EVALUATION OF THE IMPLEMENTATION OF SENIOR SECONDARY SCHOOL PHYSICS CURRICULUM USING TYLER'S EVALUATION MODEL IN NORTH-CENTRAL STATES, NIGERIA

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ABSTRACT

The study evaluated the implementation of physics curriculum in senior secondary school using Tyler`s evaluation Model in North- Central States, Nigeria. This study adopted survey design. The targeted population for this study comprised of 548 public schools' physics teachers and 112,835 physics students in North Central States, Nigeria in 2021/2022 academic session. The samples for this study were made up of 130 secondary schools physics teachers and 251 physics students. A research instrument named 'Teachers' Evaluation of Curriculum Implementation Questionnaire (TECIQ) consist of 86 items and Students` Evaluation of Curriculum Implementation Questionnaire (SECIQ) consist of 44 items. A four-point scale was used. A grand mean score of 2.5 was used to determine the decision mean to each section of the questionnaire. The research instruments were validated by experts from science education department, Federal University of Technology (FUT) Minna and from Test and measurement unit of National Examination Council (NECO). The reliability of the research instruments was determined after conducting a pilot study on physics teachers and students in Abuja, who were parts of population, but not part of sample for the main study. Cronbach Alpha was used to analyse the data collected. The following reliability coefficients were obtained on evaluation of teachers on the implementation of performance objectives 0.96, organization of the learning activities 0.76, coverage of the learning activities 0.90, availability and the rate of utilization of instructional materials 0.99, level of compliance of learning activities 0.79 and evaluation techniques in the implementation of physics curriculum 0.91 (average reliability of TECIQ = 0.88). Students` Evaluation of Curriculum Implementation Questionnaire (SECIQ) reliability coefficient are syllabus coverage 0.96 and level of availability 0.95 (average reliability of SECIQ= 0.95). Data collected from the study were analysed using descriptive statistics of (mean and standard deviation) while and inferential statistics Mann-Whitney U-test and Kruskal-Walis test was used to analysed the hypotheses at 0.05 level of significance. Findings of the study revealed the assessment of the implementation process of Physics showed differences in the coverage of syllabus by the teachers and that there were inadequate of instructional materials used in teaching among others. Based on the findings it is recommended that; curriculum planners should emphasis more on the use of interactive method of instruction which will boost physics students` performance in curriculum implementation and government agencies responsible should organise workshops and seminars to re-train teachers on the proper implementation of physics curriculum.

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STAN:	Science Teachers Association of Nigeria
FME:	Federal Ministry of Education
CIPP:	Context, Input, Process, Product
GPA:	Grade Point Average
JCCE:	Joint Consultative Committee on Education
NIP:	National Institute of Physics
NERDC:	National Educational Research Development Council
NERC:	National Educational Research Council
TECIQ:	Teachers' Evaluation of Curriculum Implementation Questionnaire
SECIQ:	Students` Evaluation of Curriculum Implementation Questionnaire
SPSS:	Statistical Package for Social Science
WAEC:	West Africa Examination Council
WASSCE:	West African Secondary School Certificate Examination

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

Science is an area of learning that is absolutely necessary for development because of its linkage to technology and industry (Batomalaque, 2015). Scientific development is essential for better quality of life, the sustainable development of the planet, and peaceful coexistence among people. From the immediate basic essentials of life such as access to water, food and shelter, to other issues such as management of agricultural production, water resources, health, energy resources, biodiversity, conservation, environment, transport, communication and so on. Science provides the basis for action at local, regional, national and transnational levels (UNESCO, 2015). Science and technology have been identified as the key drivers for growth and sustainable social development and transformation of nations, which could lead to industrialization (Uza, 2013).

Science education aims at helping learner to gain a functional understanding of scientific concepts and principles linked with real life situations and acquire scientific skills, attitudes and values necessary to analyse and solve day-to-day problems (Batomalaque, 2015). This portends the reason why basic sciences are core subjects in the elementary and secondary schools world over. It emphasises the fact that all citizens should achieve some degree of scientific literacy to enable them participate effectively as citizens in the modern societies. Lederman (2008) in his article about "Science Education and the Future of Humankind" argued that:

"*We have arrived at a point in history where there must be a major increase in the capability of ordinary people to cope with the scientific and technological culture that is shaping their lives and the lives of their children*."

Worthy of note is the fact that only quality science education can bring about effective learning among students which will eventually produce palpable development for any country. Quality science education is effective science teaching which occurs when students learn and achieve many scientific goals and not just being able to repeat scientific knowledge (Omoifo, 2012). During effective learning, student learn how to develop conceptual understanding and thinking skills in order to change their intuitive, everyday ways of explaining the world around them to incorporate scientific concepts and ways of thinking into their personal frameworks so as to enhance their ability to solve problems (Omorogbe & Ewansiha, 2013).

In accordance to this, Ogunleye and Fasakin (2011) emphasised the importance of scientific knowledge in boasting the national prestige, national income and even international rating of a country like Nigeria. Science and technology are key drivers to any nation development, because technological and scientific revolutions underpin economic advances, improvements in health systems, education and infrastructure (Lee-Roy, 2012). Science provides a body of knowledge for use in addressing various forms of human, material and environmental problems. It can also be viewed as composed of two major complementary modes: accumulation of knowledge through exploration and discovery efforts about the natural world, and the use of such knowledge for human and material development.

David (2015) identified six components of a model for standard science teaching in United States of America includes:

1. Teachers of science should plan inquiry-based programme for their students;
2. Teachers should interact with students to focus and support their inquiries, recognise individual differences and provide opportunities for all pupils to learn;

3. Teachers should engage in ongoing assessment of their teaching and resulting students learning;
4. Conditions for learning should provide students with time, space, and resources needed for successful science learning;
5. Teachers should foster habits of mind, attitudes, and values of science by being good role models for these attributes and
6. It is important for teachers to become active participants in on-going planning and development of the school science programme.

Although these benchmarks were derived from American Science education specifications, they are by no means limited to United States alone. This same standard is recommended in all science classrooms worldwide. The realisations of these standards vary among nations because of variation in commitment to achieve and maintain the set standards. Most poor nations lack resources to enforce these standards in science teaching and learning. The practiced competencies of science teachers can be derived from what they actually do in schools and particularly in the science classrooms.

Everyday observations of science teachers especially Physics teachers in the classrooms indicate that most of the teaching skills acquired before certification are not put into practice. The deficiencies in science teaching range from; non coverage of contents in schemes of work, non-giving and marking of assignments, non-supervision of instruction, non-organisation of practical lessons, non-organisation of extra lessons to cover lost grounds, non-assessment of learning outcomes regularly, non-application of improvisation knowledge in instruction to non-taking out of students to field experiences (Ajaja, 2009). Again, all these tend to suggest that teachers are to be held responsible for the lack of interest of students in science which results in poor learning

outcomes among the science students. Among these science subjects: biology, chemistry, integrated science and physics taught in Nigerian secondary schools.

Physics is one of the bedrock of scientific and technological development worldwide. Physics is an academic discipline in Nigerian schools that serves both as an essential ingredient as well as bedrock of all technology (Haruna, 2003; Busari, 2014). For the proper understanding of technical and indeed technological subjects, physics plays a major role. Physics is in fact "science in action". Physics in action focuses on physics in everyday life as its application in sports and medicine are vivid and often revealing (Usman, 2011). According to Busari (2014), the increasing importance and attention given to physics stem from the fact that without physics, there is no science, there is no modern society. In other words, physics is the soul of technology and an indispensable single element in modern societal development.

Physics as one of the branches of science, its important subject that must be well known and passed before any science student could further in the line of science in any tertiary institution. The importance of Physics cannot be over emphasised as it forms the basis for technological advancement of any nation. Physics is applied to almost every human activity, and virtually every profession involves some element of physics (Omiola *et al.* 2012). However, students need to be encouraged to know the importance of Physics in national development, government and educational practitioners should also play major role in employing qualify personnel to teach the subject.

Despite the importance of Physics to the scientific and technological development of any nation, yet students' performance in the subject is not encouraging. When one examines the senior secondary school Physics results, in WASCE (SSCE) in Nigeria, and particularly in North- Central States, in the previous years (2011-2015), it was

discovered that the results were generally poor. Students that scored credit and above are regarded as those that achieved well. Achievement is seen in this study as the learning outcome of the students in physics. Majority of the students scored less than credit in both WAEC examinations. For instance, a report from WAEC chief examiner stated that out of 419,245 candidates that enrolled for Physics examination in 2011, only (28.38%) had credit pass and above. Similarly, in 2013, 2014 and 2015 only 46.62%, 29.27% and 31.22% respectively, obtained credit pass and above in Physics. Again, 53.38%, 70.72%, and 68.72% recorded failure in 2010, 2014 and 2015 respectively (WAEC).

From the data presented (See Appendix A), it can be seen that from 2011 to 2015, the percentage of candidates that passed Physics at credit level and above was below 50% on average. Thus, the results showed candidates' poor performance in Physics in the same year period under review (2011 - 2015). Thus, a large number of the students did not perform well. One wonders whether it is because of lack of infrastructures, poorly equipped physics laboratories, inadequate teaching strategies employed by the teachers and insufficient number of qualified physics teachers among others (Jegede & Adedayo, 2013)

Many researchers have identified causes of students' poor academic performance in science subjects; particularly physics, to include poor teaching methods, abstract nature of science concepts, lack of qualified teachers, poor infrastructure, inadequate laboratory facilities, teacher-centered instruction, and non-availability and non-utilization of instructional materials (Gambari, 2010; Abdulraheem, 2012 and Bilesanmi-Awoderu, 2012).

Busari (2014) was of the view that among the factors contributing to student's low enrolment and performance in physics are poor mathematical ability, poor attitude to physics, poor perceptions about physics and poor teaching methods employed in teaching physics. It is also observed by the chief examiner of West African Examination Council (WAEC) that, the problem affecting physics achievement can be related to teachers` teaching methodology of presenting the content of the curriculum to students (WAEC, 2015).

Owolabi and Oginni (2013) have expressed some doubts as to whether the senior secondary school physics curriculum is well implemented in schools. This issue ought to be empirically investigated rather than speculated upon, hence, the need for the present study evaluation of the implementation of senior secondary school physics curriculum using Tyler`s evaluation model in North- Central states, Nigeria.

Curriculum is a particular form of specification about the practice of teaching; it is a way of translating any educational idea into hypothesis testable in practice (Blenkin, 2012). In Nigeria, secondary school curriculum is designed to encourage all students to achieve their spiritual, intellectual and social potential as well as to understand the relevance of learning in their daily lives (Ali and Ajibola, 2015). It is important to note that, it is one thing to design curriculum, it is another thing to implement it effectively.

