**TEACHING SKILLS REQUIRED BY PRE-SERVICE TEACHERS FOR ENHANCING TEACHING AND LEARNING OF BASIC SCIENCE AND TECHNOLOGY IN BOSSO LOCAL GOVERNMENT, NIGER STATE**


**BY**


**MURTALA MOHAMMED**
**2016/3/64548TI**


**DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION**
**FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA**


**JULY, 2021**

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**A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF TECHNOLOGY DEGREE (B.Tech) IN INDUSTRIAL AND TECHNOLOGY EDUCATION**

**JULY, 2021**

# DECLARATION

I, Murtala Mohammed with matriculation number 2016/3/64548TI an undergraduate student of the Department of Industrial and Technology Education certify that the work embodied in this project is original and has not been submitted in part or full for any other diploma or degree of this or any other university.


**MURTALA MOHAMMED**                                    _____
**2016/3/64548TI**                                              Signature & Date

# CERTIFICATION

This project has been read and approved as meeting the requirements for the award of B.Tech degree in industrial and technology Education, School of Science and Technology Education, Federal University of Technology, Minna.


Dr. A.M. Hassan                                                 _____
Project Supervisor                                              Signature and Date




_____                                           _____
DR. U.I, Yakubu                                                 Signature and Date
Head of Department




_____                                           _____
External Examiner                                               Signature and Date

## DEDICATION

This project is dedicated to almighty Allah my great advocate, the founding of knowledge and seat of wisdom the beginning and the end of every project and also to the beloved family of Mohammed Saidu Dan-Musa

## ACKNOWLEDGEMENT

# ABSTRACT

The study was carried out to determine teaching skills required by technology education student to enhance teaching and learning of basic technology in Bosso local government Minna, Niger state. Four research questions guided the study while four null hypotheses were formulated and tested at 0.05 level of significance. The study adopted survey research design. The population for the study was 48 Basic Technology teachers and Lecturers. There was no sampling because of the manageable size of the population. The instrument used for data collection was structured questionnaire. Three experts validated the instrument. Mean and standard deviation were employed to analyze data for answering research questions while t-test was used to test the null hypotheses at 0.05 level of significance. The finding of the study revealed that Selection instructional content of a lesson, Select available human and material resources need for planning a lesson, Construct a lesson plan, Select methods and techniques for teaching a lesson, are the Instructional planning skills required by technology education student to enhance teaching and learning of Basic Science and Technology subject. Provide safety poster in the laboratory to encourage correct safety habit in sequence and logical order, Arrange benches and machines properly to facilitate learning are the Teaching methodological skills required by pre-service teachers for enhancing the implementations of Basic Science and Technology subject. Evaluating students affective domain, Assessing students psychomotor performance, Construct reliable test to evaluate students progress, Assessing the effectiveness of the teaching strategy, Making record about students academic ability, Provide records about students moral character and personality are the Instructional evaluation skills required by pre-service teachers for enhancing the implementations of Basic Science and Technology subject. It was recommended that workshop and seminars should be organized for the teachers of Basic science and technology in order to build their capacity for the implementation of the basic science and technology in junior secondary schools in Bosso Local government Minna.

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**CHAPTER ONE**

**1.1     Background to the Study**

A sound knowledge of Basic Science and Technology subject in junior secondary schools can create a strong foundation for any technological development. It enables individual with knowledge and skills for designing techniques and process that will enable them to make maximum use of their natural resources for the benefit of the society and improving individual living. Basic Science and Technology is one of the pre-vocational subjects offered at the junior secondary schools in Nigeria. It is a preparatory core subject of vocational and technical education. Basic Science and Technology being one of the skill oriented subjects which enables the individual to acquire appropriate skills and abilities to live in and contribute effectively to the development of his society (Olaitan, 2013).

Basic Science and Technology is also a basic subject on which future technological development of students are build for those interested in vocational technical courses or engineering in higher institutions. According to the report of Federal Ministry of Education (FME) (2010), Basic Science and Technology is an essential subject in the 9 year basic education programme. Its purpose according to the report is to contribute to the achievement of the national education goals by inculcation of technology literacy, experience of students to the world of work to match their talents and interests for wise vocational choice and inculcation of positive attitudes towards work as a source of human identity, livelihood and power. Basic Science and Technology provides opportunities to students to use tools and machines used in the industries. This helps to build good attitudes towards technology and the industry. The study of Basic Science and Technology helps to reduce ignorance about technology. The teaching of Basic Science and Technology according to report of Nigerian Educational Research and Development

Council (NERDC) (2012) became necessary due to technological development and increased national policy orientation towards vocational education development. The desired development in the Nigerian vocational education system can only be achieved through effective implementation of Basic Science and Technology in secondary school level.

Basic Science and Technology is a pratical-oriented and requires skills field of study and aims at equipping the students with essential technical skills. Uwameiye and Ogiegbaen (2011) described Basic Science and Technology which as a core subject among the pre-vocational subjects in junior secondary school syllabus that involves the academic practical study of materials and sources of energy with the ultimate intention of applying knowledge from the study to provide a comfortable environment for man. Uwameiye (2010) reported that through technology, students are helped to explore the various areas of technology towards making intelligent career choice.

The study of Basic Science and Technology has helped to reduce ignorance of technology; it provides skills that help the learners to handle any piece of work given them. Also, students who have acquired Basic Science and Technology knowledge and do not have means of continuing their education may be employed as craftsmen in industries. Uwameiya (2010) observed that through Basic Science and Technology, students are assisted to explore the various areas of technology towards making intelligent career choice. Basic Science and Technology has three major objectives as stated by the Federal Republic of Nigeria (2013);

- To provide pre-vocational orientation for further technology.
- To provide Basic Science and Technology literacy for every living
- To stimulate creativity.

According to the NERDC (2012) Basic Science and Technology has four branches which are:

- Basic technology

- Basic science

- Information technology

- Physical and health education.

For the aim and objective of Basic Science and Technology to be achieve graduate are been train in technology education programme, so that they can effectively implement teaching of Basic Science and Technology. Technology Education according to Aina (2014) meant skill training in crafts and in certain trades such as building, auto mechanics and woodwork. Now the major fabric of technology education Involves training In the process of applying both science and technical education to practical problems right from primary to tertiary level of education This is because it aims at developing practical skills as well as the creative and Innovative abilities and facilitates decision making skills and problem solving abilities.

Technology Education aim to train students in the application of science and technological knowledge to the solution of practical problems facing society, not merely to train them In manual and technical education is taken to mean technology education In addition, technical education within the content of craftsmanship is seen by many as education for self reliance, which leads to national development. It is the education which provides the persons that has received it with self employment thereby contributing to the society in which he/she lives It is for this reason that authors like Toby (2011), Sofolahan 1989 in Miller (2011) attributed under-development to low level of technology which marks the sociocultural difference between developed and developing worlds. Technical/technology education is a major component of

vocational education The Nigeria Educational Research and Development Council NERDC (2012) stated that vocational education is that form of education which is obtainable at the technical colleges This is equivalent to senior secondary education but designed to Prepare individual to acquire practical skill, basic and scientific knowledge and attitude required as craftsmen and technicians and sub-professional level. The technical college teacher according to Ekpenyong (2013) must be versatile in their areas and in the general and basic technology education subjects. According to the student handbook of industrial and technology education the following are the objective of the programme:

1. Equip graduates with appropriate techniques for solving problems affecting Technology Education and Technological innovations.

2. Provide specialized training for technical teachers, curriculum developer and supervisors of Technology Education at all school levels.

3. Equip graduates with creative teaching strategies at the elementary, secondary and tertiary levels of education.

4. Equip graduates with designs and research skills.

Students in Technology Education are been train so as to be able to teach Basic Science and Technology subject in junior secondary schools. To achieve the aim and objective of Basic Science and Technology there must be adequate teaching skills by the teacher to ensure sound delivery of knowledge to the students. Uwameiye (2010) described a teacher as person who attempts to help someone acquire or change some knowledge, skills, attitude, idea or appreciation. According to Olaitan (2010) a teacher is a person who imparts knowledge, skills and attitude to someone in a school. A technical teacher according to Miller, Bakare and Ikatule (2010) is an individual who is trained in pedagogy and technical area of a particular subject to

impart knowledge, skill and attitudes to students in an institution. Teachers of technology in this study are individuals who have been trained professionally in the art of teaching Basic Science and Technology curriculum to students in junior secondary schools. Teachers of technology are still set of individuals to implement new Basic Science and Technology curriculum. For effective implementation of the Basic Science and Technology curriculum in Junior Secondary Schools these teachers need to possess the required teaching skills.

Skill in the view of Robinson (2000) is a standardized requirement for an individual to properly perform a specific job. Krevisky and Jordan (2011) viewed skills as ability to possess suitable and sufficient skills, knowledge and experience for carrying out a particular task. Olaitan (2010) added that skill is the knowledge, attitude and judgement which one required in order to perform successfully at a specified proficiency in any given work. Usioboh (2013) described skill as ability to do something well measured against a standard especially ability acquired through experience or training. To be skilled means having enough knowledge and attitude to do something to a satisfactory standard. In the context of this study, skills the capacity of a teacher of technology to effectively teach the content of Basic Science and Technology curriculum in Junior Secondary Schools. Skilled teachers of technology are expected to posses the skills and knowledge required in the teaching of the subject matter to students; and where this is lacking, improvement of the teaching skills of the teachers is needed.

For proper implementation of Basic Science and Technology subject in junior secondary, teachers of Basic Science and Technology most posses the following teaching skills so as to achieve the aim and objectives of Basic Technology:

- Skills in instructional planning
- Skills in classroom management

- Skills in teaching methodology

- Skills in instructional evaluation.

- Skills in teaching the curriculum content.

For Basic Science and Technology knowledge and skills to be properly transfer to the student implementation of teaching skills must be effective. Implementation is a process of making something work or the processes of bring something to reality. According to Patrica (2014), implementation is the carrying out, or the practice of a plan for doing something. It is the deed that must have preface thinking in order for something to happen. Olaitan (2010) described implementation to be a process, technique or means of extending the content of what is planned for the learner. In this study, implementation means the process of carrying out series of planned activities towards achieving the stated objectives of Basic Science and Technology at secondary school level. In Nigerian Secondary School education system, teachers play major roles in the implementation of subjects such as Basic Sience and Technology.

Reports from different states in Nigeria indicated poor performance of students in their Junior Secondary School Examination in Basic Science and Technology Babalola (2012). This could be attributed to incompetence of teachers of Basic Science and Technology in equipping the students with knowledge, skills and attitudes that could assist them in passing their examinations. In addition, the inadequacy of required facilities in the schools also contributed to the weak implementation of Basic Science and Technology in schools. For every graduating students of technology education who are going to the field of equipping the teaching they must posses' adequate and qualified teaching skills which will enables them to build student in the junior secondary schools. NERDC report (2012) stated that 50% of the teachers in Nigerian school system were found unqualified to teach.

## 1.2     Statement of the Problem

Basic Science and Technology is an incorporated subject whose its teaching requires an interdisciplinary approach to the exclusion of subject's boundaries. Teacher quality is a strong predictor of student quality. More so, that it is widely acknowledged that no educational system can rise above the quality of its teachers". There is therefore great doubt as to the adequacy of teachers, in terms of quality teaching skills, now handling the subject in our various secondary schools.

Reports from different states in Nigeria indicated poor performance of students in their Junior Secondary School Examination in Basic Science and Technology Babalola (2009). This could probably be attributed to incompetence of teachers of Basic Science and Technology. The committees, (FGN 2004) then observed that the present crops of teachers teaching the subject are grossly incompetent and incapable. Some recent studies carried out in the area of teacher quality for the junior secondary school Basic Science and Technology in some states of the federation indicate negative disposition (Nduanya, 2010) and Okeke (2014). In a similar survey, Aina (2014) on technical teacher production noted that out of all the militating factors against the full implementation of the Basic Science and Technology programme, the teacher quality factor ranks highest. As a result of the problem of inadequate teaching skill of the teachers of Basic Science and Technology. This study, therefore intend to identify teaching skills required by technology education students to enhance teaching and learning of Basic Science and Technology in Minna, Niger

**1.3    Purpose of the Study**

The main purpose of this study is to determine the teaching skills required by technology education students to enhance the teaching and learning of Basic Science and Technology in Bosso, Niger State. Specifically the study will identify:

1.  Instructional planning skills required by technology education student to enhance the teaching and learning of Basic Science and Technology.

