activities out perform their peers by more than 70 percent. Education Testing Service (ETF)'s study is similar to the present study since both studies focus on influence of teaching method on the participation of students and achievement of students. However, the socio-cultural differences between Federal Capital Territory of Nigeria and South West, Nigeria motivated the need to carry out the present study to determine the extent to which methods used influence pupils' participation in Basic Science in Federal Capital Territory of Nigeria.

Studies on the Extent Learning Objectives are Effectively Used to Plan Lessons in Basic Science and Technology

A study was carried out by Mcber (2000) on extent to which Basic Science Teachers Plan effective Basic Science Lessons to Achieve Learning Objectives of Basic Science. Seven research questions guided the study. The study adopted descriptive survey design. The sample for the study comprised 315 teachers drawn from a population of 31523 teachers in Malaysia. An instrument titled "Basic Science Teachers' Planning of Basic Science Lessons to Achieve Learning Objectives of Basic Science Questionnaire" was developed, validated and used for the study. The research questions were answered using mean and standard deviation while the hypotheses were analysed using t-test statistic. The study reported that in

teacher effectiveness the following findings about teaching skills are made: effective teachers set high expectations for pupils and communicate directly to the pupils. They are good at planning, setting clear framework and objectives for each lesson. They employ a variety of teaching strategies and techniques to engage pupils and to keep them on task and have a clear strategy for pupil management. A sense of order prevails in all classrooms and pupils feel safe and secure. They manage time and resources wisely and have methods and techniques to monitor pupils' understanding of lesson and work and regular setting and marking of homework. McBer's study is similar to the present study since both studies focus on teaching effectiveness. Though the study captured most of the variables in the present study, the differences in location of the study motivated the need to carry out the present study to determine the extent to which Basic Science Teachers Plan effective Basic Science Lessons to Achieve Learning Objectives of Basic Science in Federal Capital Territory of Nigeria.

A study was carried out by Balogun (2002) on ability of Basic Science teachers in teaching Basic Science to achieve learning objectives of Basic Science in Western Nigeria. Six research questions and six null hypotheses guided the study. The study adopted descriptive survey design. The sample for the study comprised 2,544 teachers and students. An instrument named 'Ability of Basic Science teachers in teaching Basic Science achieve learning objectives of Basic Science Questionnaire' was developed and used for the study. The research questions were answered using mean and standard deviation while the hypotheses were tested using t-test statistic. The finding of the study indicated that the abilities of Basic Science teachers for achieving learning objectives include up-to-date science knowledge, use of simple understandable language, use of appropriate feedback, among others. Balogun's study is similar to the present study since both studies focus on ability of Basic Science teachers in teaching Basic Science to achieve learning objectives of Basic Science. However, the differences in location of the study motivated the need to carry

out the present study to determine the ability of Basic Science teachers in teaching Basic Science achieve learning objectives of Basic Science in Federal Capital Territory of Nigeria.

Studies on the Extent Appropriate Teaching Methods Used in Teaching Primary School Basic Science and Technology

Kekong (2007) investigated on pedagogies adopted by primary school teachers for effective teaching and learning in Uyo, Akwa-Ibom State. Four research questions and two null hypotheses guided the study. The descriptive survey design was used for the study. The population of the study comprised all the secondary school teachers in Uyo. A sample of 384 teachers was drawn for the study using multistage sampling procedure. A questionnaire developed by the researcher served as the instrument for data collection. Data collected were analyzed using mean and standard deviations to answer the research questions, while t-test was used to test the hypotheses. The study found that most primary school teachers make use of play way method, role playing, demonstration, cooperative learning, and guided discovery methods for effective teaching and learning. The result also showed that there was no significant difference in mean responses of male and female teachers on methods employed for effective teaching and learning. Hence, the study provides relevant information to this one, especially on teaching methods utilized by teachers in teaching. But the two studies vary with respect to scope and the areas of the studies. Therefore, the two studies are not the same which made this one vital.

A study was carried out by Greenery (2009) on influence of teachers' teaching method on participation and performance of pupils in primary school teaching in Hong Kong. The study was guided for three research questions and six null hypotheses. Descriptive survey design was adopted by the study. The sample for the study comprised 1783 teachers. The instrument for data collection was titled 'Influence of Teachers' Teaching Method on Participation and Performance Questionnaire'. Mean and standard deviations were used to answer the research questions while the hypotheses were tested using t-test statistic. The

study found out that most of the teaching methods used by the teachers involved the participation of pupils and increased their performance. The study also found out that most competent teachers made sure that the learners were actively involved in the teaching-learning process. Greenery's study is similar to the present study since both studies focus on influence of teaching method on the participation of pupils and achievement of pupils. However, the socio-cultural differences between Nigeria and Hong Kong motivated the need to carry out the present study which determined the extent to which methods used influence pupils' participation in Basic Science in Federal Capital Territory of Nigeria.

Odoh (2009) investigated on instructional methods adopted by Basic Science teachers for effective teaching and learning in Zone B Education Zone of Benue State, Nigeria. Five research questions and three null hypotheses guided the study. The study employed descriptive survey research design. The population of the study comprised of all the 448 secondary school teachers in the state. A sample of 244 science teachers was drawn for the study using stratified sampling technique. A questionnaire developed by the researcher was used for data collection. Data collected were tested using mean and standard deviations to answer the research questions while ANOVA and t-test were used to test the hypotheses. Findings showed that majority of the teachers employed guided discovery, demonstration, discussion, play-way method and role playing in teaching. Also, the result indicated that gender had no significant influence on the adoption of a variety of instructional methods. Hence, the study provides important information for this one, especially as it considered instructional strategies and other variables which are also part of this study. However, the two studies vary with regard to the designs and areas of study. For this reason, this study was necessary.

Osorung (2012) carried out a study on instructional strategies utilized by primary school teachers in Delta State, Nigeria. Five research questions and two null hypotheses guided the study. The study adopted descriptive survey research design. The population of

the study consisted of all the secondary school teachers in the state. Using multistage sampling procedure, 418 teachers were sampled for the study. A researcher-designed questionnaire was used for data collection. Data collected were analyzed using mean and standard deviations to answer the research questions, while t-test was used to test the hypotheses. Findings showed that many of the primary school teachers make use of demonstration, guided discovery, problem solving, peer teaching, role play teaching methods in teaching. The result also showed that there was no significant difference in mean ratings of male and female teachers on instructional strategies adopted in teaching Basic Science and Technology. The study therefore provides useful information for this one, especially as it considered instructional strategies adopted by teachers generally in teaching. But the two studies vary in terms of scope, design and areas of study. This made this current study pertinent.

Studies on the Extent Instructional Resources are used for Effective Teaching of Basic Science and Technology

A study was conducted by Jegede and Taplin (2000) on resources used by Basic Science teachers in teaching Basic Science to achieve learning objectives of Basic Science among Hong Kong teachers. The study was guided by three research questions and three null hypotheses. Descriptive survey design was adopted for the study. The sample for the study comprised 875 teachers. The instrument for data collection was an observational schedule titled "Resources used by Basic Science teachers in teaching Basic Science to achieve learning objectives of Basic Science". Mean and standard deviation were used to answer the research questions while the hypotheses were tested using z-test statistic. It was discovered that the teachers rarely utilize relevant resources in teaching Basic Science due to ignorance. The study also found that teachers need resources for exploring environment, understanding basic technology, fundamental movements like basic movement, athletics, games and sports among others. It is interesting to note that the areas of need identified by Hong Kong teachers

in this study are similar to those identified in studies of science and technology teachers in other countries, as well as studies to teach other disciplines in western countries. The socio-cultural differences between Nigeria and these western countries motivated the need to carry out the present study which determined the resources used by Basic Science teachers in teaching Basic Science to achieve learning objectives of Basic Science in Federal Capital Territory of Nigeria.

Another study was out by Udofia and Udo (2011) on extent resources used by teachers in teaching achieves learning objectives in early childhood education in Oyo LGA of Oyo State. Five research questions and five hypotheses guided the study. Descriptive survey design was adopted for the study. One hundred and thirty three school children were selected using purposive sampling. Resources used by teachers in teaching to achieve learning objectives questionnaire was the instrument for data collection. Mean, standard deviation and regression analysis were used to analyze the data therein. The study revealed that although few classrooms provided an attractive and well-furnished environment for pupils, there was need for resources adequate seating, work space, lighting, ventilation and protection from the elements in order for teachers to teach to achieve learning objectives. Udofia and Udo's study is similar to the present study since both focuses on resources used by teachers in teaching to achieve learning objectives. However, the socio-cultural differences between age of the respondents as well as Oyo State and the Federal Capital Territory motivated the need to carry out the present study that determined the resources used by Basic Science teachers in teaching Basic Science to achieve learning objectives of Basic Science in Federal Capital Territory of Nigeria.

Jeptanui (2011) carried out a study to examine the efficiency in the use of instructional resources in public primary schools in Kapseret zone, Wareng District. Four (4) research questions guided the study. A descriptive survey design was used in conducting the study. The target population comprised 18 public primary schools, 213 teachers, 7138 pupils

and all the 18 head teachers. The study sampled a total of twenty (20) teachers, five (5) head teachers and a hundred (100) pupils using purposive sampling techniques. Both quantitative and qualitative data were collected using questionnaires for teachers and pupils and interview schedule for the head teachers. Quantitative data were coded and analyzed using frequencies and percentages. The study found out that not all the required instructional resources were available for use by both teachers and pupils in public primary schools. Book to pupils ratio was conforming to current ratio of 1:1 per subject per class. Chalkboard and textbooks were widely used, while other instructional resources were not utilized. Jeptanui's study therefore provided useful information for this present study with respect to teachers' use of instructional resources for effective teaching of Basic Science and Technology, notwithstanding that the areas of the studies, scope of the studies, designs of the studies and methods of data analysis vary. Hence, the two studies are different which made the present needful.