Curriculum, according to Ali and Ajibola (2015), is defined as the planned experiences provided by the school to assist the students in attaining the designated learning outcomes in the different school subjects' students choose to study in the school. Another dimension to curriculum is that the learning of content may not result in achieving an objective if both contents and objectives are not closely related. The

achievement of the objectives is partly determined in terms of how well the curriculum is implemented.

According to NERDC (2008), the objectives of Nigeria's senior secondary school physics curriculum include; providing basic physics literacy for functional living in the society, acquisition of basic physics concepts and principles as a preparation for future studies, acquisition of essential scientific skills, attitudes as a preparation for technological application in the modern world, stimulation, and enhancement of creativity. These goals are admirable but achieving them has proven difficult over time. Notably, education objectives cannot be met if the planned curriculum for such level of education is not well implemented (Adebule and Akomolafe, 2014).

The implementation of the curriculum is the aspect that concerns the nature and scope of classroom teacher and evaluation of learning achieved by students who were taught. Specifically, the process of curriculum implementation entails interaction between the curriculum planner, the teacher, the learners and the learning environment. The teacher is the major implementer of the curriculum since what the teacher does with it in the classroom determines whether the set goals would be achieved or not. Though such factors as students' interest and readiness and more importantly physical environment (for example availability and adequacy of learning materials and equipment) may be constraining, a knowledgeable and competent teacher would always be able to make the best out of any situation.

The implementation of curriculum is facing some challenges, one of which is the lack of teachers' participation in decision making and curriculum planning. Teachers are not involved in curriculum planning, whereas, Danbatta (2013) asserted that teacher efficiency could make or ruin curriculum implementation since the responsibility of

interpreting and putting the curriculum into use solely rests with the teacher. Another issue is that the Nigeria curriculum covers too much information and suggests redesigning its content to remove unnecessary and irrelevant facts. What aggravates the situation is that teachers are unprepared to cope with growing curricula, which means that instruction becomes ineffective, inappropriate and often inaccurate. Over the years, the issue of policy changes in the educational system which started with the 6-5-4 system change to 6-3-3-4 system and now the 9-3-4 system because subjects change. Alongside the changes in educational system are changes in the curriculum leading to realignment of subject being taught at each level of education and the Implementation requirements. Implementation in this study is the teaching of physics curriculum content to secondary school students.

It is worthy to note that no matter how well-developed and comprehensive a curriculum is, its success is dependent on the quality of the teachers implementing it (Tom-Lawyer, 2015). Curriculum evaluation is an empirical field-based attempt to find out how the use of particular curriculum content meets the objectives of implementing it in schools. Ifeobu (2014) view curriculum content in terms of how it relates to the national and individual objectives.

Evaluation is the process of making value judgments or taking decisions about events, objectives or their characteristics (Isa *et al.,* 2020). This is an indispensable exercise that brings to light the true picture of educational plans and processes to be determined during curriculum implementation (Abdulkarim, 2012). Even when the curriculum has been found to be adequate in terms of objectives, contents, facilities and stipulated methods if not properly implemented, the intended goal will not be achieved. Therefore, assessment is the only means through which the effectiveness of curriculum can be determined.

Furthermore, this study looked at gender has been identified to be of paramount importance in a study of this nature. Adeyinka (2020) view gender factor to be capable of facilitating evaluation of implementation of physics curriculum. Gender issue generally in education industry has become of immense importance and cannot be overlooked, but attention should be deliberately given to it, in order to make intellectual discourse free from sentiments and prejudice. It is a composition of male and female in educational researchers, for a long time, researches have shown concern on the influence of gender in the sector. In the study of Stamarski and Son-Hing (2015) male and female teachers need to do proper evaluation of implementation of physics curriculum, so that student would be able to achieve better in their education pursuit.

Another important variable in this study is the term years of experience of teachers. Teacher years of experience has to do with the increased awareness of diversifying search for new ideas, new commitments and new challenges. Teachers' year of experience and knowledge on the evaluation of implementation of physics curriculum. It is worth noting that experience gained over time, enhances the knowledge, skills, and productivity of teachers. Nevertheless, (Ilomoki and Lakkala, 2018) showed that teaching experience in schools count significantly in the determination of students' achievement in external examinations such as West Africa Senior School Certificate Examination (SSCE). Experienced teachers are already immune to classroom provocative situations and have developed resistance and several solutions against classroom problems (Etiubon and Benson, 2014). According to Tillberg (2020) who noted that familiarity with a skill or field of knowledge acquired over months or years of actual practice and which presumably has resulted in superior understanding or mastery of curriculum.

Curriculum implication for implementing gender education is focus on two major areas;

i. Comprehensive and challenging gender-sensitive curriculum and,

ii. Increase female teachers for effective curriculum implementation.

A gender education is one that creates no segregation or discrimination in application of curriculum. It is an education free from unnecessary sex stereotyping and undue emphasis in sex role and differentiation. Indeed, it is the best investment any nation can provide to assume national development for educating girls and women. The curriculum content, curriculum materials/resources, teacher ingredients all have to be put in place. The need for an innovative curriculum and emphasis is on modalities for effective curriculum implementation. The curriculum content should be made to cater for the interest and needs of both male and female students without necessarily channeling certain aspects of the curriculum content to particular gender (male or female).

Curriculum can be evaluated in a number of ways using different evaluation models. Goal Evaluation Model: Tyler (1950), Cronbach (1963) Course Improvement Through Evaluation Model, Metfessel and Michael's (1967) Paradigm, Stakes (1967) Antecedents-Transactions-Outcomes (ATO) Model, Hammond (1969) Decision Objective Model, Alkin (1969) Decision Management Evaluation Model, The Provus Discrepancy Evaluation Model by Malcom Provus (1971), Stufflebeams (1971) context, input, process, product (CIPP) model, Goal-free Evaluation Model Proposed by Scriven (1972), Proto-type Evaluation Model by Baker and Alkin (1973),Needs Assessment Model by Witkin (1977) and Secondary School Evaluation Model (1977) among others.

However, in the present study, the Tyler's evaluation model or sometimes called the objectives-centered model which was the basis for most common models in curriculum design, development and assessment was used. The Tyler model comprised of four major parts. These are:

i. Defining objectives of the learning experience;

ii. Identifying learning activities for meeting the defined objectives;

iii. Organising the learning activities for attaining the defined objectives; and

iv. Evaluating and assessing the learning experiences.

In this, the researcher intends to use the evaluation component of the model. The Tyler Model begins by defining the objectives of the learning experience. These objectives must have relevancy to the field of study and to the overall curriculum (Abdulkarim, 2012). Tyler's model obtains the curriculum objectives from three sources: the student, the society, and the subject matter. When defining the objectives of a learning experience Tyler gives emphasis on the input of students, the community and the subject content. Tyler believes that curriculum objectives that do not address the needs and interests of students, the community and the subject matter will not be the best curriculum. The second part of the Tyler's model involves the identification of learning activities that will allow students to meet the defined objectives.

Tyler's model is student-centered approach to learning as it is designed to measure the degree to which pre-defined objectives and goals have been attained. In addition, the model focuses primarily on the product rather than the process for achieving the goals and objectives of the curriculum. Therefore, Tyler's model is product focused and chosen because it is comprehensive, purposeful, accepted and used by curriculum evaluator's in different parts of the world. Product evaluation has the purpose of measuring and interpreting the qualification of graduates at the end of a project presentation. It is expected to provide a measure to see more of the number of candidates passing physics at credit level and going into science oriented courses after their secondary school programme.

It is worrisome to note that the physics curriculum being implemented since 2008 still produce students who achieve poorly in physics. In addition, there are no much empirical study to the best of the researcher's knowledge has been carried out on physics curriculum evaluation, to find out the extent to which the stated objectives of physics curriculum Implementation are being achieved in North Central States, Nigeria.

1.2 Statement of the Problem

One of the foremost goals of science education in Nigeria is to produce scientists for national development Federal Republic of Nigeria (FRN, 2013). In spite of Nigerian government's desire to promote science education programme in the country, the quality of science students, in particular physics students produced by the secondary schools seem to be deteriorating (WAEC, 2015). The teaching and learning of Physics need serious attention in order to enhance a sustainable technological development in Nigeria. It has been shown that instructional practices depend on what teachers bring to the classroom and that professional competence is a crucial factor in classroom and school practices. Over the years, the problem of under achievement of science students in Physics has been a general problem. One is led to observe that despite the importance of physics as a science subject, evidence have shown that students are not doing well in this subject at West African Secondary School Certificate Examination (WASSCE).

Furthermore studies (Adeyemo, 2010; Esokomi, *et al*, 2016; Wafula, 2019 and Adolphus, 2020), also identified low learners' motivation among students, inadequate teaching and learning materials, limited learning activities in Physics classrooms and poor syllabus coverage as some of the major concerns in Physics curriculum implementation. Unfortunately, fewer studies had focused on evaluation of the

implementation of the Physics curriculum in secondary schools in North Central states, Nigeria.

The Persistent, poor performance and low enrolment in Physics had been attributed to the use of teaching methods, low learners' motivation, inadequate learning material, minimal learning activities and poor syllabus coverage (Wafula, 2019). Thus, investigation into this problem would provide information on effective implementation of the Physics curriculum.

Consequently, there is need to empirically assess the implementation of the senior secondary school physics curriculum in its entirety and to find out the implementation of the physics curriculum in achieving the set objectives of physics education, with regards to achieving aims and objectives, adequacy of content coverage, availability and extent of teachers' utilization of the available infrastructure materials, level of compliance of teachers with the recommended instruction methods and evaluation techniques used by physics teachers among others in assessing their students. Therefore, this study seeks to evaluate the implementation of senior secondary School Physics Curriculum using Tyler`s evaluation model in North-Central States Nigeria.

1.3 Aim and Objectives of the Study

The study is aimed at evaluating the implementation of Physics Curriculum in Senior Secondary School using Tyler`s evaluation Model in North- Central States, Nigeria.

Specifically, the study is to achieve the following objectives to;

1. Determine the teachers` evaluation of the implementation of performance objectives of senior secondary schools Physics curriculum.