2.  Classroom management/laboratory skills required by technology education students to enhance the teaching and learning of Basic Science and Technology.

3.  Teaching methodological skills required by technology education students to enhance the teaching and learning of Basic Science and Technology.

4.  Instructional evaluation skills required by technology education students to enhance the teaching and learning of Basic Science and Technology.

**1.4    Significance of the Study**

The findings of the study will be of great benefits to the technology education students, Basic Science and Technology students, Ministry of education, Educational researchers and the society.

The findings will reveal areas where technology education students need improvement in teaching Basic Science and Technology to students. Therefore the skills identified could be used to train teachers of Basic Science and Technology for effective teaching. The stated objectives of Basic Science and Technology will now be achievable ones.

The students of Basic Science and Technology will also be of benefit from the study if the findings that will be identifying will be using to train technology education students who are the principal implementers of Basic Science and Technology in schools. Improvement of these technology education students will now affect the learning result of the students positively. The students will now understand the knowledge and skills in Basic Science and Technology. Appropriate understanding of Basic Science and Technology will motivate their interest in choosing technology as careers for success in the future**.**

The findings of this study will also be of benefit to the Niger State Ministry of Education. The findings of this study will reveal to Ministry of Education areas of Basic Science and Technology where teachers need advancement. Workshops, seminars or conferences will now be organize for these teachers in order to enrich their knowledge in Basic Science and Technology and appropriate methods of teaching it.

The educational researchers will also benefit from this study. This study will provide information or literature to educational researchers who want to conduct similar study. The study will also serve as a guide to the researchers. It will enable them to know the procedures for conducting improvement needs study.

The study will bring an awareness of the usefulness and help the society to be able to give every members of the society proper education in order to acquire proper skill and knowledge of Basic Science and Technology to improve and develop the society

**1.5     Scope of the Study**

The study will be carried out to determine the teaching skills required by the technology education students to enhance teaching and learning of Basic Science and Technology in Niger State. The study specifically will cover the teaching skills required by the technology education

students in planning instruction, teaching the content of Basic Science and Technology instructional planning, classroom/laboratory management, using teaching methods and techniques and in applying evaluation techniques for the implementation of Basic Science and Technology in public junior secondary schools in Bosso Local government area, minna, Niger state.

The Technology Education lecturers and teachers of Basic Science and Technology subjects in junior secondary school level in the study constitute the respondents from which data for the study will be collect. This is because, it is the candid believe of the researcher that these two groups of respondents are suitable for providing the require data for the study. Adequacy of workshop or laboratory equipment will not be covered, as it does not form part of teaching skills required.

## 1.6    Research Questions

Below are the research questions guiding the study:

1.  What are the Instructional planning skills required by technology education student to enhance teaching and learning of Basic Science and Technology?

2.  What are the Classroom/laboratory management skills required by technology education students to enhance teaching and learning of Basic Science and Technology?

3.  What are the Teaching methodological skills required by technology education students to enhance the implementations of Basic Science and Technology?

4.  What are the Instructional evaluation skills required by technology education students to enhance the implementations of Basic Science and Technology.

## 1.7    Hypotheses

The following null hypotheses that will be tested at 0.05 level of significance:

**H$_{01}$:** There is no significant difference in the mean responses of Technology Education lecturers and Basic Science and Technology teachers on the instructional planning skills required by technology Education students to enhance teaching and learning of Basic Science and Technology.

**H$_{02}$:** There is no significant difference in the mean responses of Technology education lecturers and the Basic Science and Technology teachers on the classroom/laboratory management skills required by technology Education students to enhance teaching and learning of Basic Science and Technology.

**H$_{03}$:** There is no significant difference in the mean responses of Technology Education lecturers and Basic Science and Technology teachers on the Teaching methodological skills required by technology Education students to enhance teaching and learning of Basic Science and Technology.

**H$_{04}$:** There is no significant difference in the mean responses of Technology Education lecturers and Basic Science and Technology teachers on the instructional Evaluation skills required by technology Education students to enhance the implementation of Basic Science and Technology.

**2.0                              LITERATURE REVIEW**

**2.2 Conceptual Framework**

2.1.1    Basic Science and Technology in junior secondary school education in Bosso Local government area

2.1.2    Instructional planning skills required in teaching the content of Basic Science and Technology curriculum in junior secondary school

2.1.3    Teaching skills required in Classroom/Laboratory Management

2.1.4    Skills require in using teaching methods and techniques

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2.2    **Theoretical Framework**

2.2.1 Jerome Bruner's Cognitive Theory of teaching and learning

**2.3 Review of Related Empirical Studies**

**2.4 Summary of Review of Related Literature**

**2.4.1  Basic Science and Technology in junior secondary school education in Bosso Local government area**

Technology is the process by which humans modify nature to meet their needs and wants. Technology according Afuwape and Oriola (2017) is the use of the product of creativity, inventions and scientific research in the service of man. To achieve these, Government of Nigeria introduced technology into the school curriculum for children to learn. Uwameiye (1993) reported that through Basic Science and Technology, students are helped to explore the various

areas of technology towards making intelligent career choice. The author explained further that technology does not in any way provide training for specific occupations nor aims at developing competencies. Technology which is the only core subject among the prevocational subjects of the Junior Secondary Schools in Nigeria, involves the academic and practical study of materials, and sources of energy with the ultimate intention of applying knowledge from the study to provide a comfortable environment for man. This study of Technology helps also to reduce ignorance about technology.

From the beginning of 6. 3. 3. 4. System of education in Nigeria, technical and vocational education as offered as a subject at the end of primary school and was called "Introductory Technology" which is different from the current 9. 3. 4 system of education where it is called "Basic Technology" (Fakomogbon, Morakinyo, Omiola & Ibrahim, 2012). Basic Science and Technology is a subject that introduces students at the Junior Secondary schools in Nigeria to the basic rudiment of technology. According to the National Policy of Education (2013) the objective of junior secondary education are to:

1. Provide the child with diverse basic knowledge and skills for entrepreneurship and educational advancement.

2. Develop patriotic younge people equipped to contribute to social development and the performance of their civic responsibilities.

3. Inculcate values and raise morally upright individuals capable of independent thinking, and who appreciate the dignity of labour.

4. Inspire national consciousness and harmonious co-existence irrespective of differences in endowment, religion, ethic and socio-economic background.

The National Policy on Education (FRN, 2013) defined it as the aspect of education which leads to acquisition of practical and applied skills as well as basic scientific knowledge. According to the Federal Ministry of Education (2013), the following are the objectives of teaching Basic Science and Technology subject in Nigerian junior secondary school schools:

i. To provide pre-vocational orientation for further training in technology.

ii. To provide Basic Science and Technology literacy for everyday living and

iii. To stimulate creativity (Fakomogbon 2012).

Therefore, to reduce ignorance about technology and lay a solid foundation for true national development; Basic Science and Technology subject needs to be accorded a place in the school curriculum as a not only as a core subject like Mathematics and English language, but with consideration of recent technological developments. In Bosso Local government minna, Niger state there are six (6) secondary schools which offers Basic Science and Technology subject at junior level.

## 2.1.2 Instructional planning skills required in teaching the content of Basic Science and Technology curriculum in junior secondary school

Effective teaching of Basic Science and Technology requires skill. Skill base on the subject matter are the first quality every teacher of Basic Science and Technology must possess. No one can teach what he/she does not know. Jokotola (2003) stated that a teacher must know the subject he is going to impact to the learners and that without a good foundation of the subject matter the students will lose confidence in the teacher and the teacher may soon lose his or her job if the employer gets to know that he actually has nothing to offer. Olaitan (2003) also stated that subject matters may be defined generally to mean a broad field of study made up of array of knowledge, skill and attitudes which an individual must acquire to become professionally skill

contributors to the growth and development of his immediate family, community, state and nation. The world is turning into a global village where students are liable to be exposed to all sorts of new knowledge in their subject areas such as new technological developments, which make it very important for the teachers to be skill in the subject matter. If the teacher lacks the practical knowledge or skills, it will be hard to pass on required skills to the students and as such no best result will be obtained in the training. Teachers of Basic Science and Technology must be skill in all the contents of Basic Science and Technology to be taught for effective assimilation to take place.

Many teachers enter the field with a moral purpose, the ability of teachers to serve as change agents relies on four core capacities Personal, vision, inquiring, mastery and collaboration. It is the responsibilities of higher institutions to produce skill teachers in Basic Science and Technology for effective teaching in secondary schools. According to Federal Ministry of Education (FME) (2010), Nigeria is in very short supply of professional textbooks, training manual and instructional media. The scarcity of professional textbooks and training manuals is a national threat to the technological development of the nation if professional text book, training manual and instructional media are not available for teachers and students to work with. It is essential for teachers of Basic Science and Technology to be skill in both theory and practical skills. Olaitan *et al.* (2010) stated that the teachers should teach knowledge before skills. They further reported that "for effective learning to occur the learners should have good command of this information before practicing based on the knowledge of the subject matter and knowledge of how to teach subject would still not enable a teacher to be of maximum value in his profession. A skill teacher of Basic Science and Technology must have an in-depth knowledge of other subjects of the curriculum which is of social and economic aspect of

education or foundation that broadens ones knowledge and outlook thereby attaining the goals of educational system. According to Jokotola (2013) he stated that having mastered the subject matter very well the teacher must possess certain qualities which are largely physical, psychological, emotional and intellectual skill in order to be effective. Some of the skills include:

1. Good personality

2. Ability to understand child psychology

3. Ability to inspire learners

4. Resourcefulness

5. skills to improvise

6. Ability to observe and evaluate

It is therefore necessary for teachers (technology Education student) of Basic Science and Technology to be equipped with knowledge of the subject and skills for effective teaching. They should also have the capacity of creating a perfect teaching and learning atmosphere in the classroom.

### 2.1.3  Teaching Skills require in Classroom/Laboratory Management

Management is the skillful handling or use of something such as resources. It involves the act of controlling, directing and supervising. The classroom teachers does all of these and more in his managerial role in the classroom. Many productive system, whatever its aim and technology, require management, it must have leadership and direction, supervision and co-ordination, constant evaluation and adjustment. Bell (2010) also defined classroom management as the ability to establish, maintain and restore classroom as an effective environment for teaching and learning.  Bell added that it is particularly true of teachers working in urban schools where potential management problems tends to be more intense and numerous. Management

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depends on preparations, clarity about expectations, rules and procedures, instructions and opportunities to practice desired procedures and receive feedback, giving reminders to desired procedures at times when they are supposed to be implemented, consistent monitoring of the students and follow through with intervention when necessary.

Ogwo and Oranmu (2016) believed that the ability to manage and discipline is quite important because students are not in the position to take upon them more leadership responsibility than is delegated by the teachers nor can they be expected to take initiative in participating in class management. Ogwo and Oranmu are also in opinion that it is expected of the teachers to organize the classroom and laboratory that the students may receive maximum benefit from assisting in problems of laboratory routine as well as from performing individual practical work. Successful classroom and laboratory management according to them depends on some conditions, some of which are interest, understanding, careful planning by the teacher and a suitable working condition. Basic Science and Technology laboratories have expensive facilities that are very complex in nature. It requires the active involvement of the teachers in planning, directing and controlling training facilities for the purpose of learning skills. When a laboratory is clean and bright with the equipments located in their appropriate places, it will give an impressive look to facilitate instruction and effective learning. Olaitan (2013) stated that a business -like laboratory stimulates and attracts new interest and capable learners because the facilities and their setting are impressive and therefore the learners would like to be identified with the programme. There are several reasons for maintaining a good laboratory and classroom management and they are outlined as follows:

1. A well arranged laboratory facilities instruction ii. An orderly laboratory fosters students learning because a comfortable environment stimulates learning. iii. A well maintained laboratory provides a safe setting in which the teacher and her students can work.