Studies on the Extent Teachers Encourage School Pupils/Students to Participate in Basic Science and Technology Lessons

An evaluative study was carried out by Ekenem, Essien and Ekenem (2011), to investigate the ability of Basic Science teachers to provide play facilities for socio-motor skill development of pre-primary and primary school pupils in Akwa Ibom State. Four research questions and four hypotheses guided the study. The research design was survey design. The population consisted of teachers of nursery two and primary one in 324 public and 185 private schools of which 666 teachers were selected for the study. The researchers prepared a 30 item questionnaire in a 4-point Likert type scale response format. Pearson Product Moment correlation was used in analysing the data on relationship between play facilities and pupils' development of socio-motor skills. The study revealed that play is important in pupils' development but teachers in public schools rarely make use of play facilities in teaching and learning. This present study is similar to the study by Ekenem, Essien and

Ekenem as both are focused on ability of teachers to encourage school pupils to participate in learning activities. However, the two studies vary in scope, areas of the study, design of the study and methods of data analysis vary.

A study was conducted by Ngiri (2013) to examine the influence of teachers' institutional motivation on pupils' performance at Kenya corticated primary education in public primary school in Ndoileli Division, Igembe North District. Six (6) research questions guided the study. The study used descriptive survey design using a sample of 102 public primary schools teachers in Ndoileli Division selected using stratified random sampling procedure. The instrument used for data collection was a researcher-developed questionnaire. Data collected were analyzed using frequency and percentages. The study found that teachers' institutional motivation on pupils to learn is lacking in public primary schools in Ndoileli Division. Ngiri's study therefore provided useful insights to this present study with respect to encouragement given to school pupils to participate in Basic Science and Technology lessons by their teachers. However, the areas of the studies, scope of the studies, designs of the studies and methods of data analysis vary. Hence, the two studies are different which made the present study necessary.

Furthermore, a study was conducted by Rudhumbu (2014) on motivational strategies used by teachers in the teaching of primary school Mathematics in Zimbabwe. Two (2) research questions guided the study. The descriptive survey research design was adopted for the study. The population of the study consisted of 846 primary school teachers out of which 388 were sampled for the study using cluster sampling technique. A structured questionnaire was used for data collection. Data collected were analyzed using frequency and percentages. The results indicate that while most teachers concurred that it is important to motivate learners to learn Mathematics through the use of motivational teaching strategies, yet majority of the teachers do not seem to be using motivational strategies regularly in the teaching of Mathematics. The result also showed that two of the major reasons why primary

school Mathematics teachers do not regularly use motivational strategies in their teaching are high workload and large class sizes in their schools. Rudhumbu's study is related to this current study because it considered motivational strategies used by teachers as a major variable which is somehow similar to the Encouragement given to school pupils to participate in Basic Science and Technology lessons. Therefore, empirical evidence generated are useful to this study. However, the subject of interest in the study was Mathematics while this present study focused on Basic Science and Technology. Besides, the areas of the studies, scope of the studies, designs of the studies and methods of data analysis vary.

Studies on the Influence of Teachers' Qualification on Effectiveness in Teaching Basic Science and Technology

Tella (2008) carried out a study on teachers variables as predictors of academic achievements of primary school pupils in Mathematics. Three research questions guided the study. The correlational research design was adopted for the study. The participants for this study were 254 primary school teachers and 120 primary school pupils selected by stratified random sampling technique from primary schools in Ijebu Local Government Area of Osun State. The study used an instrument tagged teachers variable questionnaire and a Mathematics achievement test constructed by the researcher. Data was analyzed using stepwise multiple regression analysis. Results reveal that qualification and experience were not significantly correlated with pupils' achievement in Mathematics. The study focused on teachers' qualification as one of the variables; therefore it provides useful information to this present study. The study used stepwise multiple regression analysis but this current study used mean, standard deviation and t-test. The current study is even different from that of Tella in terms of scope and areas of study.

A study was carried out by Osakwe (2009) on the availability of trained/qualified teachers in public and private Basic schools in Ogun State. The sample for the study was made up of 457 teachers from 45 public and 30 private primary and junior secondary schools.

A descriptive survey research was adopted. A structured questionnaire was developed based on the purpose of the study. Three research questions and three null hypotheses were formulated and tested using z-test statistics at 0.05 level of significance. Availability of qualified Basic school teachers questionnaire was designed by the researcher for data collection and was validated by three experts while a trial test was conducted outside the study area using Cronbach's Alpha method of reliability to establish internal consistency of the instrument. The study revealed that there was inadequate number of trained/qualified teachers in the state. The study is similar to the present one as both are interested in competency of teachers in public and private primary and junior secondary schools. It was therefore necessary to carry out this present study in order to evaluate the skills required of Basic Science teachers in teaching Basic Science and Technology in Federal Capital Territory of Nigeria using evaluative research design.

Another descriptive study was conducted by Obiweluzo (2012) on the availability of trained/qualified teachers in public and private primary schools in Nsukka Education Zone of Enugu State. Four research questions and three null hypotheses guided the study. A total number of seventy-one (71) teachers were randomly sampled from Nsukka town in Enugu State from public and private primary schools. Availability of qualified primary school teachers questionnaire was designed by the researcher for data collection and was validated by three experts while a trial test was conducted outside the study area using Cronbach's Alpha method of reliability to establish internal consistency of the instrument. Data collected were analysed using mean and standard deviation. The findings of the study revealed that there was more number of qualified teachers in public schools than in private schools. The study is similar to the present study as both are focused on the availability of trained/qualified teachers in public and private primary schools. However, Federal Capital Territory of Nigeria is a different location from Nsukka Education Zone. This motivated the need to determine the

extent to which Basic Science Teachers Plan effectively Basic Science Lessons to Achieve Learning Objectives of Basic Science in Federal Capital Territory of Nigeria.

A study by Abe (2014) investigated the effect of teachers' qualification on students' performance in Mathematics. The study employed a descriptive survey design. The population of the study comprised of all public and private secondary schools in Ikere Local Government Area of Ekiti State. The study used a sample of three hundred students randomly selected from ten secondary schools junior class three. The ten schools were purposively selected. The instrument for the study was a 50-item test selected from past JSCE questions based on topics treated with the students in the study. Data collected was analyzed using mean, standard deviation and t-test statistics. The t-test was used to test the three hypotheses, while the mean was used to answer research questions. Results showed that there is a difference in mean performance of students taught by NCE and B Sc./Ed teachers in Mathematics. Results also showed a significant difference in performance between those taught by professional and those taught by non-professional teachers. The study is relevant because it studied the relationship between teachers' qualification and academic achievement which is a variable of interest in this study. Abe's study is also important in that it provided a guide on the classification of academic qualifications. The study is however, different from the present study in terms of the variables of interest. The areas of study also differ. For these reasons, the current study was imperative.

Studies on the Influence of Teachers' Gender on Effectiveness in Teaching Basic Science and Technology

A study was carried out by Centra and Gaubatz (2000) to determine whether male and female students rate teachers differently depending on the gender of the teacher. The study was guided by eight research questions. Evaluative research design was adopted for the study. The instrument for data collection was titled 'Pupils' Evaluation of Teachers' Teaching Effectiveness Questionnaire'. Mean and standard deviations were used to answer

the research questions while the hypotheses were tested using t-test statistic. The study analyzed data from 741 classes in which there were at least 10 male and 10 female students. The results revealed small same gender preferences, particularly in female students rating female teachers. Teaching style rather than gender may well explain these preferences. The present study focused on determining the influence of gender on teacher effectiveness in Basic Science teaching in Federal Capital Territory of Nigeria.

A study by Ezeudu and Obi (2013) investigated the effect of gender and location on students' achievement in Chemistry in secondary schools in Nsukka Local Government Area of Enugu State, Nigeria. It was guided by three research questions and three hypotheses. The ex-post-facto research design was adopted for the study. The sample of the study was made up of 827 comprising 473 males and 354 females drawn using simple random technique. A proforma was the instrument used to collect data for the study. Mean and standard deviation were used to answer research questions and t-test statistics were used to test the hypotheses. The findings showed that male students achieved significantly better than the female students in both urban and rural schools. The study is useful to this one as both are concerned with gender differences. However, the studies differ in terms of the level of education used. The study is also different from the present study because it investigated the effect of gender on students' achievement in Chemistry in secondary schools whereas the present study investigated teachers' effectiveness among basic science and technology teachers. In this case this study was important.

In addition, Awodun, Oni and Oyeniyi, (2015) determined the influence of teachers' gender and location on secondary school students' performance in Physics in Ekiti State, Nigeria. The research design adopted was ex-post-facto research. Three null hypotheses guided the study. The population of the study was two hundred (200) SS II Physics students randomly drawn from ten secondary schools in Ikere Local Government Area of Ekiti State. A questionnaire was used for data collection. ANOVA statistical analysis was used to test the

three null hypotheses. The findings showed that there is significant difference in the performance mean scores of boys taught by male and that of those taught by female Physics teachers. There is significant difference in the performance mean scores of girls taught by male and that of those taught by female teachers and there is significant difference in the performance mean scores of students taught by male and that of those taught by female Physics teachers. The result also revealed that students taught by urban teachers performed better than those taught by Physics teachers in rural locations. The study provides useful information on the influence of gender but varies with this one with respect to the area of study, population and even the entire scope. Hence, this study was crucial.

Nwagbo and Ugwuanyi (2015) investigated the influence of gender on science teachers' pedagogical beliefs and ICT classroom practices in secondary schools in Enugu State, Nigeria. Two research questions and two null hypotheses guided the study. The design for the study was Ex-post facto. Eight secondary schools with internet facilities were used and 120 science teachers were involved. Researchers' designed questionnaire was the instrument for data collection. Data collected were analyzed using mean, standard deviation and independent samples t-test. The results showed that there is no significant difference between the mean ratings of male and female science teachers on their pedagogical beliefs, meaning that both male and female science teachers hold innovative pedagogical belief. The study provided useful information on the influence of gender but varies with this one with respect to the area of study, population and even the entire scope. Therefore, this study was necessary.