2. Find out organization of teachers' evaluation of the implementation learning activities in the Physics curriculum contents, syllabus and scheme of work in senior secondary schools.
3. Ascertain the teacher's evaluation of coverage of content of the learning activities in the Physics curriculum contents in school syllabus and scheme of work in the implementation of Physics curriculum by teachers.
4. Establish the availability and utilisation of instructional materials in the implementation of Physics curriculum in the secondary schools.
5. Examine the of level of compliance of implementation of teaching strategies in Physics curriculum in the secondary schools.
6. Find out the evaluation techniques used by physics teachers in the implementation of Physics curriculum in the secondary schools.
7. Examine the coverage of the learning activities in the Physics curriculum contents, syllabus and scheme of work in senior secondary schools by teachers based on gender.
8. Find out the level of compliance of learning activities by physics teachers in the implementation of Physics curriculum in the secondary schools based on gender.
9. Examine the evaluation techniques used by physics teachers in the implementation of Physics curriculum in the secondary schools based on gender.
10. Find out syllabus coverage in the implementation of Physics curriculum in the secondary schools by students.
11. Examine the availability of instructional materials in the implementation of Physics curriculum in the secondary schools as perceived by students.

12. Find out teachers' evaluation of the implementation of performance objectives of senior secondary schools Physics curriculum based on years of teaching experiences.

1.4 Research Questions

The following research questions guided the study

1. What is the teachers evaluation of implementation of performance objectives of senior secondary schools Physics curriculum?
2. What is the physics teachers perception of the organisation of the learning activities in the Physics syllabus and scheme of work used in implementation of physics curriculum in senior secondary schools?
3. What is the extent of the coverage of content of the learning activities in the Physics curriculum syllabus and scheme of work used in the implementation of Physics curriculum by teachers?
4. What is the level of availability and utilisation of instructional materials in the implementation of Physics curriculum in the secondary schools?
5. What is the difference in level of compliance of implementation of teaching strategies of learning activities in the Physics curriculum in the secondary schools?
6. What is the evaluation techniques used in the implementation of Physics curriculum in the secondary schools?
7. What is the extent of coverage of the learning activities in the Physics curriculum contents, syllabus and scheme of work in senior secondary schools by teachers based on gender?

8. What is the level of compliance by physics teacher of the implementation of learning activities in the Physics curriculum in the secondary schools based on gender?
9. What are the evaluation techniques used by physics teachers in the implementation of Physics curriculum in the secondary schools based on gender?
10. What is the extent of syllabus content or activities coverage in the implementation of Physics curriculum in the secondary schools based on students' perception?
11. What is the level of availability of instructional materials for the implementation of Physics curriculum in the secondary schools based on students' perception?
12. What is the evaluation of teachers on the implementation of performance objectives of senior secondary schools Physics curriculum based on their years of teaching experiences?

1.5 Null Research Hypotheses

The following null hypotheses were formulated and tested at $p \leq 0.05$.

HO_1: There is no significant difference in the overall evaluation of the implementation of Physics curriculum by physics teachers in senior secondary school based on gender.

HO_2: There is no significant difference in the overall evaluation of implementation of Physics curriculum by Physics teachers based on the year of experience.

HO_3: There is no significant difference in the organisation of physics curriculum by Physics teachers based on the year of experience.

HO_4: There is no significant difference in the syllabus coverage in Physics curriculum implementation between the Physics teachers and the Physics students.

HO_5: There is no significant difference in availability of instructional materials used in teaching and learning physics between the physics teachers and physics students.

HO_6: There is no significant difference in the level of compliance to teaching strategies by teachers in the implementation of Physics curriculum in senior secondary school based on gender.

1.6 Significance of the Study

The findings of the study would be beneficial to the relevant stakeholders in education such as; students, parents, physics teachers, secondary schools' management board, proprietors of private schools, ministry of education, and future researchers especially in the area of physics teaching and education when published. This study is considered significant because of the usefulness of the findings made with regards to the theoretical contributions to already existing literature on assessment of secondary school physics curriculum in Nigeria.

The findings of the study if exposed to physics teachers would be beneficial to the parent as results of quality teaching, care of their ward and children given through the teaching of physics. This may also bring joy and satisfaction to the family. Good education and performance of their children may also serve as an assurance for better tomorrow.

The findings of this study would be beneficial to physics teachers who are actually the implementers of the curriculum with self-evaluating criteria to enable them assess themselves on the implementation of physics Curriculum for Secondary School in North Central States of Nigeria. Exposure of physics teachers to the findings of this would provide them with information on the requirements of the national minimum standards in the teaching of physics. It may also serve as a guide for them on how to effectively

use the physics curriculum in their classroom teaching which encompasses all aspects of child development.

The findings of this study may be useful to secondary schools' management board as it may help them see the need to adopt serious measures to ensure facilities or instructional materials are available and adequate for students in both urban and rural secondary schools. The Board may also find the information provided through the findings of this study useful to ensure continuing professional development of physics teachers. This may also help to expose the teachers to current trends in the teaching of physics and child development. These would be achieved by exposing management Board of secondary schools to the findings of this study.

The findings of the study may help them meet the national minimum standards and guidelines for establishment, operation and administration of secondary schools. This may help create conducive environment to the students to maximize their learning process and also prevent closure of their schools and possible prosecution by relevant agencies. Further, the information would help them ensure that physics teachers in their schools give their best in not only teaching but also ensuring that students who are placed in their care are well treated and cared for.

The finding from this study would help the state ministry of education (quality assurance unit) to enforce the regulations laid down by the federal ministry of education in regard to the provision of teaching of physics and learning in all public and private secondary schools in Nigeria. The state ministry of Education may also use the information to organize seminars, workshops and conferences for principals and physics teachers to sensitize them on how to effectively use physics curriculum in their respective schools.

Finally, the study would also be useful to future researchers especially in teaching and learning of physics. The information could provide them with empirical data on the extent of implementation of set minimum standards for teaching of physics in North-Central States of Nigeria which may be useful for further research studies in related areas.

1.7 Scope of the Study

The geographical scope of this study was limited to all public school physics teachers` and students within North-Central geographical zone of Nigeria which comprises of Niger, Nasarawa, Kogi, Kwara, Benue, Plateau state and Federal Capital Territory, Abuja. The Zone is located between longitude $2^{o}40`E$ to $10^{o}40`E$ and latitude $6^{o}0`N$ to $11^{o}20`N$. The study assessed the implementation of physics curriculum in senior secondary schools in North-Central States, Nigeria. The specific curriculum assessment plan for this study was based on Tyler's evaluation model of the curriculum implementation. The assessment was based on the following areas, namely: Objectives of Physics curriculum, Determination of learning experience, Organisation of the curriculum activities and Evaluation approaches stated.

1.8 Basic Assumptions of the Study

The basic assumptions of this study are:

1. That Physics curriculum contents in senior secondary schools are not fully and adequately implemented.
2. All the schools are using the same National Educational Research Development Council (NERDC) Curriculum

3. That the senior secondary school I, II, III Physics students and their Physics teachers will be honest in answering their respective questionnaire and observation checklist based on what it is being implemented in the classroom.
4. All Physics teachers are trained on student-centered approaches and are able to employ them in teaching and learning.
5. All schools had adequate laboratories and laboratory materials for instruction in Physics
6. The family backgrounds of learners and all school environments are similar, hence equal level of exposure to career guidance and counseling at home and at school.
7. All teachers teaching Physics are trained and qualified as teachers of Physics.

1.9 Operational Definition of Terms

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

Coverage of the syllabus: it is the effective implementation of the curriculum by achieving all set objectives for a given class on time resulting to high sores in examinations.

Curriculum Evaluation: This is ascertaining availability and adequacy of resources (human, physical and instructional) toward successful implementation of the secondary school Physics programme. Also, curriculum evaluation helps in throwing light on whether physics curriculum as developed and organized actually produces the desired results;

Curriculum: Curriculum is an organized framework that delineate (outlines) the content students are to learn, the processes through which students achieve these goals, and the context in which teaching and learning occur. It is also referring to as planned

subject content, teaching methods employed, materials provided and activities experienced in order to achieve set objectives or outcomes

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

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

Experienced Physics Teachers: Teachers with five years and above teaching experience at senior secondary level are regarded as experienced Physics teachers less experienced Physics teachers are those with below five years‟ teaching experience at senior school level.

Implementation: Process of enacting the curriculum or educational program produced during the previous stages of the curriculum cycle

Learner: A learner is a person undergoing instruction in an educational institution, therefore as used in this study a learner is a secondary school student taking physics.

North-Central State Nigeria: A geographical zone in Nigeria that comprises Niger, Nasarawa, Kogi, Kwara, Benue, Plateau states and Federal Capital Territory, Abuja

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

Physics: In this study Physics refers to one of the three science subjects (Chemistry, Biology & Physics) offered in the senior secondary school curriculum that is critical for producing science and technology human resources.

Public secondary schools: public secondary schools are government funded secondary schools in Nigeria.

Structure: It refers to the arrangement or organization of Physics curriculum in a systematic pattern.

Teachers' Qualification;

Professional qualifications such as B.Ed (Physics Education), B.Sc. (Physics) plus P.G.D.E, or N.C.E. Teachers with any of the specified professional qualifications are regarded as qualified teachers. Teachers who do not possess any one of the specified qualifications are regarded as unqualified teachers.

Teaching methods: Teaching methods refers to learner-centered learning process where most learning activities are performed by the learner while teachers' role is to facilitate learning by providing resources required and guiding activities for achievement of the learning objectives.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Conceptual Framework

2.1.1 History and Development of Science Education in Nigeria

The knowledge in science is imparted through science education whose two main aims are production of scientifically literate society and the development of potential scientific and technological manpower. Ogungbesan (2012) views promoting the scientific development of the nation as the ultimate objective of science education. Education in the sciences must be based on the information that has rich survival value and upon strategies of inquiry that facilitate better adjustment to life. Ukoli (1985) perceived that the ultimate goal of science education in Nigeria is to transform the society into a scientific society, a society in which it will become possible to:

(i) Achieve generalized theoretical knowledge concerning fundamental conditions determining the occurrence of various types of events and processes.

(ii) Free humans' minds from superstitions.

(iii) Undermine the intellectual foundations for moral and religious dogmas.

(iv) Develop among increasing numbers, a questioning intellectual temper towards traditional beliefs, so that issues, which were formerly accepted without questions are now subjected to systematic and critical thought, and logical methods for assessment are accepted instead.

The type of science education that will achieve the objectives highlighted above will be one that will equip the child with the knowledge of who a scientist is and how a scientist works. The implications of these are, any existing or proposed science education should

be relevant to the growth of Nigerian child. According to Onocha (1985), the emergence of science education in Nigeria dated back to 1859 when the rudiment of science in the form of Nature study was introduced into the curriculum of Church Missionary Secondary School, Lagos. Prior to this period, there was nothing like science in the curriculum of either primary or secondary schools in Nigeria.