2. When students work in a well managed laboratory, they come to learn acceptable occupational work habits and procedures.

Some of the social agents in the laboratory is that the learners bringing in anxiety and opposition from home, playground and other extra -curricular activities of the learners Olaitan (2013).They also reported that a well managed tools and equipments in any occupation will provide learning effectiveness but challenging and existing to all the users of the laboratory. Therefore teachers' effectiveness in managing classrooms/laboratory determines learning outcome of the students or learners. Competencies improvement need of Teachers of Basic Science and Technology must be determined in for effective management of laboratory of basic technology.

**2.1.4   Skills require in using teaching methods and techniques**

Teachers of Basic Science and Technology are also expected to be skilled in applying appropriate teaching methodology. Teaching methodology is essential in any educative process. The teacher has to employ very rich methods and select  suitable ones among them .The method will not only give students with knowledge but it also must develop skills of cooperative learning, discussion and social relations of students of the same time (James 2002). Teaching methodology according to Ogwo and Oranmu (2016) "is a recurrent pattern of teacher behavior, applicable to various subjects matters, characteristics of more than one teachers and relevant to learning". Teaching methodologies described as recurrent because they are repeated over interval

measured in minutes or weeks that teaching can also been said to be instrumental process such as pattern teacher behavior, for example lecturing, discussion and so on Ogwo and Oranmu (2016).

Delivery systems for curriculum such as film, programmed instruction, printed matter etc are also organizational structures for promoting learning. The instructional processes promoted student learning of different kind of various subject matters. Pedagogy requires that teachers avoid confining to one teaching methods, teachers are advised to use various methods. Among the various difficulties experienced by teachers of Basic Science and Technology is not being able to use adequate teaching methods. Basic elements of several types of teaching methods may appropriately be combined for best result depending on the age of the students and the type of subjects matter being taught. This is where teachers select good but not all can be used at the same depending on the age and level of the students. Udoh (2012) stated that no teaching method is more effective than the other. But in a strict sense, some methods are more suitable for teaching certain contents that is skill, knowledge and values and so on.

A good teacher knows the principle guiding the choice of teaching method and stick to them in all situations, the teacher select the best suited for the subject matter considering the students ability available materials and the time her own capability. Olaitan (2013) also supported the concept that many expert will prefer the instruction separated from the curriculum and call it methodology which will include methods and techniques of teaching or various delivery system. According to Ogwo and Oranmu (2016), it is the teachers personal qualities compiled with his professional skills and the age of the learners that makes for effective teaching". Any effective teacher is aware that any teaching methodology employed without due consideration for the learner will not be successful. Some of the methods found effective in teaching technology based subjects are as follows:

1. Demonstration method

2. Discussion methods

3. Lecture methods

4. Project methods

5. Laboratory methods.

Demonstration method means teaching through displaying something that is audio-visual explanation of an idea process or a product. It involves showing, doing and telling the students the point of emphasis. It is mostly used as a technique within a method of teaching and sometimes used as a method by itself. The method is most effective methods in teaching skill or performance oriented subjects either in the sciences or art, the method is executed by examples and activities by the teachers while the learner observe and listens, thus the demonstration tasks the learners sense of sight and learning. This method could be given to the entire class, small group of students or to an individual. It requires careful planning and skilful execution where the method is used as an adjunct to another method or solely used, the teacher needs to plan well, organize the materials and skillfully present the demonstration exhibition and high degree of craftsmanship.

The lecture method which is also referred to as the talk chalk is the traditional methods of teaching which many modern educators consider as out dated but it is still prevalent in the education system in parts of Nigeria. Large amount of materials could be covered to a large class size in single period; it involves verbal presentation of ideas, concepts, generalization and facts. This method is not recommended for those in the primary school and lower secondary school

level because of their level of development Jokotola (2013) stated that the art of lecturing is a difficult one which requires that the teacher should undergo some training and continuous practice so as to achieve the required standard of performance. The teacher needs to have at his disposal to a variety of skills that do come as a result of natural endowment of which these skills must be developed except in exceptional case.

Discussion method is when two or more people interact verbally with each other. It could be considered as a technique within a method, it is a method that could be adopted deliberately in a learning situation Jokotola (2013). Sometimes it occurs spontaneously as a teacher uses one method of teaching or another. It may also occur at brief intervals during informal lecture. It involves talking over subjects from various points of view and the teacher's role is not to dispense or communicate knowledge but to act as a moderator, she does not dictate or influence the viewpoints of the student as he moderates the discussion.

Project method is learning activities selected, planned, designed and executed by learning collectively or individually clarifying factors, acquired new knowledge skills appreciation and to solve identified problems under teacher's guidance and supervision. Okoro (2015) reported that "in the planning of a project students may have to list the major steps in doing the project, make needed sketches, list the tools, equipments and materials required and state the procedures to be adopted in the assembly of the project. Okoro also remarked that in project methods, students are not usually told exactly what to do but are expected to participate in the planning of the intended project.

Another method is the laboratory method; the concept of laboratory work has extended from science affair to almost all other disciplines. Laboratory work is no more restricted to science alone. Laboratory method of teaching involves observation, experimentation or

application by individual or small groups dealing with actual materials. This method is not restricted to a classroom called laboratory alone but it cuts across environments outside the classroom that provides practical work to give first hand experiences to the learner. Subjects like English or literature are in modern times taught in specialized laboratories equipped with tape recorders, cassettes and earphones, instead of scientific apparatus to do science experiments Jokotola (2013). Teachers (technology Education students) are therefore expected to be skilled in using appropriate methods for teaching contents of basic technology. The choice of any method should however be based on stated objectives and the objectives must be stated in term of anticipated change in students behaviour that can be measured.

### 2.1.5 Teaching Skills require in applying evaluation techniques

The aim of evaluation is to uncover how much knowledge students have acquired during the teaching and learning processes, how much progress is being made which helps to reveal the level at which the objectives of the programme are being achieved. Evaluation plays an important role in many facts of the school program. It contributes directly to the teaching and learning process used in classroom instruction, curriculum development, making and reporting, guidance and counseling, school administration and research. Okoro (2015) stated that evaluation is useful in the evaluation of teacher ability and effectiveness. When a teacher evaluates his students he is directly evaluating his own ability and effectiveness as a teacher. If students constantly perform badly in an examination, it could be that the teacher has been unskilled and has not presented and taught his lesson in an interesting way. Ojidu (2013) stated that teachers' observation and judgments of students' behaviour are of special value in those areas where the behaviour is readily observable and the teacher special skills to judge. It is

therefore needless to say that evaluation is the appraisal of the worth or value of a thing or action and making of appropriate decision on the basis of such appraisal (Okoro, 2015).

When people choose between alternative lines of action they do so on the basis of an evaluation of the factors involved. Bell (2010) raised some important points about students evaluation which is often regarded as being essential for the benefit of teachers and administrations. Properly used evaluation procedures contribute to improve students' learning through the following:

1. Clarifying the nature of intended learning outcome

2. Providing feedback concerning learning progress

3. Providing short term goals to work towards providing information for overcoming learning difficulties for selection of future learning experiences.

It is therefore important for teacher of Basic Science and Technology to develop the necessary skills needed for the effective use of evaluation techniques. According to Houston (2014) information from carefully developed evaluation technique can also be used to evaluate and improve instruction. Okoro (2015) also stated that evaluation of students' performance can be categorized into the following:

1. Context evaluation- which involves the assessment of course and program objectives

2. Input evaluation- which helps to evaluate the teachers ability and effectiveness.

3. Process evaluation – which involves the assessment of instructional methods and determination of the level of knowledge or skill possessed by students if done at the formative stage of the teaching and  learning process

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

According to Ogwo and Oranu (2016) evaluating the input provides information on programme needs in terms of facilities, funds, equipments, materials, personnel and other resources involved in a programme. Process evaluation on the other hand is a technique which provides periodic feedback on the quality of implementation of a programme and determines if there are any defects in the implementation process. It also provides information for interpreting programme outcomes (Olaitan 2013).

### 2.1.6 Teaching Skills require in Effective Use of Instructional Materials

Instructional materials attract students' attention and interest on the subject being taught and maintaining their attention alive during learning process. It enables a comprehensible and an efficient teaching to occur. The more the sensory organ of the students are addressed the more efficient and permanent learning will be. For this reason teachers have to use the instructional materials in order to address the sense of the students as much as possible. Besides, the rapid improving technology increases the instructional alternatives in the educational system. olaitan (1996) stated that instructional materials that are used efficiently have the potential to improve the educational system. Ogwo and Oranu (2016) in their research about the perception of instructional materials stated that classroom teachers generally demonstrated little knowledge and skill about using computers and other devices for instructional material proves a major problem among teachers in secondary schools. It is therefore pivotal for computer studies teachers to attain and maintain an assure degree of technological competence o make instructional materials more effective, consequently it allows them to become more efficient in dealing with their daily tasks.

According to Houston (2014) instructional materials play an important role in the communication process for effective learning therefore, systematically prepared instructional

materials enhance communication leading to effective teaching and learning. Instructional materials assist teachers to teach effectively and also assist the learner to grasp contents and practice easily. Similarly teaching and learning aid helps both the trainer and trainee in the process of teaching and learning. However the aid or instructional material must be carefully designed, selected and skillfully used in order to bring about effective teaching and learning. Teaching only takes place only when learning has occurred. The teacher performs the teaching activities with the purpose of helping learners of diverse personalities and backgrounds to assimilate planned content. Therefore the teacher has to select appropriate content and activities, synthesis the desired conduct of the learner decide on methods to use, emphasis to make, values to prefer, conditions to strive for, changes to advocate and make efforts to accomplish the purpose of education.

Instructional materials or media are carriers of information that are selected to help learners achieve their objectives, Houston (2014). These can include printer, monitor, printed matter, diskette, CD ROM, DVD ROM, System units, or other Basic Science and Technology machines. However to effectively teach basic technology, one has to develop the required skills and competence to handle these instructional materials. It is with the aid of these instructional materials that the teacher would be able to teach effectively in the classroom and also help the learners to understand what is being taught more easily. There are several types of teaching and instructional materials categorized as projected and non-projected. Houston (2014) described projected instructional materials as media format where still images are enlarged and displayed on a screen like the overhead projectors, cinema projector, opaque projector, slide projector and LCD projector. Projected instructional materials are said to be more effective especially in higher learning because they clarify and assist meanings which words cannot portray. It is also suitable

for large groups but very expensive in capital layout and maintenance, it also requires that the teachers should be well trained for the development and correct use

Non-projected instructional materials which are also called the backbone of the whole range of classroom visual aid are also very useful and effective. Teachers would have to generally appreciate their values. Some example of non-projected instructional materials are the white board display materials, printed and duplicated materials, audio aids such as radios, record player public address system, and electronic aid such as the CPU, computers. Therefore for schools to realize fully the educational potential offered by basic technology, teachers need technology training to acquire skills for use in their teaching practices. There is need also for in-service education program for the teachers which should lay emphasis on the integration of computer use in subject content areas and individual curriculum units. The training should be made open to both private and public school teachers to ensure uniform standards. In addition most teachers needs retraining in Information Technology (IT) techniques to enable them integrate it into instructional method and materials.

## 2.2 Theoretical Framework

### 2.2.1 Jerome Bruner's Cognitive Theory of teaching and learning

The cognitive theory of Jerome Bruner was propounded in 1990. The cognitive theory of Jerome Bruner advocated the use of discovery learning in schools. According to him, the student is not to be presented with subject matter in its final form but that the learner should be allowed to organize it himself so as to be able to discover relationships that exist among items of information. Bruner advocated that if students were allowed to pursue concepts on their own, they would gain a better understanding. Basically, Bruner see learning as something inside the learner. He therefore suggests that classrooms should be organized so that children can learn

through their own active involvement. The role of the teacher is to guide the students into discovery. The teacher according to him is to provide guidance or organizing the curriculum in a spiral manner so that the students are continually building upon what they have already learnt (Bruner, 1960).