Summary of Literature Review

The review of literature was organized under the following major subheadings: conceptual framework, review of related subthemes, theoretical framework, review of related empirical studies and summary of literature review. Under the conceptual framework, the concepts of basic education, basic science and technology and teacher effectiveness, the

teaching and learning of basic science and technology in primary schools, concepts of teachers' qualification, gender and assessment are reviewed.

The concept of Basic education has been defined as the foundational education given to children of school age in order to inculcate in them basic literacy and numeracy skills that are relevant to daily life. This foundation for science and technology is laid through Basic science and technology. Basic science and technology is considered as a subject that exposes children to the knowledge of sciences and technology in an integrated manner. This can be adequately enhanced through teachers' effectiveness. Teacher effectiveness has to do with the abilities and competencies exhibited by the teacher during teaching and learning in order to promote learning outcomes and consequently achieve some predetermined objectives or goals. Teachers' effectiveness is important in the teaching and learning of basic science and technology. The teaching and learning of Basic Science and Technology in primary schools can be considered as the presentation and acquisition of basic knowledge of science and technology at this level. This process may be influenced by teachers' qualification and gender.

The theoretical framework looked at relevant theories to the study such as the competency based teacher education theory by McDonald (1974) and Stufflebeam's Context, Input, Process and Product (CIPP) Model (1971). The competency based teacher education theory believed that teachers' possession of knowledge, skills and attitudes will enable them to recognize and solve complex problems in their domain of study or future work. This implies that teachers' effectiveness in teaching Basic Science and Technology is based on acquisition of specific competencies, skills or abilities in order to promote effective teaching and learning of the subject. The Stufflebeam's Context Input Process Product Model considers assessment as a tool which helps to make programmes work better for the people they are meant to serve. The model adopts the criteria of internal and external validity, reliability, objectivity, relevance, importance, scope, credibility, timeless, pervasiveness and

efficiency. It stresses the clarification of goals and objectives and advocates structured observation as a means of discovery whether the goals and objectives have been achieved or not. Hence, the study is anchored on the competency based teacher education theory by McDonald and the Stufflebean's Context, Input, Process and Product (CIPP) Model.

From the reviewed empirical studies, most of the studies, both local and foreign on teachers' skills and competencies for effective teaching and learning were either conflicting or inconclusive in their findings. Even the studies on the influence of teachers' qualification and gender on pupils' or students' achievement were contradicting, thus had no convergent point of conclusion. Besides, there are socio-cultural differences that necessitates that one suggests the conduct of studies to verify the validity of such findings. The studies also vary from the present study in terms of the scope and areas of study. Moreover, there seems to be dearth of literature on teachers' effectiveness in the teaching of Basic Science and Technology in the primary schools particularly in FCT Abuja, Nigeria. Therefore, in order to provide empirical evidence in this respect, an assessment of teachers' effectiveness in the teaching of Basic Science and Technology in the primary schools has become necessary.

CHAPTER THREE

RESEARCH METHOD

In this chapter, the researcher discussed the method that was adopted to carry out this study. The research method is presented under the following subheadings: design of the study, area of the study, population of the study, sample and sampling technique, instrument for data collection, validation of the instrument, reliability of the instrument, method of data collection and method of data analysis.

Design of the Study

The ex-post-facto research design was adopted for this study. According to Nworgu (2015), ex-post-facto research design is similar to experimental design in the sense that it also seeks to establish cause-effect relationships but differs from it since the researcher usually will have no control over the variables of interest and therefore cannot manipulate them. Nworgu further explained that using the ex-post-facto research design the researcher only attempts to link some already existing effects or observations to some variable(s) as causative agent(s). In this case, since the researcher is interested in assessing teachers' effectiveness (independent variable) which cannot be manipulated but can only be linked to the teaching of basic science and technology at the primary school (dependent variable), this design becomes appropriate for this study.

Area of Study

The study was carried out in the Federal Capital Territory (FCT) Abuja located in the North Central geo-political Zones of Nigeria. The Federal Capital Territory Abuja is made up of six Area Council namely; Abaji, Bwarri, Gwagwalada, Kuje, Kwali and Municipal council. The Federal Capital Territory Abuja was chosen for this study because it is one of the areas in the geo-political zones with high number of primary schools where observation has shown poor level of achievement of the learning objectives in Basic Science and Technology. Besides, to the best of the researcher knowledge as at the time of review of

literature no study have been conducted on the assessment of teachers' effectiveness in teaching Basic Science and Technology in primary school in FCT Abuja, Nigeria.

Population of the Study

The population of this study comprised of all the 9,193 (4439 male and 4754 female teachers) Universal Basic Education Commission (UBEC) schools teachers from 570 Universal Basic Education Commission (UBEC) schools in Federal Capital Territory of Nigeria (Planning and Research Department, Universal Basic Education Commission (UBEC), 2017) (see Appendix E page, 112).

Sample and Sampling Technique

The sample size for the study comprised of 1120 public primary school teachers teaching Basic Science and Technology. Multistage sampling procedure was used to draw the teachers from the six Area Councils in Federal Capital Territory of Nigeria. This is because the population involved is large and it is spread over a wide geographical area.

In the first stage, the researcher employed proportionate random sampling techniques to draw 20% of the public primary schools in each of the six Area councils which amounted to 112 public primary schools from the list of the 570 Universal Basic Education Commission (UBEC) schools in FCT, Abuja. The use of 20% (percent) of the public primary school was based on the recommendation of Ali (2006), that when the population is large about 5 to 20% could be used for the study. Given that the number of the schools is moderately large, the researcher deemed it wise to use 20% of public primary schools in FCT for the study.

At the second stage, the researcher used disproportionate random sampling technique to draw 10 public primary school teachers teaching Basic Science and Technology from each of the 112 public primary schools sampled from the six Area Councils of FCT which amounted to the sample size 1120 public primary schools teachers used for the study (see Appendix D page 112)

Instrument for Data Collection

The instrument for data collection for this study was an observation schedule titled: 'Observational Schedule for Assessing Teachers' Effectiveness in Teaching Basic Science and Technology (OSATETBST)' developed by the researcher. The observational schedule was used to rate the extent of basic science and technology teachers effectiveness during class. The OSATETBST was made up of two section; A and B. Section A sought for demographic information of the teachers, while Section B contained 50 items arranged in five clusters to elicit information on teachers' effectiveness in teaching basic science and technology. Each of the clusters contained 10 items to guide the researcher in assessing and rating basic science and technology teacher's effectiveness. Cluster A sought information on the extent teachers possess required skills for teaching Basic Science and Technology. Cluster B assessed the extent to which learning objectives are effectively used to plan lessons in basic science and technology. Cluster C, assessed the extent to which appropriate teaching methods were used in teaching primary school Basic Science and Technology. Cluster D, focused on the extent to which instructional resources were used for effective teaching of Basic Science and Technology. While Cluster E, is focused on extent to which teachers encourage school pupils to participate in Basic Science and Technology lessons. The OSATETBST was modelled on a four point rating scale ranging from VGE- Very Great Extent = 4 points, GE-Great Extent = 3 points, LE-Low Extent = 2 points to VLE-Very Low Extent =1 point (See Appendix B page 107).

Validation of the Instrument

To ascertain the face validity of the instrument, the observation Rating scale was given to three experts; two in Childhood Education and one in Measurement and Evaluation; all from Faculty of Education, University of Nigeria, Nsukka. These validates were requested to examine the schedule to ensure that the items were related to the purpose of the study. The validates were also required to check the suitability of language, its clarity, relevance of items

to the study and total coverage in addressing research questions; bearing in mind the purpose of the study. For proper guide to the expert in the validation exercise copies of the topic for the study, statement of the problems, purpose of the study, research questions and research hypotheses together with the draft of the instrument were given to expert. Their corrections and suggestions brought the instrument to the present form.

Reliability of the Instrument

To ensure the reliability of the instrument, it was trial-tested using 30 classroom teachers in 10 public primary schools in Taraba State which was outside the area of the study but with similar characteristics such as curriculum, social cultural setting, universal basic education schools and teachers, and basic education science and technology teachers. Estimate of internal consistency of the instrument was determined using Cronbach Alpha statistical method. The choice of Cronbach Alpha was because the items of the questionnaire were polytomously scored. The reliability coefficients of 0.83, 0.87, 0.85, 0.80 and 0.87 were obtained for clusters A, B, C, D and E respectively. The overall reliability index was .85. (See Appendix C page 109).

Method of Data Collection

The researcher sought the permission of the head teachers of the various sampled primary schools for the exercise. The researcher also briefed twenty (20) research assistants on how to use the observational schedule to rate the 1120 public primary school teachers teaching Basic Science and Technology. The briefing lasted for four days to ensure that the research assistants understood what is needed of them and to maintain uniform standard in the rating. These research assistants constitute nine Ph.D holders and eleven Ph.D students whom the researcher believe were competent enough to carry out the observation. Each research assistant was assigned to 56 basic science and technology teachers. Each basic and science technology teacher was observed for a period of 45 minutes (one full period), maximum of three teachers were observed per a day and six (6 teachers) in a week. The

observational schedule was used by the research assistant to observe and rate teachers in line with the items in the observational schedule during teaching. It took a period of two months for the whole exercise to be completed. The completed observation schedule for all the 1120 Basic Science and Technology teachers were returned by the research assistants.