Until the beginning of 1930s, science teaching in most Nigerian schools was Nature study, although in some schools, time tables listed such science subjects as biology, chemistry, physics and sometimes botany, physiology and zoology. However, by 1950 most Nigerian secondary schools were offering general science in one form or another but the general trend was to offer it as a single subject up to the school certificate examination.

By the mid-1950s, general science in Nigerian schools, began to experience a failure as an approach to science teaching because when higher school certificate (H.S.C.) courses started by 1951 in the more developed secondary schools, students who had successfully completed school certificate general science, could not be easily accepted into H.S.C. courses to study chemistry, biology and physics except a distinction was made in the course. Because of the above, by the mid-1950s, most Nigerian schools had returned to the science education pattern with a two-tier approach. General science was taught during the first two years to every student in a five-year secondary education programme. Students are subsequently allowed to specialize during the last three years so that those who desire careers in science could choose two or the three basic sciences depending on their abilities. In an effort to popularise science in the schools, science teachers all over the country met on 30th November, 1957 and the association named Science Teachers‟ Association of Nigeria (STAN) was born.

Later development in popularizing science in the country also involved the establishment of the Federal School of Science located in Lagos by the Federal Government in 1958. The school specialized in offering basic sciences for those who desired to sit for ordinary and advanced levels in the General Certificate Examinations (GCE).

With the advent of political independence on the 1st October, 1960, the country became aware of great manpower shortages, especially in the areas of science and technology. The leaders of the country realized that there could be no economic independence without an adequate supply of scientific and technological manpower. To solve this problem, they turned to the school system, but realized that the type of science being taught in the schools was not compatible with the aspirations of the country. There was a wide gap between the needs of the society and the level of scientific and technological manpower to meet those needs. There was a strong belief that the way to correct this state of affairs was to develop a sound science education programme. As a result of the above, further development in the area of university education started almost immediately after independence. In 1962, the Ahmadu Bello University was opened at the Zaria branch of the Nigeria College of Arts, science and technology. In the same year, the University of Ife opened temporarily at the Ibadan branch of the Nigerian College of Arts, science and technology and the University of Lagos also commenced. The University of Nigeria, Nsukka had opened two years earlier. These universities coupled with Advanced Teachers College established as a result of recommendation of Ashby commission in 1960, provided sources for steady flow of science teachers to Nigerian secondary schools as well as serving as research centre for further improvement of science and technology in the country. Today in Nigeria, it has been recognized that science is not only an academic discipline for scientists, but also an

important tool of industry, medicine, agriculture and domestic comfort. For this reason, a ministry of science and technology was established by the then civilian government in the country.

Curriculum development conferences and workshops were held between 1969 and 1975 culminating in the production of science curriculum materials for both primary and secondary levels and the national policy on education on document. Debates on the policy document and on other policy statements on education by our various governments were affected to have received appropriate attention in different communities of the country (Ivowi, 1982, Adeyemo, 2003, 2010).

The provisions for STEME consist of curriculum, personnel and equipment (Adeyemo, 2010). According to (Ivowi, 1984, Adeyemo, 2003), STEME policies may be put as follow:

i. Science shall be taught to all children in primary and secondary levels.

ii. The teaching and learning of science shall be done in such a way as to develop the child in three domains (cognitive, affective and psychomotor) of educational objectives.

iii. Equal opportunity in terms of the provisions of curriculum materials, resource persons and laboratory facilities shall be given to all.

iv. Every child shall take at least one science subject at the end of the secondary school course examinations.

v. Local production of science equipment and the practice of improvisation shall be pursued vigorously.

Although adequate strategies have been devised for the implementation of the policies, a closer examination of the implementation process shows that the objectives are far from being realized. A detailed analysis of the implementation strategies of the national policy is properly documented in Ivowi (1983), and a mismatch between policy and implementation are also identified. For example, while government wants all children to do sciences in schools, most schools have no laboratories at all. Apart from poor provisions for STEME in terms of facilities, the problem was compounded by the large population in school as far back as late 1970's (Ivowi, 1984). Based on these major landmarks in STEME since 1960 in Nigeria, the emphasis of science education in this twenty first century should be on quality assurance for science teachers, science students and Nigeria society at large.

Education in science has grown in popularity at rates that seem to be out stripping the resources and facilities that are available for science teaching. Thus, the enterprise into science which started in the form of rudiments of science in our secondary schools and teacher training colleges has now metamorphosed through appropriate and relevant curriculum projects into a modern scientific enterprise.

2.1.2 Historical background for physics education

Aristotle wrote what is considered now as the first book of Physics. Aristotle's ideas about motion weren't displaced until the end of 17th century, when Isaac Newton published his ideas (Wafula, 2019). In 1872 Harvard University established Physics as a college entrance requirement, chemistry and biology were added latter, these universities requirement for admission dictated secondary school course and spurred the beginning of science curriculum (Andrews, 2006). Before the beginning of the nineteenth century, the study of science was either a hobby of the few people with

means or solitary effort of someone with scientific talent. Since then, science has developed to a level where we today live in scientific civilisation in which science is no longer confined to a few individual or countries that are devoted (ibid). Physics is a branch of Physical sciences that concerns mainly with matter in relation to energy (Wafula, 2019).

Physics is an important base of science and technology because it is concerned with natural phenomena and help people understand the increasing changing technological society (Changweiywo *et al*., 2010). Today's Physics students keep thinking of Physics concepts in Aristotelian terms; despite being taught only Newtonian concepts. Historically, Physics has been taught at the high school and college level primarily by the lecture method accompanied with demonstration, hands-on experiments. Questions that require students to ponder on what will happen in an experiment and why? In contrast the developments in science and technology in the 21st Century has changed the teaching and learning approaches by the introduction of computers in classroom; particularly in developed and developing countries. Other developments in the resent past have been demands for equal rights and opportunity by women in the science and technology fields. Physics has been acknowledged as a pre-requisite for the study of several high-profile courses at the university for example; engineering, medicine, aerospace, technology and other applied science courses (Busari, 2014). The subject has many applications for example in medicine; where throughout this Century advances in Physics and medicine have gone hand in hand. Medical community devices; new techniques for diagnosing and treating a variety of illness has rapidly exploited the most fundamental discoveries in Physics. Information technology has reduced the world into a global village through the use of satellites and computers, the use of Physics knowledge and skills, has been very critical. A wide range of applications of Physics is

used in industrial development for improvement of the well-being of human lives. Physics knowledge and skills are applied in food production, preservation, transportation, telecommunication and energy production and conservation. Therefore, Physics affects all aspects of human life (ibid). In view of the obvious importance of Physics in scientific and technological advancement of any nation and its usefulness in nearly all fields of human endeavor, the poor performance of students at secondary school level in Nigeria at large and in particular North central states has been a source of concern for various stakeholders in Education as it is for this study.

According to a previous study by Njoroge *et al*., (2014) many factors are attributed to this poor performance of physics students in secondary schools. Other studies including (eg., Woudo, 2010; Wambugu & Changeiwywo, 2008, Semela, 2010, Gambari, 2010, Busari, 2014, Wafula, 2019 among others) attributed the poor performance to insufficient man power, poor teaching methods, inadequate learning materials, poor attitude, lack of understanding of concepts due to their difficult nature and failure to use modern technology in instruction.

2.1.3 Philosophy of Physics in Senior Secondary School curriculum in Nigeria

The major concepts which underline and unify the topics in the Senior Secondary School physics curriculum content are motion and energy. Relevance of the physics topics to society in terms of application is stressed throughout. Only the topics which are directly derivable from the concepts and their sub concepts were selected. Generally, the approach in the curriculum is to treat the topics under a unifying concept in a general form and provide some elaboration in the applications in order to advocate relevance and use copious illustrations to aid understanding.

Apart from such attempt at functionality, a specific teaching approach has been advocated. The guided discovery method of teaching that has been recommended is aimed at ensuring that learning, as an activity takes place while the student's mind is actively engaged through a series of well – structured experiences. These are typified with experimentation, questioning and discussion. The teacher is required to prepare his lesson properly and to guide the students very well so that learning can take place. Here, teaching must not be emphasise at the expense of learning: hence the usual lecture method, which is usual for the teacher and efficient for covering a lot of ground quickly (Adeyemo, 2010), is not recommended. This is to avoid a rigid one way in the classroom and instead to put in place a real interaction among teacher, students and materials.

The advantages of the guided-discovery approach have been discussed (Adeyemo, 2010). Like other science programmes, three factors have been emphasized in the Senior Secondary School physics curriculum content. These understand of concepts, functionality and application. Ability to explain concepts and principles, and apply them in given situations is needed in the programme because of the crucial role which physics plays in the development of science and technology. Functionality entails the use of functional equipment in order to expose students to the various processes and to enable them to acquire relevant skills. A high degree of accuracy is not actually essential at this stage; but complete reliance on the precision of the instrument used needs to be stressed. The overall effect of application and functionality is to enhance understanding of the concepts being taught (Adeyemo, 2010). Given the nature of physics and the scarcity of teachers and equipment in schools, it is difficult to effectively implement the provisions of the SSS physics curriculum. This has resulted in a difference between the prescribed programme and what is actually implemented in the schools (Busari, 2014).

The general objectives of physics curriculum as stated in the curriculum document of 1985 by Federal Ministry of Education (FME) and revised 1998, 2004, 2013 are;

i. To provide basic literacy in physics for functional living in the society.
ii. To stimulate and enhance creativity
iii. To acquire essential skills and attitudes as a preparation for technological application of physics
iv. To acquire basic concept and principles of physics as preparation for further studies

Besides, an array of performance, objectives was also stated for each topic in physics. Adeyemo (2010) emphasized some factors on the senior secondary school (SSS3) physics curriculum content;

i. Understanding the concept. That is, ability to explain concepts and principles of physics topics
ii. Functionality: that is, the use of functional equipment in order to expose students to the various processes and to enable them acquire relevant skills
iii. Application: ability to apply concept learnt skills acquired to relevant field.