In applying Bruner's ideas in the classroom, students should be confronted with problematic situation and should be allowed to find a solution. As a result, most science curricular around the world place emphasis on discovery learning as one of the method that could enhance good classroom interaction practice (Onimisi, 2005).

Bruner's theory puts emphasis on active learning process in which learners construct new ideas or concepts based on both their current and past knowledge. Bruner's theory was to discover and to describe formally the meanings that human beings create out of their encounters with the world (Bruner, 1960).

The study of Mundi (2006) revealed that students learn more and faster through the than those exposed to the conventional approach. This is because of the activity-centred nature of the students are actively involved and reinforced to learn than the conventional approaches where students are mere passive listeners. For instance, Frieman (2001) noted that with experience, social reinforcers such as compliments, praise and attention could become important consequences for human behaviour.

In the teaching of Basic Science and Technology, students are not to be presented with the subject matter in its final form but that the students should be allowed to organize if himself so as to be able to discover relationships that exist among items of information. When students are allowed to pursue concepts on their own, they would gain a better understanding. It is therefore very necessary that the classrooms should be organized so that students can learn

through their won active involvement while the teacher guides the students into discovery. Here students should be confronted with problematic situation and should be allowed to find a solution. This can only be achieved through the use of appropriate teaching method(s) by the teacher. Problem solving and if well conducted by the teacher could help learners to organise their thoughts for learning effectiveness. Many students show interest for learning when better methodologies are employed in Basic Science and Technology lessons (Mundi, 2006).

## 2.3     Related empirical studies

Olaitan, Alaribe and Omeh (2010) investigated competency improvement needs of instructors for effective teaching of cocoa plantation establishment and management to students in schools of agriculture in southwestern Nigeria. Four research questions guided the study. Survey research design was adopted for the study. It was carried out in southwestern Nigeria. The population for the study was 96 instructors in schools of agriculture in Ondo and Oyo states. The sample of the study was 42 instructors purposively sampled from the Departments of Crop production in schools of agriculture from the two states. The instrument used for data collection was a 49-competency structured questionnaire which was face validated by three experts. Split-half technique and cronbach alpha reliability method were adopted to determine the internal consistency of the competency questionnaire item; a cronbach alpha coefficient of 0.76 was obtained. Fifty two copies of the instrument were administered. All the fifty two copies of the instrument were retrieved and analysed using weighted mean and improvement needed index (INI). It was found out that improvements were needed by the instructors in 45 out of 49 competencies identified in cocoa plantation establishment and management. It is therefore recommended that, the identified competencies in which improvement are needed be packaged and used for retraining the instructors in cocoa plantation establishment and management

through workshops or short duration courses by the stake holders to enable them meet the training needs of students and justifiably motivate their interest in cocoa farming. The similarities between this study and the current study is that the both study is based on teaching and questionnaire is use for data instrument while the difference between the study is that the study make use of 42 respondents while the current study make use of 48 respondents, the study is based on agriculture while the current study is based on Basic Science and Technology and also the study area of the study is south western part of Nigeria while the current study is carried out in Minna.

Miller, Bakare and Ikatule (2011) carried out a study to determine the professional capacity building needs of teachers for effective teaching of Basic Science and Technology curriculum to students in junior secondary schools in Lagos State. Three research questions guided the study. A survey research design was employed for the study. The population for the study was 550 teachers of Basic Science and Technology for junior secondary schools. Random sampling technique was used to obtain 250 teachers for the study. Three sets of structured questionnaire items were developed and used to collect data from the teachers of Basic Science and Technology in junior secondary schools. Cronbach alpha reliability method was adopted to determine the internal consistency of the questionnaire items; values of 0.80, 0.84 and 0.81 were obtained for the sets of questionnaire respectively. Data collected were analyzed using weighted mean and improvement needed index (INI). It was found out in the study that teachers need capacity building in all areas of instruction in the junior secondary schools Basic Science and Technology curriculum content. It is therefore recommended that the findings of this study be used to organize either workshops or short duration courses for capacity building of teachers of Basic Science and Technology for teaching in junior secondary schools in Lagos State. The

similarities between the study and the current study are that, they both make use of questionnaire for the data instrument and the research is based on basic technology. While the differences between them is that the study makes use of 250 respondents while the current study makes use of 48 respondents and also the study is carried out in Lagos state while the current study is carried out in minna.

Joshua (2014) carried out a research on evaluating Basic Science and Technology instruction in Nigerian secondary schools. Evaluating deals with purposive assessment of the entire system or sub-system on which the managers operate. It is an important technique which when appropriately adopted results into effective teaching and learning of practical subjects. This study focused on identification of evaluating techniques aimed at improving the teaching of Basic Science and Technology in Edo State. The area of study comprises of the eighteen Local Government Areas (LGA) in the state. Survey design was employed for the study covering a population of 160 (60 principals and 100 Basic Science and Technology teachers). The hypotheses were tested at 0.05, level of significance. Findings from the study indicated various techniques for evaluating instructions in Basic Science and Technology workshop. The result of the hypotheses showed that there was no significant difference in the mean responses of the respondents on the management techniques identified for instruction. However, it therefore recommended that the management techniques identified by this study should be integrated into the school curriculum for Basic Science and Technology teachers to use during workshop instruction. The similarities between the study and current study is that the both studies are base on Basic Science and Technology its makes use of two respondents while the difference between the study and the current study is that the study makes use of 160 respondents while he current study makes use of 43 respondents.

Omiola (2012) carried out a study on assessment of facilities available for teaching Basic Science and Technology subject in the Junior Secondary schools in Ilorin metropolis. Basic Science and Technology workshops, equipment and tools formed the basis of the assessment. The target population was all Junior Secondary school Basic Science and Technology workshops in Ilorin metropolis and a total of 42 Basic Science and Technology workshops from both Private and Public schools were randomly selected for the study. Checklist was used as the instrument for collecting data and frequency count and percentages were used to analyze the data collected. Findings revealed that only 9 Basic Science and Technology workshops representing 21.4% had a standard workshop which is up to the space of a classroom, 22 Basic Science and Technology workshops which are 52.4% had a place for workshop but the space is not up to a classroom. Only 4 Basic Science and Technology workshops which is 9.4% had wood lathe and metal lathe machines. Majority of the Basic Science and Technology school workshops sampled have Basic Science and Technology tools such as for Woodwork tools, Metalwork tools etc. It was also noticed that the tools available in all the workshops are not enough if it were to be in ratio 1:2 students. It was recommended that Governments at all levels (Federal, State and Local) and relevant stakeholders should provide funds to procure necessary tools and equipment and as well build standard Basic Science and Technology workshops for students to enhance creativity. The similarity between this study and the current study is that the study is based on Basic Science and Technology while the difference is that the study is to asses the Basic Science and Technology workshop while the current study is on teaching skills.

Elisha and Ugochukwu (2014) carried out a research to find out the impediments to effective teaching and learning of Basic Science and Technology in Nigerian Public Secondary

Schools. The study adopted survey design and was conducted in twelve secondary schools in Ebonyi State Nigeria. Five (5) Basic Science and Technology teachers and two (2) school administrators from each of the twelve schools selected were used for the study. Therefore, the total population of the study was sixty (60) Basic Science and Technology teachers and twelve (12) school administrators, making the population a total of 84 people. There was no sample or sampling because, the population was small; so all were used for the study. The researcher with the help of research assistants conducted interviews with the school administrators and also administered questionnaires, which contained items for answering the research questions. Questionnaire was also the instrument for data collection. Data collected was analyzed using appropriate statistical procedures. Findings among others revealed that poor teaching methods adapted by Basic Science and Technology teachers, inadequacy of instructional materials, inadequate workshop tools and equipment needed for effective teaching and learning of Basic Science and Technology and poor funding of Basic Science and Technology are the impediments to effective teaching and learning of Basic Science and Technology in Nigerian public schools. Recommendations were made based on the results found. The similarities between the study and the current study is that it makes use of questionnaire as an instrument for data collection and also make use of survey for its research design while the difference is that the study make use of 84 respondents while the current study make use of 48 respondents, the current study is carried out in Niger state while the study is carried out Nigeria.

Igberadja (2015) also conducted a research on factors influencing performance in Basic Science and Technology among secondary school students of delta south senatorial district in delta state, Nigeria. Similar to other science subjects, Basic Science and Technology recorded poor secondary school students' performance both in national and international examination.

Furthermore, there are large variations in performances of Nigerian students that raise concerns. These differences in performance may be caused by multiple factors that need to be identified. The aim of this study is to identify the factors that influence students' performance in Basic Technology. Four research questions guided the study and four hypotheses were tested at the .05 level of significance. The study used the survey research design method with 218 principals of secondary schools in Delta South Senatorial District in Delta State of Nigeria as the target population. The stratified random sampling technique was used to select 65 principals (32 from public and 33 from private secondary schools) as sample of the study. The instrument for data collection was a questionnaire which was content and face validated by three lecturers. The test-retest method was used to ascertain the reliability based on 20 principals who were not part of the population under study. The estimated reliability r= 0.73. Data was collected personally by the researcher and was analyzed using ANOVA (Analysis of variance). The result revealed that multiple factors; schools', students', government, and parents' factors influenced students' performance in Basic Science and Technology with lack of resources underlying these factors. Hence, it was recommended among others that Delta State Ministry of Basic Education should adequately provide the required resources for the teaching and learning of Basic Science and Technology in secondary schools in Delta State. The similarities between this study and the current study is that the research of the study and the current study are both based on Basic Science and Technology and its makes use of questionnaires for the data instrument while the difference between the study and the current study is that the study make use of 65 respondents while the current study makes use of 48 respondents. And also the study is carried out in Nigeria while the current study is carried out in Niger state.

Jane, (2016) carried out research to investigate the relationship between teachers' effectiveness and students' academic achievement in Basic Science and Technology in Edo State Model secondary schools, Nigeria using descriptive survey research design. The instruments used to elicit information for this study were Teachers' Effectiveness Rating Scale (TERS) and Basic Science and Technology Achievement Test. (BTAT). The simple percentage, t-test and ANOVA were the statistical tools used in the analysis of data. The findings of this study included that Basic Science and Technology teachers' effectiveness was low; teachers' effectiveness had influence on student's achievement and that there was no significant difference on students' achievement in due to teachers' gender. It was recommended among others that government should organize and provide opportunities for training and re-training programmes through seminars, workshops and conference in order to increase teachers' effectiveness. The similarities between the study and the current study is that they both base on Basic Science and Technology and make use descriptive survey design. While the differences between the study and the current study is that the study is carried out in Edo state while the current study is carried out in Minna, Niger state.

Afuwape and Oriola (2017) carried out a research on skills in Basic Science and Technology for local technology and entrepreneurship in Nigeria. With the broad search for skills to drive the home grown local technology in developing countries like Nigeria, Nigerian Educational Research and Development Council (NERDC) in the new Curriculum for Basic Science and Technology, encourages teachers to lead their students to identify entrepreneurial skills in Basic Sciences. This study is one of the efforts to determine such skills in Basic Sciences and Technology for Local technology and entrepreneurship. The research took place in one of the biggest cities in a flourishing State in Nigeria with 120 students (30 each), randomly

selected from four secondary schools. The validated prime instrument for the descriptive survey design was questionnaire. The data was analyzed using inferential statistics. The researcher made recommendations that could answer the usual local and global question of "Where next is technology driving the local entrepreneurial? The similarities between this study and the current study is that the study is based on Basic Science and Technology and its both makes use of questionnaire for its data instrument while the differences is that the study makes use of 120 respondents while the current study makes use of 48 respondents and also the study is carried out in Nigeria while the current study is carried out in minna Niger state.

## 2.4    Summary of Literature Review

Skill is described by so many authors as knowledge or attitude that enables one to effectively perform the activities of a given occupation or function to the standards expected in employment. Basic Science and Technology in secondary schools will also define in the literature as integrated subjects found in junior secondary schools for stimulating students technologically. Some skills needed by teachers of Basic Science and Technology in instruction, teaching the content of Basic Science and Technology curriculum to students in junior secondary schools, classroom/laboratory management, using teaching methods and techniques, and skills in applying evaluation techniques for the implementation of Basic Science and Technology will be review. Jerome Bruner's Cognitive Theory of teaching and learning was reviewed and the relationship with the current study was established.