Method of Data Analysis

Data collected were analyzed using both descriptive and inferential statistics. Specifically, the research questions were answered using mean and standard deviation. Null hypotheses 1, 2, 3, 4 and 5 were tested using the t-test statistic. To answer the research questions, the result was interpreted using the limit of real numbers where a mean score of 1.00 - 1.49 was regarded as Very Little Extent; 1.50 ñ 2.49 as Little extent; 2.50 ñ 3.49 as Great extent while 3.50 ñ 4.00 as Very Great Extent. In testing the null hypotheses, the following decision rules were used: (i) When the associated probability value obtained is less than 0.05 (that is, $P < 0.05$) the null hypothesis was rejected and (ii) When the associated probability value obtained is greater than 0.05 (that is, $P > 0.05$) the null hypothesis was not rejected. The t-test statistic was used to determine if the extent of teachers' effectiveness in teaching basic science and technology differ significantly by gender at 0.05 level of significance.

CHAPTER FOUR

RESULTS

In this chapter, the researcher presents the results of data analysis based on the research questions and the null hypotheses that guided the study. The major findings of the study are also presented in the chapter.

Research Question 1: What is the extent to which male and female primary school teachers possess the required skills for teaching Basic Science and Technology in FCT Abuja?

Table 1: Mean Ratings of Respondents on the Extent to which Male and Female Primary School Teachers Possess the Required Skills for Teaching Basic Science and Technology in FCT

S/N	Items	Male N = 538		Female N = 591		Total		DEC
		$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	
1	Subject mastery skill	3.29	0.83	2.69	0.86	2.98	0.90	GE
2	Observational skill	2.50	0.50	2.30	0.78	2.39	0.66	LE
3	Questioning ability	3.09	0.99	2.57	0.90	2.82	0.98	GE
4	Communication skills	2.75	0.69	3.08	0.51	2.92	0.62	GE
5	Ability to give feedback to learners	3.27	0.82	2.79	0.77	3.02	0.83	GE
6	Ability to carry out experiments	1.84	0.87	2.02	0.95	1.93	0.91	LE
7	Ability to interpret results of experiments	1.96	0.90	1.99	0.91	1.98	0.91	LE
8	Ability to classify things	2.29	0.54	3.22	0.63	2.77	0.75	GE
9	Ability to organize things	3.06	0.88	3.06	0.86	3.06	0.87	GE
10	Ability to improvise by constructing things	2.34	0.74	2.24	0.84	2.29	0.79	LE
Cluster Mean		2.64	0.25	2.60	0.28	2.62	0.26	GE

Key: GE = Great Extent, LE = Little Extent

The result of the study as presented in table 1 shows the mean ratings and standard deviations of respondents on the extent to which male and female primary school teachers possess the required skills for teaching Basic Science and Technology in FCT. The result of the study showed the mean ratings for items 1 ñ 5, and 9 for male respondents as 3.29, 2.50, 3.09, 2.75, 3.27 and 3.06. These mean ratings are within the range of 2.50-3.49 set as criterion for Great Extent. This implies that the male teachers possess the required skills for teaching Basic Science and Technology in FCT to a great extent, these skills are Subject

mastery skill, Observational skill, Questioning ability, Communication skills, Ability to give feedback to learners and Ability to organize things. However, the male teachers possess the following skills to a low extent. These include; Ability to carry out experiments, Ability to interpret results of experiments, Ability to classify things and Ability to improvise by constructing things. This is so because the mean ratings are within the range of 1.50-2.49 set as criterion for low extent. The result of the study also showed that the female respondents had mean ratings for items 1, 3-5 and 8-9 as 2.69, 2.57, 3.08, 2.79, 3.22 and 3.06. This means that the female teachers possess the following skills to a great extent. These skills are; subject mastery skill, questioning ability, communication skills, ability to give feedback to learners, ability to classify things and ability to organize things. Furthermore, the cluster mean of 2.62 with a standard deviation of 0.26 showed that male and female primary school teachers possess the required skills for teaching Basic Science and Technology to a great extent.

Research Question 2: What is the extent to which learning objectives are effectively used by male and female primary school teachers to plan lessons in Basic Science and Technology in Federal Capital Territory Abuja?

Table 2: Mean Ratings of Respondents on the Extent to which Learning Objectives are Effectively used by Male and Female Primary School Teachers to Plan Lessons in Basic Science and Technology in FCT.

S/N	Items	Male N = 538		Female N = 591		Total		
		$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	DEC
11	Ability to prepare his/her lesson notes	2.84	1.04	2.68	1.04	2.76	1.04	GE
12	Ability to reflect stated objectives through his/her teaching	2.77	0.63	2.77	0.64	2.77	0.64	GE
13	Ability to properly set-induce the pupils to the new ideas	2.37	0.65	2.28	0.69	2.32	0.67	LE
14	Ability to state attainable learning objectives in line with the curriculum	2.86	0.50	2.73	0.68	2.79	0.61	GE
15	Ability to present learning content/experiences logically or in a step by step manner	3.00	0.00	2.78	0.63	2.88	0.46	GE
16	Ability to generate the desirable learning feedbacks	2.25	0.59	2.38	0.55	2.32	0.57	LE
17	Ability to cover the three behavioural objectives of learning	2.26	0.61	2.15	0.63	2.21	0.62	LE
18	Ability to think creative ways of achieving preset learning objectives	3.47	0.85	3.31	0.99	3.39	0.93	GE
19	Ability to evaluate pupils' learning	3.44	0.83	2.96	1.19	3.19	1.06	GE
20	Ability to make use of feedbacks from learning during lesson	3.30	0.89	3.24	1.01	3.27	0.96	GE
Cluster Mean		2.86	0.27	2.73	0.36	2.79	0.33	GE

Key: GE = Great Extent, LE = Little Extent

The result of the study as presented in table 3 showed the mean ratings and standard deviations of respondents on the extent to which learning objectives are effectively used by male and female primary school teachers to plan lessons in Basic Science and Technology in FCT. The result of the study showed the mean ratings for items 11, 12, 14, 14 and 18-20 for both male and female respondents are within the range of 2.50-3.49 set as criterion for Great Extent. This implies that learning objectives are effectively used by both male and female primary school teachers to plan lessons in Basic Science and Technology to a great extent, these learning objectives include; ability to prepare lesson notes, ability to reflect stated objectives through teaching, ability to state attainable learning objectives in line with the

curriculum, ability to present learning content/experiences logically or in a step by step manner, ability to think creative ways of achieving preset learning objectives, ability to evaluate pupils' learning and ability to make use of feedbacks from learning during lesson. However, items 13, 16 and 17 for both male and female respondents had mean ratings within the range of 1.50-2.49 set as criterion for low extent. This implies that both male and female teachers use the following objectives to plan lessons to a low extent, ability to properly set-induce the pupils to the new ideas, ability to generate the desirable learning feedbacks and ability to cover the three behavioural objectives of learning. The cluster mean of 2.79 with a standard deviation of 0.33 showed that learning objectives are effectively used by male and female primary school teachers to plan lessons in Basic Science and Technology in to a great extent.

Research Question 3: What is the extent to which appropriate teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology in FCT Abuja?

Table 3: Mean Ratings of Respondents on the Extent to which Appropriate Teaching Methods are used by Male and Female Primary School Teachers in Teaching Basic Science and Technology in FCT

S/N	Items	Male N = 538		Female N = 591		Total		
		$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	DEC
21	Play-way method	3.29	0.98	3.03	1.15	3.15	1.08	GE
22	Role play method	3.09	1.06	3.18	1.04	3.14	1.05	GE
23	Simulation method	2.18	0.66	2.18	0.69	2.18	0.68	LE
24	Demonstration method	3.08	1.17	2.84	1.26	2.96	1.22	GE
25	Discussion method	3.02	1.19	2.96	1.11	2.99	1.15	GE
26	Peer tutoring method	2.14	0.65	2.41	0.76	2.28	0.72	LE
27	Problem-solving method	2.78	0.82	2.81	0.80	2.79	0.81	GE
28	Guided discovery method	2.56	0.75	2.81	0.76	2.69	0.76	GE
29	Cooperative learning method	1.97	0.16	1.84	0.37	1.90	0.29	LE
30	Project method	3.24	1.05	2.94	1.10	3.08	1.09	GE
	Cluster Mean	2.74	0.33	2.70	0.39	2.72	0.36	GE

Key: GE = Great Extent, LE = Little Extent

The result of the study as presented in table 5 showed the mean ratings and standard deviations of respondents on the extent to which appropriate teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology. The result of the study showed the mean ratings for items 21, 22, 24, 25, 27, 28 and 30 for both male and female respondents are within the range of 2.50-3.49 set as criterion for Great Extent. This implies that appropriate teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology to a great extent, these teaching methods include; play-way method, role play method, demonstration method, discussion method, problem-solving method, guided discovery method and project method. However, items 23, 26 and 29 for both male and female respondents had mean ratings within the range of 1.50-2.49 set as criterion for low extent. This implies that the following teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology in FCT to a low extent, these include; simulation method, peer tutoring method and cooperative learning method. The cluster mean of 2.72 with a standard deviation of 0.36 showed that appropriate teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology in FCT to a great extent.

Research Question 4: What is the extent to which instructional resources are used by male and female primary school teachers for effective teaching of Basic Science and Technology in FCT Abuja?

Table 4: Mean Ratings of Respondents on the Extent to which Instructional Resources are used by Male and Female Primary School Teachers for Effective Teaching of Basic Science and Technology in FCT.