2.1.4 Essential features of Senior Secondary School Physics Curriculum in Nigeria

Physics, which has been found to be the foundation of scientific and technological development worldwide in both developed and developing countries alike, has some features which are generally accepted and believed to widen the knowledge and increase the horizon of understanding of physics by the learners. These features are made essential because it is believed that if they are duly and critically followed and applied in any given situation and at any given period of time will be able to make this subject

easy to comprehend by learners and as a result nullify the misconceptions of people, students, teachers of physics, other subjects' teachers, parents and community at large about physics. Some of these essential features are as followed:

i. The method of teaching physics should be guided discovery method instead of the old and routine lecture method used in teaching the subject. This was recommended due to the fact that, learning efficiency and effectiveness takes place during explanation, experimentation and discussion.

ii. There should be interaction between physics teacher and the students. In this case, it is believed that it is genuine and helpful interaction between the teacher and the students, the students will be able to expose their minds and what and when, they find difficult in physics topics to their teacher and thereby reduce the difficulties they encounter

iii. It was also recommended that each topic should have a target and specific objectives to be met at the end of this lesson and that lesson. This is necessary and important if physics is to be appreciated by the students and community at large. Before a topic could be appreciated, it must have attainable goals and objectives and if these objectives are not met, then it is said to be meaninglessly taught and of course, have no contribution to the development of the students in terms of cognitive, affective, and psychomotor domains and also has nothing to add to the society.

iv. Each topic should cut across other topic that is the knowledge guided in previously taught topic should be transferable. This means that it should have to contribute to this new topic and aids the understanding of the new topic. In a nutshell, topics should be sequentially arranged in a logical order so that each

knowledge gained could be retained, transferable and applicable to any physical challenges.

v. Evaluation should not only be based on the recalling of facts but also on the affective and psychomotor. This is recommended so that students could be wholly and all round developed on the demands of their societies.

vi. It was recommended that emphasis should be placed on the theoretical aspect as well as practical aspect of the subject. This is suggested and recommended so that any theory taught in physics could be tested and trusted to be consistent at any considerable situations

vii. Above all, each topic should be taught in a way that it takes into consideration its relevance to the societal norms, values etc so that each student can appreciate the values, norms of his society in which he/she lives.

2.1.5 Effective Implementation of Physics Curriculum in Secondary Schools

Darling-Hammond (2010) defined an effective teacher as one who is intellectually challenging, motivating students, setting high standards and encourages self-initiating learning. Aderson (2004) viewed effective teachers as those teachers who achieved the goals set for them. Effective teachers are very important for effective curriculum implementation. However, teachers' effectiveness is difficult to define since there has not been a consensus agreement on what measures quality teaching (Oluremi, 2013).

However, it is possible to measure teachers' attribute like interaction with students, teaching strategy, motivation, pedagogical content knowledge and classroom management through qualitative research approach (Aina *et al*., 2015). Oluremi (2013) identified four dimensions that could be used to characterize an effective teacher as follows: (a) Instructional effectiveness, (b) Uses of assessment for student learning, (c) Positive learning environment; and (d) Personal quality of the teacher.

The conceptualization of implementation of Physics curriculum as adopted from Aina *et al.*, (2015) is shown in Figure 2.1 below.

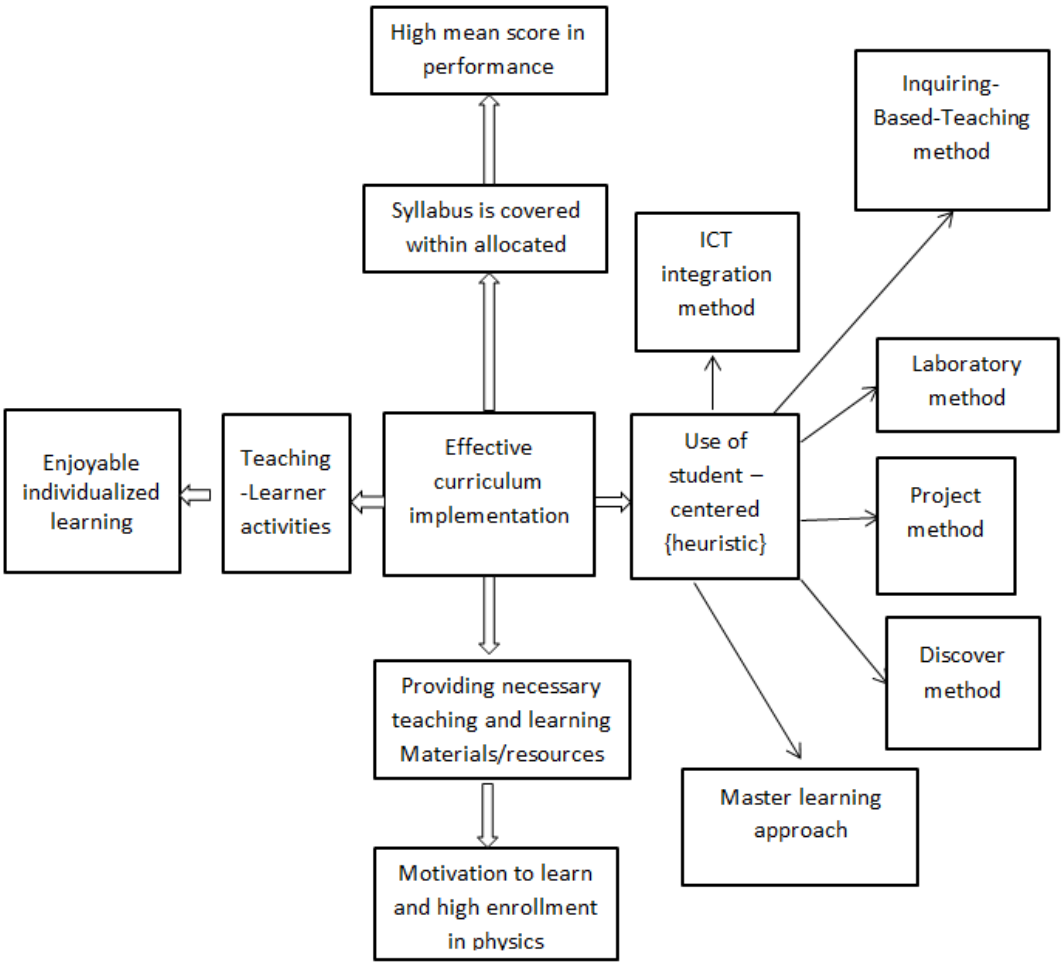

Figure: 2.1: Conceptualization of effective implementation of Physics curriculum
Source: Adopted from Aina *et al*., (2015)

As shown on Figure 2.1, it can be conceptualized that teachers' effective curriculum implementation could be measured by his or her use of modern teaching methods; provision of teaching-learning materials; providing enough learners' activities which promote enjoyable individualized learning and covering the syllabus in the allocated time. Effective curriculum implementation should not only be concerned with students' academic goals but also concerned with learners' motivation and/or enrollment in the subject, practical skill acquisition and emotional enjoyment in the learning process.

Since students enter into classroom from different backgrounds, an effective teacher should always maximize instruction time and make good use of it (Oluremi, 2013).

An effective teacher who effectively implementation curriculum is one that has high expectation in terms of learners' performance. A teacher who has low expectation for his or her students about learning is not effective. An effective teacher especially in Physics makes use of different modern teaching methods in classroom (Kola, 2013). The use of technologies is imperative for all effective teachers in schools today. Effective teachers also employ: Inquiry-Based-Teaching, laboratory, project, discovery and mastery learning methods in Physics classroom.

Syllabus coverage in the allocated time is critical for producing high mean scores in the subject. Assessment and feedback are very important to students learning since it improves their learning (Aina *et al*., 2015). Sustaining a positive environment is the responsibility of an effective teacher. An effective teacher will always interact with students both within and outside the classroom because this is very important to students' learning. This is because most students learn best in the environment where they are able to freely express their feeling and, in a situation, when they are free with the teacher.

Apart from these attributes, of teacher' effectiveness mentioned, others that are very important in measuring curriculum implementation effectiveness are motivation for both the learner and the teacher, content knowledge and students' homework (Kola, 2013). Teacher effectiveness in classroom is very important and where a teacher is not effective in teaching, students' academic performance (mean score) will be low. The described poor performance in Physics in Nigeria and in North Central States in particular may be due to ineffective curriculum implementation. Studies have shown

that teacher-efficacy is important variable in teachers' effectiveness. Consequence of teachers' effectiveness on student achievement is both additive and cumulative; teachers' effectiveness increases effective curriculum implementation hence, students' achievement (Aina *et al*., 2015).

According to Egunza (2014) teaching effectiveness directly depend on lesson planning effectiveness. In a study carried out on, "A Discussion on Teacher effectiveness in curriculum in Kenya with focus on Makadara Division." The study noted that:

> "Planning effective lesson is an important step for a teacher. A lesson plan may be defined as a set of teaching-learning activities for pupils to be carried out within a defined time. A lesson plan usually covers a single or double lesson and the learning activities are arranged in a chronological pattern and defined by steps. A lesson plan should emphasize the importance of learning by doing and collaborative learning, these are: (a) lesson objectives, (b) teaching-learning resources and teaching aids, (c) methodology (teaching methods and skills, (d) lesson assessment and evaluation (Egunza, 2014, p.374)".

This literature informs this study that effective implementation of curriculum begins with proper planning, setting the objectives to be achieved putting the available time into consideration, obtaining the materials to be used, arranging the teaching learning activities and how to evaluate the learning effectiveness. This study therefore endeavored to evaluate the implementation of senior secondary school physics curriculum using Tyler`s evaluation model in North Central Nigeria.

2.1.6 Goals and Objectives of Nigerian secondary education

The broad aims of secondary education within the overall Nigerian education policy are:

(1) Preparation for useful living within the society

(2) Preparation for higher education.

Education is described as the totality of life experiences that people acquire, and which enables them to cope with and derive satisfaction from living in the world (Babafemi, 2007). This is said to enable people achieve social capability and optimum individual growth. It is on this premise that it is believed that the quality of a nation's education is proportional to the level of its prosperity. Economically, advanced nations of the world are distinguished by the excellence of their educational system.

Following the political independence of Nigeria, there was a realization that the type of education our colonial masters left with us needed a critical re-examination of the worth: of content, objectives, relevance, methods, administration, evaluation, and so forth. According to Ezeobata (2007), this period saw a state of affairs in Nigerian education where every subject had to 'prove its usefulness' to retain a place in the school curriculum. This was said to have led the then National Educational Research Council (NERC) to convey a historic curriculum conference at Lagos in 1969. This conference recommended new set of goals and provided directions for major curriculum revision upon which the National Policy on Education of 1977 and the revised policy in 1981 and 2004 were based. Against this background of national aspirations, a new educational system commonly referred to as the 6-3-3-4 system of education emerged. The system consisted of six years of primary school education, three years of junior secondary school (JSS), three years of senior secondary school (SSS) and four years of post-secondary education (Omotayo *et al.,* 2008).

The implementation of the 6-3-3-4 education system began in 1982 and brought many reforms into the educational system in Nigeria. According to Ajala (2002) "the new National Policy on education has all the necessary ingredients for landing Nigeria into the future technologically, politically, Socially and Morally, adding that the policy if well-coordinated and implemented is a solid basis for the nation to launch itself among the great nation". Babafemi (2007) however remarked that the current situation on ground is far from this ideal as the system seems to be suffering from poor and shoddy implementation.