Many related empirical studies will also be review in order to show the researcher the suitable methodology to be adopted for the study. These include the studies of Miller, Bakare and Ikatule (2011), Jane, (2016) and Omiola (2012) among others. This study will carry out to

determine the teaching skills required by technology Education students to enhance teaching and learning of Basic Science and Technology in Bosso, Niger state.

# CHAPTER THREE

# RESEARCH METHODOLOGY

This chapter addressed the following sub-headings: design of the study, area of the study, population for the study, instrument for data collection, validation of the instrument, Administration of the instrument, method of data collection and decision rule.

## 3.1 Design of the Study

The study adopted a descriptive survey research design. Descriptive Survey research design in the opinion of Udoh (2012) is a descriptive study which the whole population or representative sample of the population is study by collecting analyzing data from the group through the use of questionnaire. Oghene (2010) defines a survey as a research technique in which information is gathered from a sample of people through questionnaire and interview. Thus, because of the need to generate primary data to achieve the objectives of this study, survey research was adopted. The survey design is therefore considered appropriate since the study seeks information from a respondent using a questionnaire.

## 3.2 Area of the study

The study was carried out in Niger State. It is one of the States in North-Central geo-political zones of Nigeria and was created in April 1976 with Minna as the State capital. Niger State. Is located within the middle belt region of Nigeria between Latitude $8^0 20''$ and $11^0 20''$ North and Longitude $3^0 40''$ and $7^0 40''$ East. The total land area of the state is 76,363 square kilometres representing approximately 8% of the total arable land area of 62,992.30 square kilometres in Nigeria. The State is bounded on the West by the Republic of Benin, North by Zamfara State, North-West by Kebbi, South by Kogi State, Sourth-West by Kwara, North -East by Kaduna and

South-East by the Federal Capital Territory (FCT) Abuja (World Projections, 2018). It has six technical colleges name: The Government Technical College, Minna, established in the year, 1988, is one of the state-owned Technical College in Niger State. The Federal Science and Technical College is one of the first nine (9) Federal Technical Colleges established in the year 1988 by the Federal Government. Government Technical College Eyagi-Bida is a public combined junior and senior secondary school located in Nasarafu, Banyagi in Bida Local Government. The Government Technical College, New Bussa, established in the year, 1988, is one of the state-owned Technical College in Niger State. The Government Technical College, Kontagora, established in the year 1988, is a state-owned Technical College under the management of the Niger state government

### 3.3 Population of the study

The targeted population for the study is six (6) public schools which consist of 25 Basic Science and Technology teachers and 15 lecturers from the School of Science and Technology Education.

### 3.4 Sample

Since the population is of manageable size, there was no sample, the entire population was used for the study.

### 3.5 Instrument for Data Collection

The research instrument that was used for the study was a questionnaire. The instrument was divided into two parts. Part one will comprises of respondent's personal data and the pat two will consist of the questionnaire which is divided into four sections. The section A contains (14) items which deals with Instructional planning skills required by technology education student to enhance teaching and learning of Basic Science and Technology subject in secondary schools in

Bosso Local Government, Minna, Niger state. Section B contains (15) items which deals with Classroom/laboratory management skills required by technology education students to enhance teaching and learning of Basic Science and Technology subject. Section C contains (18) items which deals with teaching methodological skills required by technology education students to enhance the implementations of Basic Science and Technology subject. Section D also contain (20) items which deals with Instructional evaluation skills required by technology education students to enhance the implementations of Basic Science and Technology subject.

## 3.6    Validation of instrument

The instrument face validation by three lecturers in the Department of Industrial and Technology Education, Federal University of Technology, Minna. Their suggestion was used to modify and produce the final copy of the instrument that will be use for the data collection.

## 3.7    Reliability of the Instrument

A trial test of the instrument was carried out for the purpose of determining the coefficient of stability of the instrument using test retest reliability technique. The instrument was administered on twenty JSS II Basic Science and Technology Students in Government Secondary School, Bida which is out of the research area. The objective answer sheets were marked by the researcher and scores kept. After two weeks FCCAT was re- administered to the same sample at Government Technical College, Garki FCT Abuja. The reliability coefficient of the instrument was determined using Pearson product moment correlating coefficient. Reliability coefficient of 0.71 was gotten showing that the instrument was stable.

## 3.8    Administration of instrument

The instrument that was use for the data collection will be administered to the respondents by the researchers and three research assistant in the study area.

**3.9    Method of data analysis**

Mean and standard deviation was used to analyze the data collected for the study, while t-test statistics was used to test the null hypotheses formulated for the study. A four point rating scale will be used to analyze the data as shown below.

Highly Required (HR)        =        4points

Required (R)        =        3points

Not Required (NR)        =        2points

Undecided (U)        =        1point

Therefore, the mean value of the 4 point scale is 2.50

**3.10    Decision Rules**

The level of the mean score of 2.50 was chosen as the point. This is interpret relatively according to the rating point scale adopt for this study. Therefore, an item whit response below 2.50 was regard or consider as Not Required while an item with response at exactly 2.50 and above will be regard as Required.

**4.0**          **PRESENTATION AND ANALYSIS OF DATA**

This chapter deals with the presentation and analysis of data with respect to the research

questions and hypotheses formulated for this study, the result of data analysis for the research

questions were presented first, followed by those of the hypotheses tested for the study.

**4.1    Research Question 1**

What are the Instructional planning skills required by technology education student to
enhance teaching and learning of Basic Science and Technology subject?

**Table 4.1: Mean response of Technology Education lecturers and Basic Science and Technology teachers on the instructional planning skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject.**

|  |  | $N_1$=23 | $N_2$=25 |  |
| --- | --- | --- | --- | --- |
| **S/No** | **ITEMS** | **$\overline{X}$** | **SD** | **Remarks** |
| 1 | Select instructional content of a lesson | 4.19 | 0.610 | AGREED |
| 2 | Select available human and material resources need for planning a lesson | 4.29 | 0.684 | AGREED |
| 3 | Construct a lesson plan | 4.21 | 0.652 | AGREED |
| 4 | Select methods and techniques for teaching a lesson | 4.31 | 0.639 | AGREED |
| 5 | Select evaluation techniques | 4.36 | 0.525 | AGREED |
| 6 | Think of how lesson can be introduced to motivate students interest and participation | 4.30 | 0.637 | AGREED |
| 7 | Provide a conducive classroom environment for effective theoretical and practical work | 4.23 | 0.701 | AGREED |
| 8 | Create the objectives of a lesson to be achieved | 4.25 | 0.674 | AGREED |
| 9 | State the previous knowledge | 4.28 | 0.620 | AGREED |
| 10 | Topic selection | 4.38 | 0.841 | AGREED |
| 11 | Think appropriate timing to implement Basic Technology | 4.26 | 0.916 | AGREED |
| 12 | Thinking of instructional method | 4.30 | 0.536 | AGREED |
| 13 | Choice of instructional material | 4.33 | 0.493 | AGREED |
| 14 | Objective to be achieved | 4.41 | 0.485 | AGREED |

**Key:**

$\overline{X}$= mean

SD= standard deviation

Table 4.1 above shows the Mean response of Technology Education lecturers and Basic

Science and Technology teachers on the instructional planning skills required by technology

Education students to enhance teaching and learning of Basic Science and Technology subject.

The mean ranges from 4.19 - 4.41 indicating a high degree of acceptance showing objective to be achieved is an essential required skill and was ranked the higher having the mean score of 4.41. The standard deviation on each items ranges from 0.485 to 0.916 showing the closeness in the responses of the respondents. The table shows that all the respondents agreed to all the items.

## 4.2    Research Question 2

What are the Classroom/laboratory management skills required by technology education students to enhance teaching and learning of Basic Science and Technology subject?

**Table 4.2: Mean response of Technology education lecturers and the Basic Science and Technology teachers on the classroom/laboratory management skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject.**

| S/No | ITEMS | $\overline{X}$ | SD | Remarks |
|---|---|---|---|---|
| | | N₁=23 | N₂=25 | |
| 1 | Reorganize the need for adequate ventilation in the classroom. | 4.48 | 0.500 | AGREED |
| 2 | Make the tools and equipment in good condition | 4.39 | 0.552 | AGREED |
| 3 | Arrange facilities in order of the needs for instruction | 4.33 | 0.700 | AGREED |
| 4 | Arrange classroom setting to accommodate various instructional activities | 4.40 | 0.492 | AGREED |
| 5 | Provide safety poster in the laboratory to encourage correct safety habit in sequence and logical order | 4.36 | 0.615 | AGREED |
| 6 | Arrange benches and machines properly to facilitate learning | 4.39 | 0.567 | AGREED |
| 7 | Supervise students activities in classroom/ laboratory | 4.30 | 0.640 | AGREED |
| 8 | Apply corrective measures to enhance discipline in the classroom / laboratory | 4.34 | 0.542 | AGREED |
| 9 | Organize routine cleaning procedure for the laboratory facilities | 4.36 | 0.657 | AGREED |
| 10 | Assign leaders among students to coordinate activities among themselves | 4.30 | 0.642 | AGREED |
| 11 | Check for the appropriateness of workshop facilities | 4.31 | 0.464 | AGREED |
| 12 | Assess the effectiveness of instruction in the workshop through students practical test | 4.33 | 0.470 | AGREED |
| 13 | Check laboratory tools and equipment after use | 4.33 | 0.651 | AGREED |
| 14 | The teacher should have full control on the class and students | 4.34 | 0.540 | AGREED |
| 15 | Maintaining order in the class | 4.46 | 0.500 | AGREED |

**Key:**

$\overline{X}$= mean

SD= standard deviation

Table 4.2 above shows the Mean response of Technology Education lecturers and Basic Science and Technology teachers on the classroom management skills required by technology

Education students to enhance teaching and learning of Basic Science and Technology subject.

The mean ranges from 4.30 - 4.48 indicating a high degree of acceptance showing Reorganize

the need for adequate ventilation in the classroom is an essential required skill and was ranked

the higher having the mean score of 4.48. the standard deviation on each items ranges from 0.464

to 0.700 showing the closeness in the responses of the respondents. The table shows that all the

respondents agreed to all the items.

## 4.3    Research Question 3

What are the Teaching methodological skills required by technology education students to enhance the implementations of Basic Science and Technology subject?

**Table 4.3: Mean response of Technology Education lecturers and Basic Science and Technology teachers on the Teaching methodological skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject.**

| S/No | ITEMS | $N_1=23$ | | $N_2=25$ |
|------|-------|----|-----|---------|
| | | | | Remarks |
| | | $\overline{X}$ | SD | |
| 1 | Group the students in a large class for demonstration process | 4.46 | 0.499 | AGREED |
| 2 | Present information with projector | 4.30 | 0.588 | AGREED |
| 3 | Present concepts and skills before demonstration commence | 4.28 | 0.647 | AGREED |
| 4 | Involve the students in all activities during learning process | 4.35 | 0.614 | AGREED |
| 5 | Use appropriate teaching methods | 4.48 | 0.500 | AGREED |
| 6 | Perform the learning process during demonstration before the students | 4.46 | 0.500 | AGREED |
| 7 | Employ team teaching during lesson | 4.46 | 0.499 | AGREED |
| 8 | Visit students while performing their tasks | 4.31 | 0.602 | AGREED |
| 9 | Make demonstration work and activities to be meaningful to the learners | 4.21 | 0.602 | AGREED |
| 10 | Using lecture method of teaching makes it easier for the students to understand basic technology | 4.46 | 0.499 | AGREED |
| 11 | Exposing Basic Technology students to field trip can boost their skills | 4.19 | 0.610 | AGREED |
| 12 | Discussion method can be effective in teaching Basic Technology subject | 4.29 | 0.684 | AGREED |
| 13 | Use of electronic learning facilities for teaching Basic Technology | 4.21 | 0.652 | AGREED |
| 14 | Asking question which provoke critical thinking | 4.31 | 0.639 | AGREED |
| 15 | Demonstrate problem solving solution which allows student to develop creative activities | 4.36 | 0.525 | AGREED |
| 16 | Direct individual learners progress and performance more consistently | 4.30 | 0.637 | AGREED |
| 17 | Inquiry approach to learning can be utilized by the teacher in teaching Basic Technology | 4.23 | 0.701 | AGREED |
| 18 | Use of reinforcement and reward | 4.25 | 0.674 | AGREED |

**Key:**

X= mean

SD= standard deviation

Table 4.3 above shows the Mean response of Technology Education lecturers and Basic Science and Technology teachers on the Teaching methodological skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject. The mean ranges from 4.21 - 4.48 indicating a high degree of acceptance showing use of appropriate teaching methods is an essential required skill and was ranked the higher having the mean score of 4.48. the standard deviation on each items ranges from 0.499 to 0.701 showing the

closeness in the responses of the respondents. The table shows that all the respondents agreed to

all the items.