S/N	Items	Male N = 538		Female N = 591		Total		
		$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	DEC
31	Textbooks	3.43	0.79	3.11	1.08	3.26	0.96	GE
32	Workbooks	3.35	0.94	2.90	1.16	3.12	1.08	GE
33	Picture books	3.29	0.82	3.10	1.01	3.19	0.92	GE
34	Real objects	3.28	0.81	3.20	1.04	3.24	0.94	GE
35	Science corners	3.10	0.90	3.45	0.83	3.28	0.88	GE
36	Science equipment	3.30	0.81	3.41	0.90	3.35	0.86	GE
37	Drawing materials	3.42	0.79	3.53	0.73	3.48	0.76	GE
38	Painting materials	3.43	0.78	3.50	0.77	3.47	0.78	GE
39	Animal books	3.59	0.51	3.40	0.82	3.49	0.69	GE
40	Charts/visual arts	3.46	0.75	3.33	0.82	3.39	0.79	GE
Cluster Mean		3.37	0.31	3.29	0.37	3.33	0.34	GE

Key: GE = Great Extent, LE = Little Extent

The result of the study as presented in table 7 shows the mean ratings and standard deviations of respondents on the extent to which instructional resources are used by male and female primary school teachers for effective teaching of Basic Science and Technology in FCT. The result of the study showed the mean ratings for items 31-40 for both male and female respondents are within the range of 2.50-3.49 set as criterion for Great Extent. This implies that instructional resources are used by male and female primary school teachers for effective teaching of Basic Science and Technology to a great extent, these instructional resources include; textbooks, workbook, picture books, real objects, science corners, science equipment, drawing materials, painting materials, animal books and charts/visual arts. The cluster mean of 3.33 with a standard deviation of 0.34 showed that instructional resources are used by male and female primary school teachers for effective teaching of Basic Science and Technology in FCT to a great extent.

Research Question 5: What is the extent to which male and female primary school teachers encourage school pupils to participate in Basic Science and Technology lessons FCT Abuja?

Table 5: Mean Ratings of Respondents on the Extent to which Male and Female Primary School Teachers Encourage School Pupils to Participate in Basic Science and Technology Lessons FCT.

S/N	Items	Male N = 538		Female N = 591		Total		DEC
		$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	
41	Asking pupils questions by calling them by their names during lesson	3.32	0.96	3.47	0.77	3.40	0.87	GE
42	Engaging pupils with problem solving tasks	3.14	1.02	3.36	0.87	3.25	0.95	GE
43	Grouping pupils to accomplish a given task collaboratively	2.32	0.46	2.34	0.47	2.33	0.47	LE
44	Reinforcement to pupils for successful completion of tasks	3.37	1.08	3.35	0.86	3.36	0.97	GE
45	Consideration for individual differences among pupils	2.26	0.44	2.30	0.46	2.28	0.45	LE
46	Ability to sustain pupils' interest in class activities	3.34	1.10	3.26	1.04	3.30	1.07	GE
47	Creativity in varying his/her instructional strategies to involve pupils	3.60	0.76	3.35	0.90	3.47	0.84	GE
48	Giving pupils active role to play during class activities	3.37	1.06	3.19	0.96	3.28	1.02	GE
49	Showing pupils warmth/care	3.25	1.14	3.46	0.82	3.36	0.99	GE
50	Creating a platform for good teacher-pupils relationship	3.54	0.93	3.46	0.72	3.50	0.83	GE
Cluster Mean		3.15	0.33	3.15	0.32	3.15	0.32	GE

Key: GE = Great Extent, LE = Little Extent

The result of the study as presented in table 9 shows the mean ratings and standard deviations of respondents on the extent to which male and female primary school teachers encourage school pupils to participate in Basic Science and Technology in FCT lessons. The result of the study showed the mean ratings for items 41, 42, 44 and 46-50 for both male and female respondents are within the range of 2.50-3.49 set as criterion for Great Extent. This implies that male and female primary school teachers encourage school pupils to participate in Basic Science and Technology lessons to a great extent, these encouragement takes the form of; asking pupils questions by calling them by their names during lesson, engaging

pupils with problem solving tasks, reinforcement to pupils for successful completion of tasks, ability to sustain pupils' interest in class activities, creativity in varying his/her instructional strategies to involve pupils, giving pupils active role to play during class activities among others. However, result also shows that; grouping pupils to accomplish a given task collaboratively and consideration for individual differences among pupils are to a low extent because their mean ratings are within the range of 1.50-2.49 set as criterion for low extent. The cluster mean of 3.15 with a standard deviation of 0.32 showed that male and female primary school teachers encourage school pupils to participate in Basic Science and Technology lessons to a great extent.

Hypothesis One: There is no significant difference on the extent to which male and female primary school teachers possess the required skills for teaching Basic Science and Technology in FCT Abuja.

Table 6: t-test Analysis of the Significant Difference on the Extent to which Male and Female Primary School Teachers Possess the Required Skills for Teaching Basic Science and Technology in FCT.

S/N	Items	Male N = 538		Female N = 591		t-cal	df	Sig	Dec
		$\bar{X}$	SD	$\bar{X}$	SD				
1	Subject mastery skill	3.29	0.83	2.69	0.86	11.93	1118	0.00	S
2	Observational skill	2.50	0.50	2.30	0.78	4.93	1118	0.00	S
3	Questioning ability	3.09	0.99	2.57	0.90	9.06	1118	0.00	S
4	Communication skills	2.75	0.69	3.08	0.51	-8.92	1118	0.00	S
5	Ability to give feedback to learners	3.27	0.82	2.79	0.77	10.00	1118	0.00	S
6	Ability to carry out experiments	1.84	0.87	2.02	0.95	-3.19	1118	0.00	S
7	Ability to interpret results of experiments	1.96	0.90	1.99	0.91	-0.72	1118	0.47	NS
8	Ability to classify things	2.29	0.54	3.22	0.63	-26.50	1118	0.00	S
9	Ability to organize things	3.06	0.88	3.06	0.86	-0.01	1118	0.99	NS
10	Ability to improvise by constructing things	2.34	0.74	2.24	0.84	2.16	1118	0.03	S
	Cluster t	2.64	0.25	2.60	0.28	2.63	1118	0.00	S

The finding of the study as presented in table 11 showed the t-test analysis of the significant difference on the extent to which male and female primary school teachers possess the required skills for teaching Basic Science and Technology in FCT. Result showed that a cluster t-value of 2.63 with a degree of freedom of 1118 and a significant value of 0.00 were obtained. Since the significant value of 0.00 is less than 0.05 set as level of significance, this means that the null hypothesis which stated that there is no significant difference on the extent to which male and female primary school teachers possess the required skills for teaching Basic Science and Technology is rejected. Inference drawn therefore is that there was a significant difference on the extent to which male and female primary school teachers possess the required skills for teaching Basic Science and Technology in FCT.

Hypothesis Two: There is no significant difference in the extent to which learning objectives are effectively used by male and female primary school teachers to plan lessons in Basic Science and Technology.

Table 7: t-test Analysis of the Significant Difference on the Extent to which Learning Objectives are Effectively used by Male and Female Primary School Teachers to Plan Lessons in Basic Science and Technology in FCT.

S/N	Items	Male N = 538		Female N = 591		t-cal	df	Sig	Dec
		$\bar{X}$	SD	$\bar{X}$	SD				
11	Ability to prepare his/her lesson notes	2.84	1.04	2.68	1.04	2.55	1118	0.01	S
12	Ability to reflect stated objectives through his/her teaching	2.77	0.63	2.77	0.64	0.08	1118	0.93	NS
13	Ability to properly set-induce the pupils to the new ideas	2.37	0.65	2.28	0.69	2.21	1118	0.02	S
14	Ability to state attainable learning objectives in line with the curriculum	2.86	0.50	2.73	0.68	3.77	1118	0.00	S
15	Ability to present learning content/experiences logically or in a step by step manner	3.00	0.00	2.78	0.63	8.21	1118	0.00	S
16	Ability to generate the desirable learning feedbacks	2.25	0.59	2.38	0.55	-3.62	1118	0.00	S
17	Ability to cover the three behavioural objectives of learning	2.26	0.61	2.15	0.63	2.84	1118	0.00	S
18	Ability to think creative ways of achieving preset learning objectives	3.47	0.85	3.31	0.99	2.90	1118	0.00	S
19	Ability to evaluate pupils' learning	3.44	0.83	2.96	1.19	7.66	1118	0.00	S
20	Ability to make use of feedbacks from learning during lesson	3.30	0.89	3.24	1.01	1.05	1118	0.29	NS
	Cluster t	2.86	0.27	2.73	0.36	6.61	1118	0.00	S

The result of the study as presented in table 14 showed the t-test analysis of the significant difference in the extent to which learning objectives are effectively used by male and female primary school teachers to plan lessons in Basic Science and Technology in FCT. Result showed that a cluster t-value of 6.61 with a degree of freedom of 1118 and a significant value of 0.00 were obtained. Since the significant value of 0.00 is less than 0.05

set as level of significance, this means the null hypothesis which stated that there is no significant difference in the extent to which learning objectives are effectively used by male and female primary school teachers to plan lessons in Basic Science and Technology is rejected. Inference drawn therefore is that there was a significant difference in the extent to which learning objectives are effectively used by male and female primary school teachers to plan lessons in Basic Science and Technology in FCT.

Hypothesis Three: There is no significant difference in the extent to which appropriate teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology in FCT Abuja.

Table 8: t-test Analysis of the Significant Difference on the Extent to which Appropriate Teaching Methods are used by Male and Female Primary School Teachers in Teaching Basic Science and Technology in FCT.