In more specific terms, the secondary school is intended, among other things, to raise a generation of people (youth) who can think for themselves, respect the views and feelings of others, respect the dignity of labour and appreciate those values specified under broad national aims and live as good citizens (FME, 2013).

2.1.7 Concept of Evaluation

Evaluation as a concept has been differently defined by different authors. Henrrietta (2016) defined evaluation as the provision of information involving selection of criteria, collection of data and analysis for the sake of facilitating decision making. Also stated that evaluation undertakes the specification of objectives of some aspects of education and the appraisal of the extent to which the said objectives have been achieved as it strives to give a sound value judgment based on the objectives and criteria as well as informed evidence. The authors outlined the four main objectives of evaluation to be:

i. Giving account of how far the objectives of programmes have been achieved
ii. Giving guidance as to what step to be taken next.
iii. Making educational decision and
iv. Making value judgment.

Henrrietta (2016) argued that a definition that highlights the judgmental character of evaluation is likely to create some anxiety among potential values and raise some resistance among opponents of evaluation.

Evaluation as a concept has been differently defined by different authors. Ifeobu (2014) defined evaluation as the provision of information involving selection of criteria, collection of data and analysis for the sake of facilitating decision making. In line with this opinion, Kukwi (2010) stated that evaluation undertakes the specification of objectives of some aspects of education and the appraisal of the extent to which the said objectives have been achieved. The authors stated that it strives to give a sound value judgement based on the objectives and criteria as well as informed evidence. The authors outlined the four main objectives of evaluation to be:

i. Giving account of how far the objectives of programmes have been achieved
ii. Giving guidance as to what step to be taken next.
iii. Making educational decision and
iv. Making value judgement.

Cronbach and his associates argued that a definition that highlights the judgemental character of evaluation is likely to create some anxiety among potential values and raise some resistance among opponents of evaluation. Evaluation could also be seen as a systematic examination of events occurring in and consequent on a contemporary programme. It is an examination conducted to assist in improving this programme and other programmes having the same general purpose.

Evaluation is also seen as an activity that comprises both description and judgment. Theorists that agree with this include Guba and Lincoln (2008), Mkpa (2007) and Onwuka, 2004). Specifically, Ifeobu (2014) maintained that the general concept of evaluation could be perceived as frequent decision making and judgments which

individuals, groups, institutions and government pass on what affect their lives and others. The author went on to reiterate that such judgments are usually taken on the basis of experience, information evidence or data.

Cai (2019) defined evaluation as making judgment about the value of concepts, methods or materials for some particular purpose. Evaluation involves the use of criteria and standards to determine the degree to which specific factors achieve accuracy, effectiveness, economy or satisfaction. The author noted that evaluation judgement can be either quantitative or qualitative. Ifeobu (2014), is of a different view and described the characteristics of effective evaluation pointing out that evaluation is not merely a testing programme or a synonym for measurement or an administrative device for assessing teaching or instruction; rather, it is a comprehensive cooperatively developed, continuous process of study to be defined and interpreted in terms of its functions and purposes.

Dambatta (2013) and Ifeobu (2014) was in agreement that evaluation can be defined as a process, global in scope, concerned with determination of the value of behaviour changes that education seeks to accomplish. They went further to say that evaluation is a technique for collecting multiple evidences to indicate the value of a process, the extent of progress towards stated goals and the use of evidence to influence future action. Though in the actual classroom situation one ought to know what is to be evaluated; whether it is the teacher education course or the performance of the products of a teacher education programme. Sarah (2013) defined evaluation as the process of agreeing upon a programme standard; determining whether a discrepancy exists between and some aspects of the programme and some discrepancy information to identify the weakness of the programme.

Sarah (2013) defined evaluation as a process of judging the merit or worth of something. This is similar to the view of Aziz *et al*. (2018) that sees evaluation as used to connote the process of making value judgments of taking decision about events, objects or their characteristics. Ifeobu (2014) sees it in broader and more encompassing senses as a process of seeking, obtaining and quantifying data with a view of making value judgement about objects, events or their characteristics. The author also sees evaluation as being of fundamental significance to man's continued existence since it enables us to from time to time, align or realign our actions and motives with societal norms and values. With particular references to the education enterprise, the author said that it plays not only a fundamental role but forms an integral and indispensable part of the enterprise. Evaluation is imperative and evidently indispensable in any worthwhile educational enterprise.

A similar view was also expressed by Dambatta (2013) that evaluation is the process of finding out the strengths and weaknesses of the whole curriculum endeavour. The author says that it can be regarded as the means of finding out what the students have learnt and what they have not learnt or what gaps remain in their learning to be achieved. The author classified evaluation into two major forms: formative evaluation and summative evaluation. Formative evaluation is the evaluation carried out in the course of a programme so as to determine the extent to which the objectives of the programme are being attained. Summative evaluation is the assessment carried out at the end of the lesson, unit, a terms' work, a year's work or the programme. Elaborating on this Ifeobu (2014) also classified evaluation into formative and summative.

These are usually undertaken during the developmental stage of the programme while the feedback obtained from formative evaluation is used as an input in improving or modifying the programme further before its final adoption. Summative evaluation

indicates to the developers of the programme whether the programme developed is effective and useful. Ifeobu (2014) is of the view that evaluation is a systematic process of determining the extent to which instructional objectives are achieved in pupils. The author also sees evaluation as a process for finding out how far the learning experience as developed and organised are actually producing the desired result. The process of evaluation involves identifying the strengths and weaknesses of the plan. Evaluation also checks the effectiveness of particular instruments that is the teachers and other conditions that are being used to carry forward the instructional programme. The authors see evaluation to involve ascertaining whether the expected outcome of a programme is achieved after necessary planning; and continued by saying that evaluation required the involvement of competent member of the curriculum group, that is those that can do very good jobs of revealing whether curriculum outcomes are realized and if not, whose improvements are necessary. The result of evaluation is fed back into each level of activity: studying, planning, interpreting decision-making, execution for appropriate modification of identified errors. The author stressed that there is need for a comparison of achievement with a standard to identify discrepancies for improvement.

The common feature of all these definitions is that value judgements are made based on the outcome of the process. Hence, evaluation process must be fully judged else it is regarded as incomplete. Evaluation according to Aziz *et al* (2018) is a systematic process of determining the extent to which instructional objectives are achieved by pupils.

The author noted that:

i. Evaluation involves a systematic process. It is a controlled observation of pupils' change in behaviour.
ii. Evaluation assumes that instructional objectives have been previously identified.
iii. The pupils have been exposed to some content before evaluating or determining the extent of learning or behavioural change that has taken place.

Ifeobu (2014) went further to say that evaluation includes both quantitative and qualitative descriptions of pupils' behaviour in addition to value judgement concerning the desirability of that behaviour. For instance, at the end of the course on evaluation, the students will be tested to determine the extent of their change in behaviour. The quantitative description of their qualitative grades will be in letter grades thus:

70% and above - A- Excellent

60-69 - B-Very Good

50-59 - C- Good

45-49 - D- Average

40-44 - E-Low Pass

Below 40% - F- Fail

At the end of the programme of study, a summary of student's grade is taken and the Grade Point Average (GPA) computed. Then, their level of grade will be determined.

For Stufflebeam in Dambatta (2013) evaluation is the process of delineating, obtaining and providing useful information for judging alternatives; though the author has been reported to include information for accountability:

1. Evaluation is performed in the service of decision-making and accountability; hence it should provide information which is useful ton decision-making as well as being accountable for the public money invested in programme.
2. Evaluation is a cyclic, continuous process and therefore must be implemented through a systematic programme.
3. Evaluation process includes the three main steps of delineating, obtaining and providing
4. The delineation and providing steps in the evaluation process are interface activities requiring collaboration between evaluator and decision-maker while the obtaining step is largely a technical activity which is executed mainly by the evaluator.

The present work which is on the evaluation of the implementation of a curriculum programme is necessary. Evaluation can be seen as a process concerned with the determining the extent to which instructional objectives are achieved by students. Ifeobu (2014) agrees with this when the author stated that once a course of action has been approved and implementation has begun, process evaluation is necessary to provide periodic feedback to persons responsible for implementing plan and procedures.

2.1.8 Concept of Curriculum and Curriculum Implementation

a) Curriculum

Etymologically, the word curriculum was coined from the Latin word "currere" meaning "race course", referring to the course of deeds and experiences through which children grow to become mature adults (Ali and Ajibola, 2015). Curriculum is the set of courses and their contents offered at a school or university. A curriculum is prescriptive and is based on a more general syllabus, which merely specify what topics must be

understood, and to what level to achieve a particular grade or standard. That is, a curriculum may be referred to as all courses offered at a school.

According to Jeffs and Smith (2010), “Curriculum is all the learning which is planned and guided by the school, whether it is carried out in groups or individually, inside or outside the school”. In other words, curriculum specifies in advance what we are seeking to achieve and how we are to go about it. Amrut (2010) sees curriculum as a planned leaning experience offered to a learner in school, adding that it is a program of studies made up of three components program of studies, program of activities and programme of guidance. Hence the meaning of the term curriculum has also been changed to meet the needs of education of different courses of studies.

Blenkin (2012) defined curriculum as a body of knowledge contents and or subjects. That is, curriculum is the process by which knowledge and skills are transmitted or delivered to learners by the most effective methods that can be devised. Curriculum is an organized plan of course outlined with the objectives and learning experience to be used for achievement of these objectives. In a wider perspective, it is a way of preparing individuals to become productive citizens and useful member of the society to which they belong. Thus, curriculum is a tool of education to educate and humanize the whole man. Modern interpretation sees the curriculum as all the knowledge and experience got by a child in and out of the school walls, either on the time table or outside it i.e., the experiences the learner has regardless of when or how they take place (Akinsola and Abe, 2006). Jeffs and Smith (2010) argued that the notion of curriculum provides a central dividing line between formal and informal education. Recognising the fact that some informal educators adopted curriculum theory and practice as a desire to be clear about content, and the approaches to the curriculum which focus on objectives and detailed programmes appear to be compatible with all round development of the learner.

Prescriptive view of a curriculum is defined as a plan for action or written document that includes strategies for achieving desired goals or ends. In other words, curriculum means a written description of what happens in the course of study. Considering curriculum as the course of experiences that form human beings into persons, Ogar and Effiong (2012) affirmed curriculum as those things which students learn because of the way in which the work of the school is planned and organised but which are not in themselves overtly included in the planning or even in the consciousness of those responsible for the school arrangements. This assertion recognises the current appreciation of curriculum theory and practice emerged in the school and in relation to other schooling ideas such as subject and lesson. In this wise, curriculum could be seen in four ways as follows:

i. Curriculum as a body of knowledge to be transmitted.
ii. Curriculum as an attempt to achieve certain ends in students.
iii. Curriculum as process.
iv. Curriculum as praxis.