## 4.4 Research Question 4

What are the Instructional evaluation skills required by technology education students to enhance the implementations of Basic Science and Technology subject.

**Table 4.4: Mean response of Technology Education lecturers and Basic Science and Technology teachers on the instructional Evaluation skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject.**

| S/No | ITEMS | $N_1=23$ | | $N_2=25$ |
|------|-------|----------|-----|---------|
| | | $\overline{X}$ | SD | Remarks |
| 1 | Evaluating students affective domain | 4.37 | 0.484 | AGREED |
| 2 | Assessing students psychomotor performance | 4.42 | 0.572 | AGREED |
| 3 | Construct reliable test to evaluate students progress | 4.30 | 0.562 | AGREED |
| 4 | Assessing the effectiveness of the teaching strategy | 4.33 | 0.495 | AGREED |
| 5 | Making record about students academic ability | 4.36 | 0.504 | AGREED |
| 6 | Provide records about students moral character and personality | 4.35 | 0.500 | AGREED |
| 7 | Make use of information procedure like observation for collection of information about students | 4.40 | 0.514 | AGREED |
| 8 | Use varieties of evaluation techniques and procedures such as test assessment and project | 4.26 | 0.633 | AGREED |
| 9 | Give test periodically to monitor learning process during instruction | 4.29 | 0.633 | AGREED |
| 10 | Evaluate the students learning difficulties during instruction | 4.34 | 0.659 | AGREED |
| 11 | Use the evaluation records available to determine the level of academic attainment by students | 4.25 | 0.611 | AGREED |
| 12 | Assessing Students independence in handling practical task | 4.33 | 0.601 | AGREED |
| 13 | Give tests that are related to what the students were taught in classroom | 4.37 | 0.637 | AGREED |
| 14 | Evaluate students effective performance | 4.48 | 0.500 | AGREED |
| 15 | Assess student psychomotor performance | 4.23 | 0.625 | AGREED |
| 16 | Assess the relevant student behavior | 4.43 | 0.560 | AGREED |
| 17 | Construct reliable test to evaluate students progress | 4.38 | 0.486 | AGREED |
| 18 | Make record about student academic ability, moral character and personality | 4.43 | 0.495 | AGREED |
| 19 | Make use of information procedure like observation for collection of information about students | 4.43 | 0.496 | AGREED |
| 20 | Use varieties of evaluation techniques and procedures i.e test assessment and project | 4.47 | 0.563 | AGREED |

**Key:**
$\overline{X}$= mean of respondents
SD= standard deviation

Table 4.4 above shows the Mean response of Technology Education lecturers and Basic

Science and Technology teachers on the Instructional evaluation skills required by technology

Education students to enhance teaching and learning of Basic Science and Technology subject.

The mean ranges from 4.27 - 4.47 indicating a high degree of acceptance showing use varieties of evaluation techniques and procedures i.e test assessment and project is an essential required skill and was ranked the higher having the mean score of 4.47. the standard deviation on each items ranges from 0.484 to 0.659 showing the closeness in the responses of the respondents. The table shows that all the respondents agreed to all the items.

## 4.5    Hypothesis 1:

H$_{O1:}$ There is no significant difference in the mean responses of Technology Education lecturers and Basic Science and Technology teachers on the instructional planning skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject.

**Table 4.5: t- test Analysis of Mean response of Technology Education lecturers and Basic Science and Technology teachers on the instructional planning skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject.**

| S/No | ITEMS | Lecturers N=23 | | Basic Science and Technology N=25 | | T-CAL | Remark |
|------|-------|----------------|-----|-----------------------------|-----|-------|--------|
| | | $\overline{X_1}$ | SD$_1$ | $\overline{X_2}$ | SD$_2$ | | |
| 1 | Select instructional content of a lesson | 4.47 | 0.501 | 4.45 | 0.499 | 0.823 | NS |
| 2 | Select available human and material resources need for planning a lesson | 4.33 | 0.599 | 4.29 | 0.606 | 0.528 | NS |
| 3 | Construct a lesson plan | 4.33 | 0.506 | 4.27 | 0.601 | 0.517 | NS |
| 4 | Select methods and techniques for teaching a lesson | 4.47 | 0.501 | 4.45 | 0.499 | 0.744 | NS |
| 5 | Select evaluation techniques | 4.22 | 0.610 | 4.17 | 0.601 | 0.563 | NS |
| 6 | Think of how lesson can be introduced to motivate students interest and participation | 4.31 | 0.617 | 4.28 | 0.696 | 0.736 | NS |
| 7 | Provide a conducive classroom environment for effective theoretical and practical work | 4.21 | 0.634 | 4.21 | 0.699 | 0.986 | NS |
| 8 | Create the objectives of a lesson to be achieved | 4.32 | 0.622 | 4.31 | 0.655 | 0.899 | NS |
| 9 | State the previous knowledge | 4.37 | 0.517 | 4.35 | 0.533 | 0.836 | NS |
| 10 | Topic selection | 4.32 | 0.612 | 4.29 | 0.651 | 0.765 | NS |
| 11 | Think appropriate timing to implement Basic Technology | 4.25 | 0.677 | 4.22 | 0.722 | 0.728 | NS |
| 12 | Thinking of instructional method | 4.24 | 0.624 | 4.25 | 0.675 | 0.968 | NS |
| 13 | Choice of instructional material | 4.36 | 0.612 | 4.37 | 0.861 | 0.896 | NS |
| 14 | Objective to be achieved | 4.28 | 0.820 | 4.25 | 0.801 | 0.834 | NS |

**Key:**

$\overline{X_1}$ = mean score of lecturers
SD$_1$ = standard deviation of lecturers
$\overline{X_2}$ = mean score of basic science and technology
DF= 46
SD$_2$ = standard deviation of basic science and technology
T-CAL= t- test
t-table value=1.96

The data in table 4.5 shows the t-test analysis of the Mean response of Technology Education lecturers and Basic Science and Technology teachers on the instructional planning skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject it can be seen that the calculated t-value (t-cal) of all the 14 items were less than the t-table value of 1.96 at 0.05 level of significance and 62 degree of freedom. This means that the opinion of the Lecturers and Basic Science and Technology teachers did not differ significantly on all the items. On this basis the null hypothesis is upheld for all the items. It can therefore be stated that there is no significant difference in the mean responses of lecturers and Basic Science and Technology teachers.

## 4.6 Hypothesis 2:

H$_{O2}$: There is no significant difference in the mean responses of Technology education lecturers and the Basic Science and Technology teachers on the classroom/laboratory management skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject.

**Table 4.6: t- test Analysis of Mean response of Technology education lecturers and the Basic Science and Technology teachers on the classroom/laboratory management skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject.**

| S/No | ITEMS | Lectueres N=23 | | Basic Science and Technology N=25 | | T-CAL | Remark |
|---|---|---|---|---|---|---|---|
| | | $\overline{X_1}$ | SD$_1$ | $\overline{X_2}$ | SD$_2$ | | |
| 1 | Reorganize the need for adequate ventilation in the classroom. | 4.48 | 0.501 | 4.48 | 0.501 | 0.935 | NS |
| 2 | Make the tools and equipment in good condition | 4.38 | 0.551 | 4.35 | 0.554 | 0.787 | NS |
| 3 | Arrange facilities in order of the needs for instruction | 4.31 | 0.696 | 4.42 | 0.705 | 0.655 | NS |
| 4 | Arrange classroom setting to accommodate various instructional activities | 4.38 | 0.488 | 4.36 | 0.495 | 0.543 | NS |
| 5 | Provide safety poster in the laboratory to encourage correct safety habit in sequence and logical order | 4.35 | 0.603 | 4.39 | 0.627 | 0.895 | NS |
| 6 | Arrange benches and machines properly to facilitate learning | 4.40 | 0.556 | 4.30 | 0.577 | 0.848 | NS |
| 7 | Supervise students activities in classroom/ laboratory | 4.29 | 0.640 | 4.35 | 0.642 | 0.916 | NS |
| 8 | Apply corrective measures to enhance discipline in the classroom / laboratory | 4.34 | 0.542 | 4.36 | 0.543 | 0.940 | NS |
| 9 | Organize routine cleaning procedure for the laboratory facilities | 4.36 | 0.658 | 4.30 | 0.658 | 0.984 | NS |

| | | $\overline{X}_1$ | $SD_1$ | $\overline{X}_2$ | $SD_2$ | T-CAL | |
|---|---|---|---|---|---|---|---|
| 10 | Assign leaders among students to coordinate activities among themselves | 4.30 | 0.643 | 4.31 | 0.642 | 1.000 | NS |
| 11 | Check for the appropriateness of workshop facilities | 4.32 | 0.467 | 4.32 | 0.463 | 0.861 | NS |
| 12 | Assess the effectiveness of instruction in the workshop through students practical test | 4.33 | 0.473 | 4.33 | 0.468 | 0.817 | NS |
| 13 | Check laboratory tools and equipment after use | 4.33 | 0.653 | 4.33 | 0.652 | 1.000 | NS |
| 14 | The teacher should have full control on the class and students | 4.34 | 0.542 | 4.74 | 0.539 | 0.900 | NS |
| 15 | Maintaining order in the class | 4.46 | 0.500 | 4.61 | 0.501 | 0.892 | NS |

**Key:**

$\overline{X}_1$ = mean score of lecturers

$SD_1$ = standard deviation of lecturers

$\overline{X}_2$ = mean score of basic science and technology

DF= 46

$SD_2$ = standard deviation of basic science and technology

T-CAL= t- test

t-table value=1.96

The data in Table 4.6 shows the t-test analysis of the Mean response of Technology Education lecturers and Basic Science and Technology teachers on the classroom management skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject it can be seen that the calculated t-value (t-cal) of all the 14 items were less than the t-table value of 1.96 at 0.05 level of significance and 62 degree of freedom. This means that the opinion of the Lecturers and Basic Science and Technology teachers did not differ significantly on all the items. On this basis the null hypothesis is upheld for all the items. It can therefore be stated that there is no significant difference in the mean responses of lecturers and Basic Science and Technology teachers.

### 4.7 Hypothesis 3:

**HO3:** There is no significant difference in the mean responses of Technology Education lecturers and Basic Science and Technology teachers on the Teaching methodological skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject.