S/N	Items	Male N = 538		Female N = 591		t-cal	df	Sig	Dec
		$\bar{X}$	SD	$\bar{X}$	SD				
21	Play-way method	3.29	0.98	3.03	1.15	3.98	1118	0.00	S
22	Role play method	3.09	1.06	3.18	1.04	-1.44	1118	0.15	NS
23	Simulation method	2.18	0.66	2.18	0.69	-0.00	1118	0.99	NS
24	Demonstration method	3.08	1.17	2.84	1.26	3.32	1118	0.00	S
25	Discussion method	3.02	1.19	2.96	1.11	0.79	1118	0.42	NS
26	Peer tutoring method	2.14	0.65	2.41	0.76	-6.22	1118	0.00	S
27	Problem-solving method	2.78	0.82	2.81	0.80	-0.51	1118	0.60	NS
28	Guided discovery method	2.56	0.75	2.81	0.76	-5.62	1118	0.00	S
29	Cooperative learning method	1.97	0.16	1.84	0.37	7.87	1118	0.00	S
30	Project method	3.24	1.05	2.94	1.10	4.55	1118	0.00	S
	Cluster t	2.74	0.33	2.70	0.39	1.59	1118	0.11	NS

The result of the study as presented in table 17 showed the t-test analysis of the significant difference in the extent to which appropriate teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology. Result showed that a cluster t-value of 1.59 with a degree of freedom of 1118 and a significant value of 0.11 were obtained. Since the significant value of 0.11 is greater than 0.05 set as level of significance, this means the null hypothesis which stated that there is no significant difference in the extent

to which appropriate teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology is not rejected. Inference drawn therefore is that there was no significant difference in the extent to which appropriate teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology.

Hypothesis Four: There is no significant difference in the extent to which instructional resources are used by male and female primary school teachers for effective teaching of Basic Science and Technology in FCT Abuja.

Table 9: t-test Analysis of the Significant Difference on the Extent to which Instructional Resources are used by Male and Female Primary School Teachers for Effective Teaching of Basic Science and Technology in FCT.

S/N	Items	Male N = 538		Female N = 591		t-cal	Df	Sig	Dec
		$\bar{X}$	SD	$\bar{X}$	SD				
31	Textbooks	3.43	0.79	3.11	1.08	5.74	1118	0.00	S
32	Workbooks	3.35	0.94	2.90	1.16	7.05	1118	0.00	S
33	Picture books	3.29	0.82	3.10	1.01	3.34	1118	0.00	S
34	Real objects	3.28	0.81	3.20	1.04	1.32	1118	0.18	NS
35	Science corners	3.10	0.90	3.45	0.83	-6.83	1118	0.00	S
36	Science equipment	3.30	0.81	3.41	0.90	-2.06	1118	0.03	S
37	Drawing materials	3.42	0.79	3.53	0.73	-2.38	1118	0.01	S
38	Painting materials	3.43	0.78	3.50	0.77	-1.39	1118	0.16	NS
39	Animal books	3.59	0.51	3.40	0.82	4.70	1118	0.00	S
40	Charts/visual arts	3.46	0.75	3.33	0.82	2.80	1118	0.00	S
	Cluster t	3.37	0.31	3.29	0.37	3.52	1118	0.00	S

The result of the study as presented in table 19 showed the t-test analysis of the significant difference on the extent to which instructional resources are used by male and female primary school teachers for effective teaching of Basic Science and Technology. Result showed that a cluster t-value of 3.52 with a degree of freedom of 1118 and a significant value of 0.00 were obtained. Since the significant value of 0.00 is less than 0.05 set as level of significance, this means the null hypothesis which stated that there is no significant difference in the extent to which instructional resources are used by male and

female primary school teachers for effective teaching of Basic Science and Technology in FCT is rejected. Inference drawn is that there was a significant difference in the extent to which instructional resources are used by male and female primary school teachers for effective teaching of Basic Science and Technology in FCT.

Hypothesis Five: There is no significant difference on the extent to which male and female primary school teachers encourage school pupils to participate in Basic Science and Technology lessons in FCT Abuja.

Table 10: t-test Analysis of the Significant Difference on the Extent to which Male and Female Primary School Teachers Encourage School Pupils to Participate in Basic Science and Technology Lessons in FCT.

S/N	Items	Male N = 538		Female N = 591		t-cal	Df	Sig	Dec
		$\bar{X}$	SD	$\bar{X}$	SD				
41	Asking pupils questions by calling them by their names during lesson	3.32	0.96	3.47	0.77	-2.73	1118	0.01	S
42	Engaging pupils with problem solving tasks	3.14	1.02	3.36	0.87	-3.90	1118	0.00	S
43	Grouping pupils to accomplish a given task collaboratively	2.32	0.46	2.34	0.47	-0.41	1118	0.67	NS
44	Reinforcement to pupils for successful completion of tasks	3.37	1.08	3.35	0.86	0.35	1118	0.72	NS
45	Consideration for individual differences among pupils	2.26	0.44	2.30	0.46	-1.55	1118	0.11	NS
46	Ability to sustain pupils' interest in class activities	3.34	1.10	3.26	1.04	1.36	1118	0.17	NS
47	Creativity in varying his/her instructional strategies to involve pupils	3.60	0.76	3.35	0.90	4.93	1118	0.00	S
48	Giving pupils active role to play during class activities	3.37	1.06	3.19	0.96	3.00	1118	0.00	S
49	Showing pupils warmth/care	3.25	1.14	3.46	0.82	-3.49	1118	0.00	S
50	Creating a platform for good teacher-pupils relationship	3.54	0.93	3.46	0.72	1.68	1118	0.09	NS
	Cluster Mean	3.15	0.33	3.15	0.32	-0.01	1118	0.99	NS

The result of the study as presented in table 22 showed the t-test analysis of the significant difference on the extent to which male and female primary school teachers encourage school pupils to participate in Basic Science and Technology lessons. Result showed that a cluster t-value of -0.01 with a degree of freedom of 1118 and a significant value of 0.99 were obtained. Since the significant value of 0.99 is greater than 0.05 set as level of significance, this means the null hypothesis which stated that there is no significant difference on the extent to which male and female primary school teachers encourage school pupils to participate in Basic Science and Technology lessons in FCT is not rejected. Inference drawn is that there was no significant difference on the extent to which male and female primary school teachers encourage school pupils to participate in Basic Science and Technology lessons.

Summary of Findings

In chapter four, the researcher essentially presented the results of the study derived from the analyses of the data collected. The following findings emerged.

1. Male and female primary school teachers possess the required skills for teaching Basic Science and Technology to a great extent.
2. Learning objectives are effectively used by male and female primary school teachers to plan lessons in Basic Science and Technology to a great extent.
3. Appropriate teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology to a great extent.
4. The result of the study showed that instructional resources are used by male and female primary school teachers for effective teaching of Basic Science and Technology to a great extent.
5. Male and female primary school teachers encourage school pupils to participate in Basic Science and Technology lessons to a great extent.

6. There was a significant difference on the extent to which male and female primary school teachers possess the required skills for teaching Basic Science and Technology.
7. There was a significant difference in the extent to which learning objectives are effectively used by male and female primary school teachers to plan lessons in Basic Science and Technology.
8. There was no significant difference in the extent to which appropriate teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology.
9. There was a significant difference in the extent to which instructional resources are used by male and female primary school teachers for effective teaching of Basic Science and Technology.
10. There was no significant difference on the extent to which male and female primary school teachers encourage school pupils to participate in Basic Science and Technology lessons.

CHAPTER FIVE

DISCUSSION OF FINDINGS, CONCLUSION AND SUMMARY OF THE STUDY

In this chapter, the results are discussed based on the research questions and null hypotheses that guided the study. The chapter is organized based on the following sub-headings: discussion of the findings, conclusion, and educational implications of the findings of the study, recommendations, limitation of the study, suggestions for further studies and summary of the study.

Discussions of the Findings/Results

The results of the study were discussed under the relevant sub-headings below in line with the specific purposes, research questions and hypotheses raised in the study. They are discussed with research findings in literature review.

- The extent of teachers' required skills for teaching primary school Basic Science and Technology
- The extent learning objectives are effectively used by teachers to plan lessons in Basic Science and Technology
- The extent appropriate teaching methods are used by teachers in teaching primary school Basic Science and Technology
- The extent instructional resources are used by teachers for effective teaching of Basic Science and Technology
- The extent teachers encourage pupils to participate in Basic Science and Technology lessons.

The Extent Teachers' Possess Required Skills for Teaching Primary School Basic Science and Technology

The findings of the study showed that both male and female primary school teachers possess the required skills for teaching Basic Science and Technology to a great extent. These skills include: subject mastery skill, questioning ability, communication skills, ability to give feedback to learners, ability to classify things and ability to organize things. This implies that both male and female primary school teachers possess the required skills for teaching Basic Science and Technology to a great extent in the Federal Capital Territory (FCT) Abuja. This finding agree with the finding of Kearsley (2005), who reported that mastery of subject, ability to prepare lesson plan, setting attainable lesson objectives, proper set induction to new topics among others are the skills required of basic science teachers. Both male and female teachers have the required skills for teaching Basic Science and Technology in the Federal Capital Territory (FCT) Abuja to a great extent. This could be due to the fact that the teachers underwent academic training and obtained the requisite qualifications for teaching at the primary school level of education in Nigeria. However, observational skill, ability to carry out experiments, ability to interpret results of experiments and ability to improvise by constructing things were possess in low extent. This finding is in agreement with Onyeachi (2008) who reported that most of the teachers teaching basic science and technology at the primary school level are not specialist in science related subjects.

The findings further revealed that there was a significant difference in the extent male and female primary school teachers possess the required skills for teaching. This finding is in line with the findings by Awodun, Oni, and Oyeniyi, (2015) that found out that there was significant difference between the performances means scores of students taught by male and female Physics teachers. This could be that there were differences in the skills possessed by male and female teachers for teaching the subject, which in can in turn reflect on studentsö performance. The finding is contrary to the findings by Nwagbo and Ugwuanyi (2015), that

there was no significant difference between the mean ratings of male and female science teachers in their pedagogical beliefs. This means that both male and female science teachers had similar views about required pedagogical skills for the teaching of science subjects. However, with the common belief that males are more likely to perform well in science-oriented subjects than their female counterparts, it may be possible to have differences between the skills possessed by males and females for teaching Basic Science and Technology which could be the reason for the finding of this study.