To achieve any of the above-mentioned, effective implementation of a well-planned curriculum cannot be overstretched.

It is appropriate to say curriculum is all about experience required of a child for all round development since the organization of schooling and further education had long been associated with the idea of curriculum. Curriculum is a particular form of specification about the practice of teaching. It is not a package of materials or syllabus of ground to be covered rather it is a way of translating any educational idea into a hypothesis testable in practice. It invites critical testing rather than acceptance (Ali and Ajibola, 2015).

Furthermore, curriculum is said to be a specification about the practice of teaching which involves pragmatic efficacy of the learners' experiences. Experience as a general concept comprises knowledge of or skill of something or some events gained through involvement in or exposure to that thing or event. In this wise, curriculum is an important element of education in which overall objectives of education depend largely on the nature of the curriculum (National Educational Research Development Council, 2004). Curriculum experts have argued that curriculum making either at the level of development, design, implementation or reformation needs the inputs of critical stakeholders if it is to be relevant, meaningful and adequate to meet the needs of the people for whom it has been put together. In his opinion, Ali and Ajibola (2015) contends that education is a social construct which is a part of society and should reflect the community. In this sense, curriculum is the thrust of education vested with force thereby integrating societal trends, traditional values and individual expression.

In his conception of curriculum Tom-Lawyer (2015) affirmed that curriculum is the course of deeds and experiences through which learners become the adults they should be for success in adult society. In other words, curriculum encourages the entire scope of formative deed and experience occurring both within and outside school for the purposeful formation of adult members of society.

However, curriculum may refer to a well-defined and prescribed course of studies, which students must fulfill in order to pass a certain level of education. That is, curriculum is being construed as learning activities that make up a particular system of education. Tom-Lawyer (2015) in his examination of cognitive development theory explained in details how the curriculum is sequenced in schools.

In Nigeria for instance, secondary school curriculum is designed to encourage all students to achieve their spiritual, intellectual and social potential as well as to understand the relevance of learning in their daily lives. It is important to note that, it is one thing to develop/design curriculum, it is another thing to implement it effectively. Objectives of any level of education cannot be achieved if the planned programme for such level of education is not well implemented. Ali and Ajibola (2015) observed that no matter how well a curriculum of any subject is planned, designed and documented, implementation is important.

Curriculum is the instrument the school uses to bring changes in the learners' behaviours and this is what education is all about. Education is expected to bring about certain desirable changes in the behaviour of the learner. It is necessary that the curriculum be evaluated at regular intervals because these desirable changes are dynamic. Also, the needs of the society which the curriculum is meant to serve are always changing. The people that are involved in the planning of the curriculum should try to find out if the desired change in behaviours of the learner is actually being achieved. The aim by which the curriculum was developed will be achieved if there is regular evaluation of its implementation. An evaluation of the physics curriculum as in this study is an evaluation of the educational goals to find out how far the set objectives of physics education in secondary schools satisfy the needs of the society.

b) Curriculum Implementation

Many educationists that have discussed the issue of curriculum implementation in Africa identified it as the major setback for attaining goals of education in Africa. Curriculum implementation entails putting into practice the officially prescribed courses of study, syllabus and subjects (Ali and Ajibola, 2015). Akdeniz and Panic (2012) defined curriculum implementation as the task of translating the curriculum document

into the operating curriculum by the combined efforts of the students, teachers and others concerned. That is, curriculum implementation demands concerted efforts of end-users of the curriculum for its effective implementation at all levels in order to achieve the desired goals.

The process by which curriculum is transformed from the paper into an active exercise is known as curriculum implementation (Salami and Ojediran, 2017). Curriculum implementation is done in the classroom by educators in primary and secondary schools and by lecturers in Colleges of Education, Polytechnics and universities. Curriculum implementation involves putting into practice the officially recommended courses of study, syllabuses, and subjects. The procedure involves helping the student to gain knowledge or experience as the student obtains the arranged or intended experiences, knowledge, skills, ideas, and attitudes that are gone for enabling a similar student to work effectively in a general public (Gautam, 2015).

Ali and Ajibola (2015) described curriculum implementation as putting the curriculum into work for the achievement of the goals for which the curriculum is designed. In his conception of curriculum implementation, Obioma (2013) defined it as the transition of the objectives of the curriculum from paper to practice. That is, only effective curriculum implementation ensures achievement of the objectives for which the curriculum was designed to attain. Also supported the assertion by defining curriculum implementation as the translation of theory into practice, or proposal into action. According to Tom-Lawyer (2015), “Curriculum implementation is the process of putting all that have been planned as a curriculum document into practice in the classroom through the combined efforts of teachers, learners, school administrators, parents as well as interaction with physical facilities, instructional materials, psychological and social environments”.

At this juncture, it could be said that putting the curriculum into operation requires an implementation agent. The teacher is identified as the agent in the curriculum implementation process. Curriculum implementation therefore refers to how the planned or officially designed course of study is translated by the teacher into syllabus, scheme of work and lessons to be delivered to students. The above definitions show that effective curriculum implementation involves interaction within the teachers, learners and other stakeholders in education geared towards achieving the objectives of education.

Curriculum implementation is one of the six steps in curriculum development process as observed by (Dambatta, 2013). Which includes: Problem identification, needs assessment of learners, setting goals and objectives, identifying the educational strategies by which the curricular objectives will be achieved and finally evaluating the effectiveness of the curriculum? The successful implementation of a curriculum to a large extent is determined by the teachers (Emmanuel and Daniel, 2016). Curriculum implementation is a well-researched subject that requires the collaborative efforts of all educational stakeholders to ensure its effectiveness. Therefore, it is necessary to note that the implementation is actualized, when there is effective translation of policies into practice (Asebiomo, 2015). There have been failures in curriculum innovations due to ineffective implementation (Orafi, 2013). The difficulties of implementation were discovered in the late sixties and early seventies (Alan & Wong, 2012).

In view of these, the constructivists strongly advocate teachers' "mastery of the subject matter and qualification as essential determinant factors of viable consideration in curriculum implementation". In addition, lack of teachers` competence and teaching qualification imply that wrong and poor method of teaching will be used in the class, and once that happen the criterion of methodology as a determinant factor in curriculum

implementation is equally affected (Demirkol, 2010; Ganyaupfu, 2013; Badu-Nyarko and Torto, 2014). Teaching materials and teaching environment must interact with the learner; Dambatta (2013) considered such factors to be central for effective curriculum implementation. These factors notwithstanding, are mostly influenced by other factors such as finance and politics (Emmanuel & Daniel, 2016).

1) The learner

Learning readiness in terms of interest and pre-requisite knowledge in students is important factor worthy of consideration in curriculum implementation. Interest sustains one to learn, without interest hardly does a student concentrate and attaches importance to what he is taught. For instance, in a memorandum submitted to the Joint Consultative Committee on Education (JCCE) meeting on the issue of re-engineering teacher Education and development for quality service delivery held at Dutse Jigawa state, Nigeria between 19th - 23rd of September 2011, the Federal Capital Territory Education Secretariat, Abuja in 2011 submitted a memorandum on the Need to admit quality Entrants into Teacher Education Programmes. In the memorandum an observation was made that in recent times, teacher Education Programmes in Nigeria are failing to attract quality entrants. That the scenario in the admission process is usually such that, after all other fields of endeavour have been filled up, the left over then resort to education as the last option without any interest.

The consequence of which according to the memorandum is that Teacher Education, and of course teaching profession, is occupied to a mediocre that lack intrinsic motivation to sustain their profession. Tahir (2013) posited that; studies have shown that less than 5% of Education students in the faculties of Education in Nigerian Universities actually applied to study courses in Education. That the figure is much

lower in Colleges of Education as only few students applied for admission into the Colleges in the past five years. For this reason, Tahir (2013) concluded that, the vast majority of students being admitted into Colleges of Education are academically weak and more seriously have no interest in pursuing career in Education. That many of them see teaching as the last resort and others as a stepping-stone to greener pastures. The implication of all these is that, Nigerian Colleges of Education are flooded with students who lack interest in teaching generally and necessary pre-requisite knowledge to warrant proper implementation of the curriculum content. The effective interaction of, the teacher, the learner in the learning environment is heavily dependent on the available financial resources and political will of the government and the administrators of the Colleges to effectively make use of these resources towards proper implementation of an existing curriculum (Emmanuel and Daniel, 2016). Thus, a government which is not interested in Education will not commit its financial recourses to supply all that is needed in the implementation process. Similarly, no matter the level of the political will of the government, such commitment can only be possible if the required financial resources are available.

2) The Teacher

Teachers in institutions are the chief implementers of the intended curriculum. In line with this, Emmanuel and Daniel (2016) argued that the teacher is so critical in the implementation of any major thrust of a policy reform. However, Dambatta (2013) observed that teachers most times are not involved during policy formulation even though they are expected to implement this curriculum. In a similar passion, Olorundare and Akande (2011) did not note that in the production of the latest NCCE minimum standard (2012 edition) and most likely the previous ones, the lecturers in an NCE Programme nor were the beneficiaries of the NCE training involved at any significant

level. That the planning for the reform which produced the document has been top-down strategy which is contrary to the modern practice of bottom-up strategy in which all stake holders are involved. They finally warned as reported in Dambatta (2013) a curriculum reform that is either imposed or merely informed is characterized by poor level of acceptance in form of a total antagonism or at best apathy towards its implementation.

Thus, teachers' adequacy and quality to a great extent determine the quality of graduates in any institution of learning, and as such it is an issue in curriculum implementation. Adequacy of teachers in our institutions of learning, most especially, the higher institution like colleges of education and universities today has raised serious concern on the ratio of teachers to the students in colleges of education is bottom heavy. In terms of quality, 4177 (50%) of the College lecturers were having only first degree. Out of this number, 3142 (38%) had professional first degrees, while the remaining 1035 (12%) with non-professional first degree while 2450 (29%) of the other 50% had postgraduate professional degrees. Those with non-professional postgraduate degrees were 1237 (15%) and PhD holders were 465 (6%).