**Table 4.7: t- test Analysis of Mean response of Technology Education lecturers and Basic Science and Technology teachers on the Teaching methodological skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject.**

**Lecturers N=23        Basic Science and Technology N=25**

| S/No | ITEMS | $\overline{X_1}$ | SD₁ | $\overline{X_2}$ | SD₂ | T-CAL | Rem ark |
|---|---|---|---|---|---|---|---|
| 1 | Group the students in a large class for demonstration process | 4.47 | 0.501 | 4.45 | 0.499 | 0.828 | NS |
| 2 | Present information with projector | 4.32 | 0.594 | 4.29 | 0.586 | 0.747 | NS |
| 3 | Present concepts and skills before demonstration commence | 4.30 | 0.643 | 4.27 | 0.652 | 0.675 | NS |
| 4 | Involve the students in all activities during learning process | 4.36 | 0.605 | 4.35 | 0.624 | 0.877 | NS |
| 5 | Use appropriate teaching methods | 4.46 | 0.500 | 4.49 | 0.502 | 0.569 | NS |
| 6 | Perform the learning process during demonstration before the students | 4.46 | 0.500 | 4.47 | 0.501 | 0.892 | NS |
| 7 | Employ team teaching during lesson | 4.47 | 0.501 | 4.45 | 0.499 | 0.828 | NS |
| 8 | Visit students while performing their tasks | 4.33 | 0.599 | 4.29 | 0.660 | 0.582 | NS |
| 9 | Make demonstration work and activities to be meaningful to the learners | 4.33 | 0.506 | 4.29 | 0.499 | 0.581 | NS |
| 10 | Using lecture method of teaching makes it easier for the students to understand basic technology | 4.47 | 0.501 | 4.45 | 0.610 | 0.744 | NS |
| 11 | Exposing Basic Technology students to field trip can boost their skills | 4.22 | 0.611 | 4.17 | 0.696 | 0.563 | NS |
| 12 | Discussion method can be effective in teaching Basic Technology subject | 4.31 | 0.671 | 4.28 | 0.669 | 0.736 | NS |
| 13 | Use of electronic learning facilities for teaching Basic Technology | 4.21 | 0.634 | 4.21 | 0.551 | 0.883 | NS |
| 14 | Asking question which provoke critical thinking | 4.32 | 0.622 | 4.31 | 0.523 | 0.899 | NS |
| 15 | Demonstrate problem solving solution which allows student to develop creative activities | 4.37 | 0.517 | 4.35 | 0.651 | 0.863 | NS |
| 16 | Direct individual learners progress and performance more consistently | 4.32 | 0.622 | 4.29 | 0.722 | 0.765 | NS |
| 17 | Inquiry approach to learning can be utilized by the teacher in teaching Basic Technology | 4.25 | 0.677 | 4.22 | 0.675 | 0.728 | NS |
| 18 | Use of reinforcement and reward | 4.25 | 0.673 | 4.25 | 0.602 | 0.928 | NS |

**Key:**

$\overline{X_1}$ = mean score of lecturers
SD₁ = standard deviation of lecturers
$\overline{X_2}$ = mean score of basic science and technology
DF= 46
SD₂ = standard deviation of basic science and technology
T-CAL= t- test
t-table value=1.96

The data in Table 4.7 shows the t-test analysis of the Mean response of Technology

Education lecturers and Basic Science and Technology teachers on the teaching methodology

skills required by technology Education students to enhance teaching and learning of Basic

Science and Technology subject it can be seen that the calculated t-value (t-cal) of all the 14

items were less than the t-table value of 1.96 at 0.05 level of significance and 62 degree of

freedom. This means that the opinion of the Lecturers and Basic Science and Technology teachers did not differ significantly on all the items. On this basis the null hypothesis is upheld for all the items. It can therefore be stated that there is no significant difference in the mean responses of lectures and Basic Science and Technology teachers.

## 4.8    Hypothesis 4:

$H_{O4}$: There is no significant difference in the mean responses of Technology Education lecturers and Basic Science and Technology teachers on the instructional Evaluation skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject.

**Table 4.8: t- test Analysis of Mean response of Technology Education lecturers and Basic Science and Technology teachers on the instructional Evaluation skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject.**

| S/No | ITEMS | Lectueres N=23 | | Basic Science and Technology N=25 | | | |
|------|-------|----------------|---|------------------|---|------|------|
| | | $\overline{X_1}$ | SD₁ | $\overline{X_2}$ | SD₂ | T-CAL | Remark |
| 1 | Evaluating students affective domain | 4.36 | 0.482 | 4.38 | 0.487 | 0.715 | NS |
| 2 | Assessing students psychomotor performance | 4.42 | 0.559 | 4.43 | 0.583 | 0.887 | NS |
| 3 | Construct reliable test to evaluate students progress | 4.30 | 0.559 | 4.31 | 0.567 | 0.923 | NS |
| 4 | Assessing the effectiveness of the teaching strategy | 4.31 | 0.499 | 4.35 | 0.493 | 0.459 | NS |
| 5 | Making record about students academic ability | 4.34 | 0.510 | 4.38 | 0.510 | 0.536 | NS |
| 6 | Provide records about students moral character and personality | 4.33 | 0.505 | 4.37 | 0.497 | 0.497 | NS |
| 7 | Make use of information procedure like observation for collection of information about students | 4.38 | 0.520 | 4.43 | 0.510 | 0.413 | NS |
| 8 | Use varieties of evaluation techniques and procedures such as test assessment and project | 4.26 | 0.628 | 4.26 | 0.639 | 0.983 | NS |
| 9 | Give test periodically to monitor learning process during instruction | 4.28 | 0.635 | 4.31 | 0.634 | 0.684 | NS |
| 10 | Evaluate the students learning difficulties during instruction | 4.34 | 0.655 | 4.35 | 0.665 | 0.951 | NS |
| 11 | Use the evaluation records available to determine the level of academic attainment by students | 4.26 | 0.601 | 4.24 | 0.620 | 0.807 | NS |
| 12 | Assessing Students independence in handling practical task | 4.33 | 0.596 | 4.33 | 0.608 | 0.982 | NS |
| 13 | Give tests that are related to what the students were taught in classroom | 4.39 | 0.612 | 4.36 | 0.658 | 0.686 | NS |
| 14 | Evaluate students effective performance | 4.48 | 0.501 | 4.48 | 0.601 | 0.935 | NS |
| 15 | Assess student psychomotor performance | 4.23 | 0.614 | 4.23 | 0.536 | 0.983 | NS |
| 16 | Assess the relevant student behavior | 4.43 | 0.560 | 4.44 | 0.561 | 0.827 | NS |
| 17 | Construct reliable test to evaluate students progress | 4.38 | 0.488 | 4.37 | 0.485 | 0.867 | NS |
| 18 | Make record about student academic ability, moral character and personality | 4.42 | 0.495 | 4.43 | 0.497 | 0.784 | NS |
| 19 | Make use of information procedure like observation for collection of information about students | 4.43 | 0.498 | 4.43 | 0.496 | 0.931 | NS |
| 20 | Use varieties of evaluation techniques and procedures i.e test assessment and project | 4.47 | 0.564 | 4.48 | 0.564 | 0.847 | NS |

**Key:**

$\overline{X_1}$ = mean score of lecturers

SD₁ = standard deviation of lecturers

$\overline{X_2}$ = mean score of basic science and technology

DF= 46

SD₂ = standard deviation of basic science and technology

T-CAL= t- test
t-table value=1.96

The data in Table 4.8 shows the t-test analysis of the Mean response of Technology Education lecturers and Basic Science and Technology teachers on the instructional evaluation skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject it can be seen that the calculated t-value (t-cal) of all the 14 items were less than the t-table value of 1.96 at 0.05 level of significance and 62 degree of freedom. This means that the opinion of the Lecturers and Basic Science and Technology teachers did not differ significantly on all the items. On this basis the null hypothesis is upheld for all the items. It can therefore be stated that there is no significant difference in the mean responses of lecturers and Basic Science and Technology teachers.

## 4.9    Summary of the Findings

The following are the main findings of the study; they are prepared based on the research questions and hypothesis tested.

Instructional planning skills required by technology education student to enhance teaching and learning of Basic Science and Technology subject

Select instructional content of a lesson, select available human and material resources need for planning a lesson, construct a lesson plan, select methods and techniques for teaching a lesson, select evaluation techniques, think of how lesson can be introduced to motivate students interest and participation, provide a conducive classroom environment for effective theoretical and practical work, create the objectives of a lesson to be achieved, state the previous knowledge, Topic selection, think appropriate timing to implement Basic Technology, thinking of instructional method, choice of instructional material and objective to be achieved

Classroom/laboratory management skills required by technology education students to enhance teaching and learning of Basic Science and Technology subject:

Reorganize the need for adequate ventilation in the classroom, make the tools and equipment in good condition, arrange facilities in order of the needs for instruction, arrange classroom setting to accommodate various instructional activities, provide safety poster in the laboratory to encourage correct safety habit in sequence and logical order, arrange benches and machines properly to facilitate learning, supervise students activities in classroom/ laboratory, Apply corrective measures to enhance discipline in the classroom / laboratory, Organize routine cleaning procedure for the laboratory facilities, Assign leaders among students to coordinate activities among themselves, check for the appropriateness of workshop facilities, assess the effectiveness of instruction in the workshop through students practical test, check laboratory tools and equipment after use, the teacher should have full control on the class and students and maintaining order in the class

Teaching methodological skills required by technology education students to enhance the implementations of Basic Science and Technology subject

Group the students in a large class for demonstration process, present information with projector. present concepts and skills before demonstration commence, involve the students in all activities during learning process, use appropriate teaching methods, perform the learning process during demonstration before the students, employ team teaching during lesson, visit students while performing their tasks, make demonstration work and activities to be meaningful to the learners, using lecture method of teaching makes it, easier for the students to understand, basic technology, exposing Basic Technology students to field trip can boost their skills, discussion method can be effective in teaching Basic Technology subject, use of electronic learning

facilities for teaching Basic Technology, asking question which provoke critical thinking, demonstrate problem solving solution which allows student to develop creative activities, direct individual learners progress and performance more consistently, inquiry approach to learning can be utilized by the teacher in teaching Basic Technology and use of reinforcement and reward

Instructional evaluation skills required by technology education students to enhance the implementations of Basic Science and Technology subject.

Evaluating students affective domain, assessing students psychomotor performance, construct reliable test to evaluate students progress, assessing the effectiveness of the teaching strategy, making record about students academic ability, provide records about students moral character and personality, make use of information procedure like observation for collection of information about students, use varieties of evaluation techniques and procedures such as test assessment and project, give test periodically to monitor learning process during instruction, evaluate the students learning difficulties during instruction, use the evaluation records available to determine the level of academic attainment by students, assessing Students independence in handling practical task, give tests that are related to what the students were taught in classroom, evaluate students effective performance, assess student psychomotor performance, assess the relevant student behavior, construct reliable test to evaluate students progress, Make record about student academic ability, moral character and personality, make use of information procedure like observation for collection of information about students and use varieties of evaluation techniques and procedures i.e test assessment and project

## 4.10    Discussion of the findings

The discussions of findings are based on the research questions and hypotheses posed for the study.

The instructional planning skills required by technology education student to enhance teaching and learning of Basic Science and technology subject revealed in table 1 shows that the respondents agreed on all the items which means that the findings in tables 1 are required skill by technology education on instructional planning which are select instructional content of a lesson, select available human and material resources need for planning a lesson,

Construct a lesson plan, select methods and techniques for teaching a lesson, select evaluation techniques, think of how lesson can be introduced to motivate students interest and participation, provide a conducive classroom environment for effective theoretical and practical work, create the objectives of a lesson to be achieved, state the previous knowledge, topic selection, think appropriate timing to implement basic technology, thinking of instructional method, choice of instructional material, objective to be achieved. For proper implementation of basic science and technology education students required the adequate teaching skills. Instructional planning should be properly prepared for the teaching and learning in classroom.

The findings is accordance with Patrick (2016) that there should be proper instructional planning by the teacher before going to class to implement the teaching, it was also recommended that adequate instructional materials should be provided for the teaching of basic technology in junior secondary schools.

The result in table 2 show the findings on Classroom/laboratory management skills required by technology education students to enhance teaching and learning of Basic Science and Technology subject from the table 2 it was clearly show that the respondents agree on all the

items which means that for classroom management the state skills are required by technology education student. The following are teaching skills require for implementation of basic science and technology: reorganize the need for adequate ventilation in the classroom make the tools and equipment in good condition, arrange facilities in order of the needs for instruction, and arrange classroom setting to accommodate various instructional activities

Provide safety poster in the laboratory to encourage correct safety habit in sequence and logical order, arrange benches and machines properly to facilitate learning, supervise students activities in classroom/ laboratory, apply corrective measures to enhance discipline in the classroom / laboratory, organize routine cleaning procedure for the laboratory facilities , assign leaders among students to coordinate activities among themselves, check for the appropriateness of workshop facilities, assess the effectiveness of instruction in the workshop through students practical test, check laboratory tools and equipment after use, the teacher should have full control on the class and students, maintaining order in the class. Class room should be properly manage to enhance effective teaching and learning so achieve the objective of the lesson.