The Extent Objectives are Effectively Used by Teachers to Plan Lessons in Basic Science and Technology

The finding of the study indicated that learning objectives are effectively used by male and female primary school teachers to plan lessons in Basic Science and Technology to a great extent. These learning objectives include ability to prepare lesson notes, ability to reflect stated objective through teaching, ability to state attainable learning objective in line with the curriculum, ability to present learning content/ experiences logically, ability to think creative ways of achieving preset objectives, ability to evaluate pupils learning and ability to make use of feedbacks from learning during lesson. It also indicated that learning objectives are effectively used by primary school teachers to plan lessons in Basic Science and Technology to a great extent. This therefore means that learning objectives are effectively used by both male and female primary school teachers to plan lessons in Basic Science and Technology, taking their qualifications into consideration to a great extent. This finding is in line with the finding by Mcber (2000) who reported that effective teachers have the ability to set high expectation for pupils and communicate directly to the pupils. Such teachers are good at planning, setting clear framework and objectives for each lesson. However, ability to properly set- induce pupils to the new ideals, ability to generate the desirable leaning feedbacks and ability to cover the three behavioural objectives are possessed at low extent.

However, findings revealed that there was a significant difference in the extent to which learning objectives are effectively used by male and female primary school teachers to plan lessons in Basic Science and Technology. This result is in disagreement with the finding by Nwagbo and Ugwuanyi (2015) which revealed that there was no significant difference between the mean ratings of male and female science teachers on their pedagogical skills, which implies that gender had significant influence on the extent to which teachers make use of learning objectives to effectively plan lessons in Basic Science and Technology.

The Extent Appropriate Teaching Methods are Used by Teachers in Teaching Primary School Basic Science and Technology

The finding of the study showed that appropriate teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology to a great extent. Likewise, the finding indicated that appropriate teaching methods are used by primary school teachers in teaching Basic Science and Technology to a great extent. Such methods include: play ñway method, role- play method, demonstration method, discussion method, problem-solving method guided discovery method, and project method. These findings are in line with Kekong (2007) who found out that most primary school teachers make use of play way method, role playing, demonstration, cooperative learning, and guided discovery methods for effective teaching and learning. In the same vein, these findings agree with Odoh (2009) who revealed that majority of the teachers employed guided discovery, demonstration, discussion, play-way method and role playing in teaching. This means that most of the teachers used teaching methods that would give pupilsö opportunity to participate in class activities. The finding of this study also agreed with the findings of Greenery (2009) who found out that the teaching methods used by the teachers involved the participation of pupils and increased their performance. However, the findings of the study also indicated that peer tutoring method and cooperative learning methods are used by the basic science and technology teachers to a low extent.

The findings revealed that there was no significant difference in the extent to which appropriate teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology. The findings are consistent with that of Odoh (2009) who found that gender had no significant influence on the adoption of variety of instructional methods by teachers. It also agreed with Osorung (2012), who found out that there was no significant difference in mean ratings of male and female teachers on instructional strategies adopted in teaching Basic Science and Technology. This means that both male and female primary school teachers are use appropriate teaching methods in teaching Basic Science and Technology.

The Extent Instructional Resources are Used by Teachers for Effective Teaching of Basic Science and Technology

The finding of the study indicated that instructional resources are used by male and female primary school teachers for effective teaching of Basic Science and Technology to a great extent. Such instructional resources include textbook, workbook, picture books, real object, science corner, science equipment drawing materials, painting materials, animal books, charts/visual arts. Similarly, the finding showed that instructional resources are used by primary school teachers for effective teaching of Basic Science and Technology to a great extent. The finding of this study is in line with findings of Jeptanui (2011), who found out that chalkboard and textbooks were widely used, while other instructional resources were not much utilized. Similarly, finding of this study agree with that of Udofia and Udo (2011), who revealed that adequate seating, work space, lighting, ventilation and protection from the elements were maximized by teachers in order to achieve learning objectives. Nonetheless, finding of this study disagree with that Jegede and Taplin (2000) reported that teachers rarely utilized relevant resources in teaching basic science due to ignorance.

The findings revealed that there was a significant difference in the extent instructional resources are used by male and female primary school teachers for effective teaching of Basic

Science and Technology. This implies that male primary school teachers differed significantly from their female counterparts in using instructional resources for effective teaching of Basic Science and Technology.

The Extent Teachers Encourage School Pupils to Participate in Basic Science and Technology Lessons

The finding of the study showed that male and female primary school teachers encourage pupils to participate in Basic Science and Technology lessons to a great extent. Such encouragement among others include, calling pupils by name to ask them questions during lessons, engaging pupils with problem solving task, reinforcement to pupils for successful completion of task ability to sustain pupils' interest in class activities, creativity in varying instructional strategies to involve pupils, giving pupils' active role to play during class activities, showing warmth/care to pupils, and creating a platform for good teacher-pupils relationship. However, grouping pupils to accomplish a given task collaboratively, and consideration for individual differences among pupils are demonstrated by the teachers to a low extent. The finding corroborates the finding by Greenery (2009) who found out that most competent teachers made sure that the learners were actively involved in the teaching-learning process which increased their performance. On the contrary, Rudhumbu (2014) who revealed that while most teachers concurred that it is important to motivate learners to learn through the use of motivational teaching strategies, majority of the teachers do not seem to be using motivational strategies regularly in the teaching. The reasons given were due to high workloads and large class sizes in their schools. The findings revealed that there was no significant difference on the extent male and female primary school teachers encourage school pupils to participate in Basic Science and Technology lessons. In essence, both male and female primary school teachers encouraged pupils to participate in Basic Science and Technology lessons activities in the same manner.

Conclusion

Based on the findings, it was concluded among others that

1. Teachers are effective in teaching Basic Science and technology in Federal Capital Territory Abuja. However, teachers are not effective in the following areas: ability to carry out experiments, interpret result of the experiment, improvisation by constructing things, grouping pupils to accomplish a given task and consideration for individual difference among pupils.
2. Learning objectives are effectively used by primary school teachers to plan lessons in Basic Science and Technology to a great extent though not effective in the following areas: ability to set induce the pupils to new ideas, ability to generate desirable learning feedback and ability to cover the three behavioural objective of learning.
3. Appropriate teaching methods were also used by both male and female primary school teachers in teaching Basic Science and Technology to a great extent but do not make effective use of simulation method, peer tutoring method and cooperative learning method.
4. Basic science and technology teacher in Federal Capital Territory make adequate use of appropriate instructional resources in teaching of basic science and technology.
5. Basic science and technology teacher in FCT encourage pupils' participation in basic science and technology lessons.

Educational Implications of the Findings of the Study

The educational implications of the findings of this study is that when primary school teachers are exposed to the various skills required for teaching Basic Science and Technology not minding their gender or qualification, the teachers' effectiveness in teaching will be adequately enhanced and consequently the preset objectives will be achieved. This is obvious because it was noted from the findings of the study that learning objectives are effectively used by primary school teachers to plan lessons in Basic Science and Technology to a great

extent. These required skills should be one of the compulsory requirements for primary school teachers' promotion and up grading. Also when Basic Science and Technology teachers are exposed to in-service training programmes, workshop and seminars, the teaching and learning of Basic Science and Technology will be enhanced since the teachers are equipped with relevant skills.

In addition, the educational implication of the finding of this study is that when primary school teachers are exposed with relevant skills on lesson planning and appropriate teaching methods for teaching Basic Science and Technology, they will ensure that such methods are used in teaching the subject to enhanced understanding and achievement among the pupils. This is obvious because it was noted from the findings of the study that appropriate teaching methods are used by primary school teachers in teaching Basic Science and Technology to a great extent.

The educational implication of the finding of this study is that it will improve schools and enhance uniformity of purpose in quality judgment on the state of teaching and learning of Basic Science by teachers and pupils in Nigeria. It will provide direction and guideline and indeed serve as an additional reference material for further educational studies. This is obvious because Government and other Non Government Agencies need these findings too to take appropriate steps toward ensuring that Basic Science teachers are well equipped to teach Basic Science and Technology.

Recommendations

The following recommendations were made according to the findings of the study. Federal and State Ministries of Education should ensure the following:

1. Every primary school teacher should be periodically exposed to symposiums to sustain their teaching efficiency and to strengthen them on the area of their deficiency such as ability to carry out experiments, interpret result of the experiment,

improvisation by constructing things, grouping pupils to accomplish a given task, consideration for individual difference, ability to set induce the pupils to new ideas, ability to generate desirable learning feedback, ability to cover the three behavioural objective of learning, simulation method, peer tutoring method and cooperative learning method among others.

2. That these required skills should be one of the compulsory requirements for primary school teachersöpromotion and up grading.
3. Practical Basic Science and technology needed equipments should be supplied by the government for the teaching of Basic Science and Technology practical;
4. Basic science and technology teachers should be trained on the use of the practical and equipments for effective teaching of basic science and technology.
5. Adequate attention should be paid to pupils related factors to learning such as motivation, study habits, interest among others.
6. Parents and pupils should be sensitized on effective and functional study habits and factors that encourage learning to compliment the efforts of teachers in achieving

Limitations of the Study

No research of this nature that involves different human personalities can probably be completed without limitations. The following limitations were noted in this study.

1. The study was limited to Primary school teachers in Federal Capital Territory, Abuja.
2. Some teachers were not co-operative because they feel that they are being examined.
3. Though the research assistants were briefed on the modalities of the instrument, there may be elements of bias in the rating due to subjectivity.

In spite of all these limitation, the finding of this work still stands.

Suggestions for Further Studies

Based on the findings of the study, the following suggestions were made for further research.

1. The study can be replicated in other States in Nigeria preferably using a larger sample of respondents to find out if the findings will be consistent with those of this study.
2. Furthermore, a study may be conducted to find out the level of availability and adequacy of relevant instructional resources and materials for teaching Basic Science and Technology in FCT Abuja.
3. Further studies should be conducted on the effect of learners' related factors on the efficiency of Basic Science and Technology teachers in FCT Abuja.
4. Impact of learners' study habit on teachers' effectiveness in teaching Basic Science and Technology.

Summary of the Study

The main purpose of the study was to assess Basic Science and Technology teachers' effectiveness in teaching Basic Science and Technology in FCT Abuja. Five (5) specific purposes, five (5) research questions and ten (5) null hypotheses guided the study. The related literature to the study was reviewed under the following major sub-headings: conceptual framework, theoretical framework, review of related empirical studies and summary of the literature review. The study adopted the ex-post-facto research design. The study area was Federal Capital Territory Abuja and covered six Area Council namely; Abaji, Bwarri, Gwagwalada, Kuje, Kwali and Municipal council. The population of this study comprised of all the 9193 (4439 male and 4754 female teachers) Universal Basic Education Commission (UBEC) school teachers in the 570 UBEC schools in FCT Abuja. A sample of 1120 public primary school teachers teaching Basic Science and Technology was drawn for the study using multi-stage sampling procedure.

The instrument for data collection for this study was an observation checklist titled: 'Observational Schedule for Assessing Teachers' Effectiveness in Teaching Basic Science and Technology (OSATETBST). The instrument was face-validated by three experts; two from Childhood Education and one from Measurement and Evaluation, all from Faculty of Education, University of Nigeria, Nsukka. The validated version of the instrument was trial-tested using 30 classroom teachers in 10 public primary schools in Taraba State which was outside the area of the study but with similar characteristics. The responses of the respondents were subjected to reliability analysis using Cronbach Alpha to determine the internal consistency of the instrument and the overall reliability index obtained was .85; hence the instrument was considered to be reliable and was used for the study

Permission was sought from the head teachers of the various sampled primary schools for the field work. The researcher also briefed twenty (20) research assistants on how to use the observation checklist to rate the 1120 public primary school Basic Science and Technology teachers while teaching. Thus, the observation checklist was used by the research assistants to observe and rate teachers in line with the items in the observational schedule while teaching. Data collected were analyzed using mean and standard deviations to answer the research questions while the hypotheses were tested using t-test statistic. The findings of the study, among others showed that:

1. Male and female primary school teachers possess the required skills for teaching Basic Science and Technology to a great extent.
2. Learning objectives are effectively used by male and female primary school teachers to plan lessons in Basic Science and Technology to a great extent.
3. Appropriate teaching methods are used by male and female primary school teachers in teaching Basic Science and Technology to a great extent.

4. The result of the study showed that instructional resources are used by male and female primary school teachers for effective teaching of Basic Science and Technology to a great extent.
5. Male and female primary school teachers encourage school pupils to participate in Basic Science and Technology lessons to a great extent.

The implication of the above findings of the study showed that Basic Science and Technology teachers in FCT are efficient in teaching basic science and technology. However, the efficiency of basic science and technology teachers do not reflect on the academic performances of pupils. Hence the review of literature informed that pupils' performance in Basic Science and Technology was below average (primary education board statistic unit, FCT, Abuja, 2017). Therefore poor achievement of pupils on basic science and technology could be attributed to learners' (pupils') related factors such as learners' interest, aspiration, intrinsic motivation, study habits and home related factors among others. The learners' related factors may have inhibited the reflection of teachers' efficiency on the academic achievement of basic science and technology pupils. In line with the above implication, it was recommended that every basic science and technology teachers should be periodically exposed to symposium to sustain the efficiency on various skills require in teaching basic science and technology while emphasis should be lead on such skills they possess to low extent such as ability to carry out experiment, ability to interpret the result of the experiment and the ability to improvise instructional materials among others; adequate attention should be paid to pupils related factors to learning to compliment the efforts the teachers in achieving the required academic objective. These among others can help promote teachers' effectiveness in teaching the Basic Science and Technology in order to enhance pupils' understanding and achievement in the subject. The limitations of the study were highlighted and suggestions were also made for further studies.

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APPENDIX A**INTRODUCTORY LETTER TO RESPONDENTS**

Department of Educational Foundations
Faculty of education
University of Nigeria
Nsukka.

11th February, 2017.

Dear Respondents,

REQUEST FOR COMPLETION OF QUESTIONNAIRE

I am a postgraduate student of the above named Department and institution, currently carrying out a research on the topic; **“Assessment of Teachers’ Effectiveness in Teaching Basic Science in Primary Schools in Federal Capital Territory of Nigeria”**.

You are kindly requested to supply relevant information by responding to the items contained in the questionnaire.

The researcher wishes to assure you that your response will be treated in strict confidence and used for academic purposes only.

Please accept my esteemed assurances of the highest regards.

Thank you.

Yours faithfully,

Igbokwe, F. O.
Researcher.

APPENDIX B

RATING SCALE FOR ASSESSING TEACHERS' EFFECTIVENESS IN TEACHING BASIC SCIENCE AND TECHNOLOGY (RATETBST)

Section A; Demographic information

Kindly indicate as appropriate:

Teacher's Qualification: NCE (), First Degree (), Masters Degree and above ()

Gender: Male (), Female ()

Section B: Teachers' Effectiveness in Teaching Basic Science and Technology

Please respond to all the statement in the questionnaire. Tick (å) in any option where applicable

S/N	Cluster A: Teachers' required skills for teaching primary school Basic Science and Technology. Item Statements	VGE	GE	LE	VLE
1	Subject mastery skill				
2	Observational skill				
3	Questioning ability				
4	Communication skills				
5	Ability to give feedback to learners				
6	Ability to carry out experiments				
6	Ability to interpret results of experiments				
7	Ability to classify things				
8	Ability to analyze a problem				
9	Ability to organize things				
10	Ability to improvise by constructing things				
S/N	Cluster B: The Extent to which learning objectives are effectively used to plan lessons in basic science and technology. Item Statements	VGE	GE	LE	VLE
11	Ability to prepare his/her lesson notes				
12	Ability to reflect stated objectives through his/her teaching				
13	Ability to properly set-induce the pupils to the new ideas				
14	Ability to state attainable learning objectives in line with the curriculum				
15	Ability to present learning content/experiences logically or in a step by step manner				
16	Ability to generate the desirable learning feedbacks				
17	Ability to cover the three behavioural objectives of learning				
18	Ability to think creative ways of achieving preset learning objectives				
19	Ability to evaluate pupils' learning				
20	Ability to make use of feedbacks from learning during lesson				
S/N	Cluster C: Extent to which appropriate teaching methods are used in teaching primary school Basic Science and	VGE	GE	LE	VLE

	Technology.				
	Item Statements				
	Teacher's ability to use:				
21	Play-way method				
22	Role play method				
23	Simulation method				
24	Demonstration method				
25	Discussion method				
26	Peer tutoring method				
27	Problem-solving method				
28	Guided discovery method				
29	Cooperative learning method				
30	Project method				
S/N	Cluster D: Extent to which Instructional resources are used for effective teaching of Basic Science and Technology.	VGE	GE	LE	VLE
	Item Statements				
	Skills in the utilization of Instructional resources such as:				
31	Textbooks				
32	Workbooks				
33	Picture books				
34	Real objects				
35	Science corners				
36	Science equipments				
37	Drawing materials				
38	Painting materials				
39	Animal books				
40	Charts/visual arts				
SN	Cluster E: Extent to which teachers encourage Encouragement of school pupils to participate in Basic Science and Technology lessons.				
	Item Statements				
	Teacher encourage pupils with the following:				
41	Asking pupils questions by calling them by their names during lesson				
42	Engaging pupils with problem solving tasks				
43	Grouping pupils to accomplish a given task collaboratively				
44	Reinforcement to pupils for successful completion of tasks				
45	Consideration for individual to individual differences among pupils				
46	Ability to sustain pupils' interest in class activities				
47	Creativity in varying his/her instructional strategies to involve pupils				
48	Giving pupils active role to play during class activities				
49	Showing pupils warmth/care				
50	Creating a platform for good teacher-pupils relationship				

APPENDIX C

RELIABILITY COMPUTATION USING CRONBACH ALPH

Clusters A: Teachersörequired skills for teaching primary school Basic Science and Technology

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded ^a	0	.0
	Total	30	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.826	10

Clusters B: The Extent to which learning objectives are effectively used to plan lessons in basic science and technology.

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded ^a	0	.0
	Total	30	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.874	10

Clusters C: Extent to which appropriate teaching methods are used in teaching primary school Basic Science and Technology

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded ^a	0	.0
	Total	30	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.852	10

Clusters D: Extent to which Instructional resources are used for effective teaching of Basic Science and Technology.

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded ^a	0	.0
	Total	30	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.796	10

Clusters E: Extent to which teachers encourage Encouragement of school pupils to participate in Basic Science and Technology lessons.

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded ^a	0	.0
	Total	30	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.871	10

Overall

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded ^a	0	.0
	Total	30	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.854	50

APPENDIX D

DISTRIBUTION OF TEACHERS IN UNIVERSAL BASIC EDUCATION COMMISSION (UBEC) SCHOOLS IN THE FEDERAL CAPITAL TERRITORY, NIGERIA

AREA COUNCIL	NO OF SCHOOL	NO OF TEACHERS		
		M	F	TOTAL
ABAJI	58	776	469	1245
BWARRI	87	584	1176	1760
GWAGWALADA	80	584	598	1182
KUJE	99	851	643	1494
KWALI	92	977	437	1464
MUNICIPAL	144	667	1381	2043
TOTAL	570	4439	4754	9193

SAMPLED SCHOOLS AND TEACHERS IN UNIVERSAL BASIC EDUCATION COMMISSION (UBEC) SCHOOLS IN THE FEDERAL CAPITAL TERRITORY, NIGERIA

AREA COUNCIL	NO OF SCHOOL	NO OF TEACHERS	
		M	F
ABAJI	12	120	
BWARRI	17	170	
GWAGWALADA	16	160	
KUJE	20	200	
KWALI	18	180	
MUNICIPAL	29	290	
TOTAL	112	1120	