The findings is in line with Patrick (2016) that classroom/laboratory management should be properly equipped and arranged by the teacher in order to facilitated teaching and learning. Patrick (2016) also recommended that well-equipped laboratories and technology workshop should be provided for practical work.

Table 3 shows the findings on teaching methodological skills required by technology education students to enhance the implementations of Basic Science and Technology subject. The findings from the table shows are the items were agreed by respondents which means that the skills are all required by the technology education. The following are the skills require for teaching methodology: Group the students in a large class for demonstration process, Present information

with projector, Present concepts and skills before demonstration commence, Involve the students in all activities during learning process, Use appropriate teaching methods, Perform the learning process during demonstration before the students, Employ team teaching during lesson , Visit students while performing their tasks, Make demonstration work and activities to be meaningful to the learners, Using lecture method of teaching makes it easier for the students to understand, Discussion method can be effective in teaching Basic Technology subject, Use of electronic learning facilities for teaching Basic Technology, Asking question which provoke critical thinking, Demonstrate problem solving solution which allows student to develop creative activities, Direct individual learners progress and performance more consistently, Inquiry approach to learning can be utilized by the teacher in teaching Basic Technology, Use of reinforcement and reward. The teacher (technology education student) should ensure that the lesson is presented in a logical manner and carefully select the appropriate teaching methods to make sure the objective of the lesson is achieved

Instructional evaluation skills required by technology education students to enhance the implementations of Basic Science and Technology subject are revealed in table 4. The findings from the table shows that the respondents agree with all the items which shows that all the listed instructional evaluation skills are required by technology education student to implement basic science and technology in Bosso local government.

# CHAPTER FIVE

## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Summary of the Study

The main focus of this research study was to find out the teaching skills required by technology Education student to enhance implementation of Basic Science and Technology in Bosso Local government Minna.

Chapter 1 of the study discussed the background of the study, which examines Basic Science and Technology as a subject, Technology Education, teaching skills and implementation of teaching skills. The statement of problem, purpose, significance, scope, assumption of the study and the research questions were all stated and discussed for the conduct of this research.

The review of related literature looked into Basic Science and Technology in junior secondary schools in Bosso Local government, instructional planning skills required in teaching the content of Basic Technology, teaching skills required in classroom/laboratory management, skills required in using teaching methodology, skills required in applying instructional techniques for the implementation of Basic Technology, teaching skills in effective instructional materials and repetitive training theory . Various views of different authors concerning the topic were harmonized in a comprehensive literature review and empirical studies.

A survey approach was used to developed instrument for the study; the respondents identified as the population of the study were the Basic Science and Technology teachers in public secondary schools in Bosso local government Minna, Niger state and Lecturers of I.T.E department. The entire respondents were used. A number of 48 questionnaires were administered. The instrument used was analysed using frequency count, and mean scores. The

research questions were discussed base on the findings from the responses and results of the instrument used.

Implication of the study and conclusions were also drawn from the findings discussed. Recommendations and suggestions for further study were formulated and stated according to the findings of the study.

## 5.2 Implication of the Study

The findings of this study had implications for government, training institutions and teachers of technology. Government through various agencies will build the capacity of teachers of technology for effective implementation of Basic Science and Technology in junior secondary schools in the state. The capacity can be built through organizing workshop and seminars for teachers. It is expected that training institutions such as colleges of education should review their curricula for the training of individuals for the implementation of Basic Science and Technology in junior secondary schools. The government will provide the necessary facilities for implementation of the Basic Science and Technology in junior secondary schools. Teachers of technology will improve themselves for the successful implementation of the new Basic Science and Technology curriculum.

## 5.3 Contribution to knowledge

The study helps to improve the teaching skills of teachers of Basic Science and Technology and ensure adequate delivery of the lesson to the student to acquire the aim and objectives of the lesson. Technology education students need improvement in teaching Basic Science and Technology to students. Therefore the skills identified could be used to train teachers of Basic Science and Technology for effective teaching. The stated objectives of Basic Science and Technology will now be achievable ones.

**5.4 Conclusion**

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

It is clearly shown that Basic Science and Technologies an incorporated subject whose its teaching requires an interdisciplinary approach to the exclusion of subject's boundaries. Teacher quality is a strong predictor of student quality. More so, that it is widely acknowledged that no educational system can rise above the quality of its teachers". There is therefore great doubt as to the adequacy of teachers, in terms of quality teaching skills, now handling the subject in our various secondary schools. therefore there is need to identify teaching skills required by the technology education students to enhance teaching and learning of Basic Science and Technology in Niger State.

**5.5 Recommendations**

Based on the findings of the study, the following recommendations were made:

1. Workshop and seminars should be organized for the teachers of basic science and technology in order to build their capacity for the implementation of the Basic Science and Technology in junior secondary schools.

2. Teachers of basic science and technology should be retrained based on areas of needs identified in the study.

3. Relevant facilities for effective implementation of the Basic Science and Technology should be provided by government and other enabling bodies.

4. Adequate instructional materials should be provided for the teaching of basic technology in junior secondary schools in Bosso local government, minna.

5. Teachers should make the course content attractive by involving students in practical classes to enhance better understanding.

6. In-service or on the job training should be given to teachers in this subject area for professional growth.

## 5.6 Suggestion for Further Study

The following are suggested for further studies:

1. Teaching skills required of technology teachers for effective implementation of Basic Science and Technology in other states.

2. Assessment of problems related to students achievement and retention in basic science and technology.

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**QUESTIONNAIRE**
**FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGER STATE**
**SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION**
**DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION**

A QUESTIONNAIRE ON TEACHING SKILLS REQUIRED BY TECHNOLOGY
EDUCATION STUDENT TO ENHANCE TEACHING AND LEARNING OF BASIC
SCIENCE AND TECHNOLOGY IN BOSSO LOCAL GOVERNMENT MINNA.

INTRODUCTION: Please kindly complete this questionnaire by ticking the column that best present your perception about the topic. The questionnaire is for research purpose and your view will be confidentially and strictly treated in response to the purpose of the research work.

PART ONE

PERSONAL DATA

Lecturer: ☐

Basic Science and Technology Teacher: ☐

Note: A four (4) point scale is used to indicate your opinion, tick the options which best describe your agreement as shown below:

Highly Required (HR)  =  4points

Required (R)  =  3points

Not Required (NR)  =  2points

Undecided (U)  =  1points

PART TWO

Section A: Instructional planning skills required by technology Education students to enhance teaching and learning of Basic Science and Technology subject.

| S/N | Skill items | Scales | | | |
|---|---|---|---|---|---|
| | | HR | R | NR | U |
| 1 | Select instructional content of a lesson | | | | |
| 2 | Select available human and material resources need for planning a lesson | | | | |
| 3 | Construct a lesson plan | | | | |
| 4 | Select methods and techniques for teaching | | | | |

| S/N | | HR | R | NR | U |
|---|---|---|---|---|---|
| | a lesson | | | | |
| 5 | Select evaluation techniques | | | | |
| 6 | Think of how lesson can be introduced to motivate students interest and participation | | | | |
| 7 | Provide a conducive classroom environment for effective theoretical and practical work | | | | |
| 8 | Create the objectives of a lesson to be achieved | | | | |
| 9 | State the previous knowledge | | | | |
| 10 | Topic selection | | | | |
| 11 | Think appropriate timing to implement Basic Technology | | | | |
| 12 | Thinking of instructional method | | | | |
| 13 | Choice of instructional material | | | | |
| 14 | Objective to be achieved | | | | |

Section B: Classroom/laboratory management skills required by technology Education student to enhance teaching and learning of Basic Science and Technology subject

| S/N | Skill Items | Scales | | | |
|---|---|---|---|---|---|
| | | HR | R | NR | U |
| 1 | Reorganize the need for adequate ventilation in the classroom. | | | | |
| 2 | Make the tools and equipment in good condition | | | | |
| 3 | Arrange facilities in order of the needs for instruction | | | | |
| 4 | Arrange classroom setting to accommodate various instructional activities | | | | |
| 5 | Provide safety poster in the laboratory to encourage correct safety habit in sequence and logical order | | | | |
| 6 | Arrange benches and machines properly to facilitate learning | | | | |
| 7 | Supervise students activities in classroom/ laboratory | | | | |
| 8 | Apply corrective measures to enhance discipline in the classroom / laboratory | | | | |

| 9 | Organize routine cleaning procedure for the laboratory facilities | | | | |
|---|---|---|---|---|---|
| 10 | Assign leaders among students to coordinate activities among themselves | | | | |
| 11 | Check for the appropriateness of workshop facilities | | | | |
| 12 | Assess the effectiveness of instruction in the workshop through students practical test | | | | |
| 13 | Check laboratory tools and equipment after use | | | | |
| 14 | The teacher should have full control on the class and students | | | | |
| 15 | Maintaining order in the class | | | | |

Section C: Teaching methodology skills required by technology Education student to enhance teaching and learning of Basic Science and Technology subject.

| S/N | Skill Items | Scale | | | |
|---|---|---|---|---|---|
| | | HR | R | NR | U |
| 1 | Group the students in a large class for demonstration process | | | | |
| 2 | Present information with projector | | | | |
| 3 | Present concepts and skills before demonstration commence | | | | |
| 4 | Involve the students in all activities during learning process | | | | |
| 5 | Use appropriate teaching methods | | | | |
| 6 | Perform the learning process during demonstration before the students | | | | |
| 7 | Employ team teaching during lesson | | | | |
| 8 | Visit students while performing their tasks | | | | |
| 9 | Make demonstration work and activities to be meaningful to the learners | | | | |
| 10 | Using lecture method of teaching makes it easier for the students to understand basic technology | | | | |
| 11 | Exposing Basic Technology students to field trip can boost their skills | | | | |

| 12 | Discussion method can be effective in teaching Basic Technology subject | | | | |
|----|---|---|---|---|---|
| 13 | Use of electronic learning facilities for teaching Basic Technology | | | | |
| 14 | Asking question which provoke critical thinking | | | | |
| 15 | Demonstrate problem solving solution which allows student to develop creative activities | | | | |
| 16 | Direct individual learners progress and performance more consistently | | | | |
| 17 | Inquiry approach to learning can be utilized by the teacher in teaching Basic Technology | | | | |
| 18 | Use of reinforcement and reward | | | | |

Section D: Instructional evaluation skills required by technology Education to enhance teaching and learning of Basic Science and Technology subject.

| S/N | skill Items | Scales | | | |
|-----|-------------|--------|---|---|---|
| | | HR | R | NR | U |
| 1 | Evaluating students affective domain | | | | |
| 2 | Assessing students psychomotor performance | | | | |
| 3 | Construct reliable test to evaluate students progress | | | | |
| 4 | Assessing the effectiveness of the teaching strategy | | | | |
| 5 | Making record about students academic ability | | | | |
| 6 | Provide records about students moral character and personality | | | | |
| 7 | Make use of information procedure like observation for collection of information about students | | | | |
| 8 | Use varieties of evaluation techniques and procedures such as test assessment and project | | | | |
| 9 | Give test periodically to monitor learning process during instruction | | | | |
| 10 | Evaluate the students learning difficulties during instruction | | | | |

| 11 | Use the evaluation records available to determine the level of academic attainment by students | | | | |
|---|---|---|---|---|---|
| 12 | Assessing Students independence in handling practical task | | | | |
| 13 | Give tests that are related to what the students were taught in classroom | | | | |
| 14 | Evaluate students effective performance | | | | |
| 15 | Assess student psychomotor performance | | | | |
| 16 | Assess the relevant student behavior | | | | |
| 17 | Construct reliable test to evaluate students progress | | | | |
| 18 | Make record about student academic ability, moral character and personality | | | | |
| 19 | Make use of information procedure like observation for collection of information about students | | | | |
| 20 | Use varieties of evaluation techniques and procedures i.e test assessment and project | | | | |