On the quantity of the lecturers findings of Tahir (2013) revealed that the total number of the lecturers in the then 56 Federal and State Colleges of Education as 8329; and the computed Lecturer student ratio in Federal Colleges of Education was 1:28 while that of the state was 1:27. With the expansion of the number Colleges of Education (both state and federal) from 2009 to date, increase in the students population in the Colleges of education, lecturer's recruitment process, financial realities of the present time and politics, this report may no longer be valid. For instance- (Dambatta, 2013) opined that the size of the Colleges has increased ten-fold to what existed in the 60s, numbering around 130 Colleges today, while the size of students and their teachers increased in the

same proportion as a result of increased demand for teachers at Basic level of Education. These increases in the sizes of the Colleges, students and teacher may affect the quality of the teacher production if the required financial and material resources are not matched proportionately.

3) Teaching Materials and Environment in School

One of the factors that determine the quality of any education is conducive learning environment. Emmanuel and Daniel (2016) believed that, a conducive learning environment particularly as it applies to colleges; implies presence and or availability of sufficient facilities such as laboratory, workshop equipment and consumable, these provisions and services is a necessity to good quality of teaching and learning. Abdu (2014) further argued that only very few Colleges approximate to this characterization. That quite a number of them are in bad shape, while others are struggling to meet the basic minimum for accreditation purposes. On the whole, the picture is not quite encouraging and this has dire consequences for teaching and learning since the learning environment is far from being conducive and by extension affects the implementation of the curriculum negatively.

2.1.9 Curriculum Evaluation and its importance

Evaluation essentially is the provision of information for the sake of facilitating decision making at various stages of curriculum development and implementation (Abdu, 2014). This information may pertain to the program as a complete entity or only to some of its components. Evaluation also implies the selection of criteria, collection and analysis of data. It includes obtaining information for use in judging the worth of a programme and procedure. It is a comprehensive term and transcends standardized tests covering all means of ascertaining the results of construction (Idris, 2016).

Evaluation of curriculum is an integral and essential part of the whole process of curriculum development. It is continuous activity and not a "tail-end-process". Evaluating and planning are complementary processes which occur almost simultaneously and continuously. Planning is made on the basis of evaluation and vice versa. However, as a separate state evaluation has its own entity (Idris 2016).

The importance of curriculum evaluation is to determine the value of the curriculum itself, is the curriculum appropriate for the particular group of students with whom it is being used? Are the instructional methods selected, the best choices in the objectives sought? Is the content the best that could be selected? Are the materials recommended for instructional purpose appropriate and the available for the purpose envisaged? (Abdu, 2014).

2.1.10 Models of Curriculum Evaluation

Models are useful in programme evaluation because they provide a set of steps that could be followed in carrying out a proposed evaluation. When appropriate evaluating models are used, they yield useful information for programme improvement. According to Ifeobu (2014) an evaluation model or framework may be regarded as a set of steps or a system of thinking which if followed or implemented will result in the generation of information which can be used by decision-makers in the improvement of educational programmes. Evaluation models are of great help to evaluators because they provide a general guide which can be adopted or modified to each specific programme being evaluated. What a sound principle of evaluation should aim at. These are that:

i. Evaluation must be based on goals and objectives of the education programme being evaluated.
ii. All personnel of the institutions concerned and other individuals connected with programmes must be committed in the evaluation process.

iii. Evaluation should be comprehensive

iv. All groups of individuals who can contribute must be involved e.g. teachers, administrative and industrial personnel, parents and external experts.

v. It should have a system of recording all information and data obtained. It is a scientific problem-solving process therefore; data obtained should be objectively recorded and analyzed.

vi. Evaluation process should result in judgment about programmes by the evaluators or inform outside.

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

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

a) Identification of objectives of educational activities.
b) Definition of the kind of data needed in making these decisions.
c) Data collection
d) The criteria for determining the quality of the matter evaluated.
e) Analysis of data in terms of criteria above and
f) Providing data for decision-makers.

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

of acceptable performance should be analyzed after deciding on the criteria for determining the quality of the matter being evaluated. According to Ifeobu (2014), a model is a way of representing and testing an idea which may otherwise be difficult to communicate in words. Evaluation model is an evaluation framework or strategy which is meant to provide a sense of direction and magnitude to the evaluation design and implementation. Evaluation model is expected to provide answers to the questions stated below:

i. How best should evaluation be defined?
ii. What should be the purpose of evaluation?
iii. What should be the duties, authorities and responsibilities of an evaluator?
iv. What is the relationship between evaluation and decision-making?
v. What types of evaluation are to be involved?
vi. What criteria are to be used in judging evaluation studies?

To prevent unnecessary drift during programme evaluation, there is need to design evaluation programme within the confines of some evaluation models.

The major models of evaluation useful in education are concerned with:

i. Ascertaining the achievement of desired outcomes;
ii. Assessment of merit;
iii. Decision-making.

The purpose of the evaluation should guide the evaluation in determining the appropriate statistical analytical procedure and tool to be employed. In the end, the result of the evaluation will be used to improve the quality of the curriculum. The discrepancies between what it should be (standard) and what it is (degree of achievement) are identified and proposals made for improvement of the curriculum. The aim of evaluation should, to a large extent determine the process to be adopted in

carrying it out. Ifeobu (2014) stated that it should not just describe programmes but indicate its good and bad aspects and may even include suggestions on how to improve the programme. The author suggested that evaluation process should take the following steps:

a) Focus the evaluation which means the definition of evaluation and types of data, who would use the data etc.
b) State how information will be collected.
c) Sequence and schedule of evaluation specification of how the information gathering activities will be carried out as well as time limit.
d) Identification of individuals and groups who should be involved.
e) Definition of system or theories for the analysis of data that will be collected.
f) Determining system or theories for reporting evaluation findings or conveying findings to decision makers and to those who would make use of the finding.
g) Specifying system for monitoring the execution of evaluation activities

In selected evaluation models to use, the evaluator should according consider:

a) The appropriateness of the model, can it yield adequate information?
b) The complicity of the model, can it be effectively applied by the evaluator taking into consideration his experiences, cost of implementation and other related factors?

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

2.1.11 Models Presentation.

1) Goal Evaluation Model: Tyler (1950)
2) Cronbach (1963) Course Improvement Through Evaluation Model

3) Metfessel and Michael's (1967) Paradigm
4) Stakes (1967) Antecedents-Transactions-Outcomes (ATO) Model
5) Hammond (1969) Decision Objective Model
6) Alkin (1969) Decision Management Evaluation Model
7) The Provus Discrepancy Evaluation Model by Provus (1971)
8) Stufflebeams (1971) context, input, process, product (CIPP) model.
9) Goal-free Evaluation Model Proposed by Scriven (1972).
10) Proto-type Evaluation Model by Baker and Alkin (1973)
11) Needs Assessment Model -by Witkin (1977)

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

(a) Definition
(b) Purpose
(c) Key Emphasis
(d) Relationship to Objectives
(e) Relationship to Decision
(f) General remarks made by the researcher.

2.1.12 Goal Evaluation Model by Tyler:

i. Definition: This is an objective oriented model or behavioural objective model on achievement of desired outcome.
ii. Purpose: To provide periodic feedback on the extent to which the set goals of a school programme are being achieved.
iii. Key Emphasis: Identification and determine the educational experiences and the best approach to effectively organize the educational experiences.

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

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

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

Goal attainment Model or Objectives – Centered Model was developed by Tyler in 1950, in a book titled "Basic Principles of Curriculum and Instruction. In the book he outlined four major structures for delivering and evaluating instruction, which is known as Tyler's Rationale. These include:

i) Defining appropriate learning objectives

ii) Introducing useful learning experiences

iii) Organising experiences to maximise their effect

iv) Evaluating the process base on students' performance

TYLER`S MODEL OF CURRICULUM EVALUATION

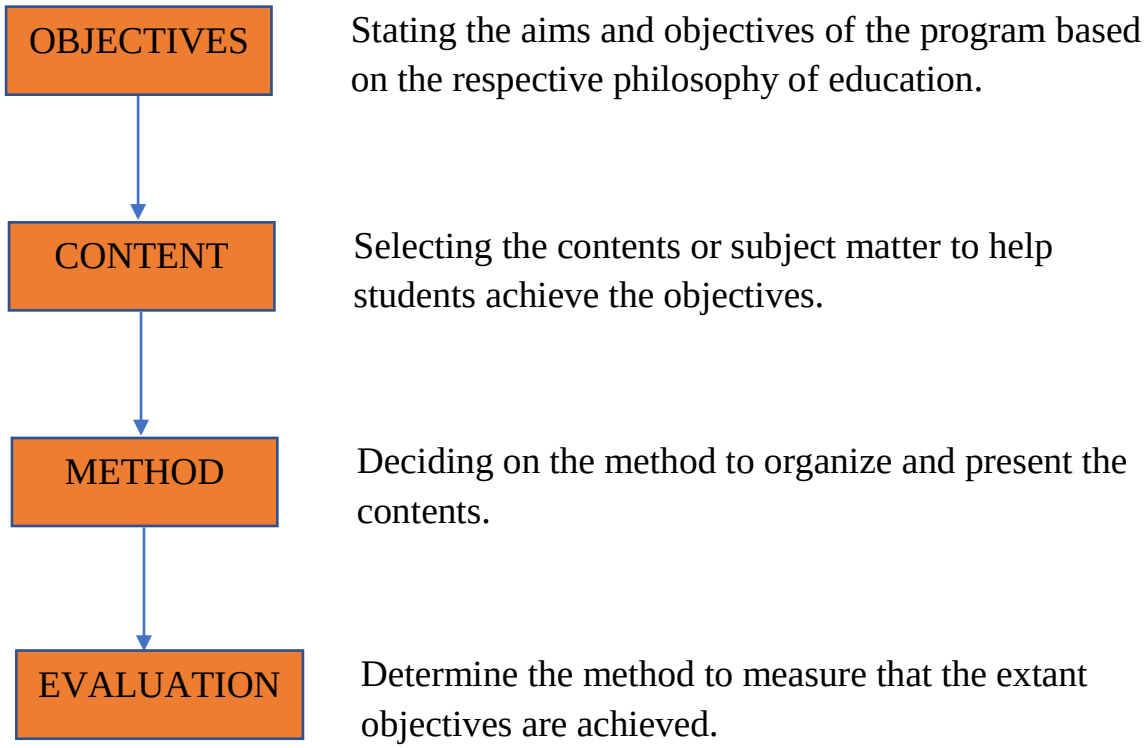

Figure 2.2: Tyler Model of Curriculum Evaluation

Tyler contends that well stated objectives are essential for effective evaluation. These well specified objectives serve as programme standards. Therefore, during evaluation, all that the evaluator needs to do is to determine strategies for attaining the set objectives and also to determine the extent to which these strategies are being implemented. The model focused on the extent to which objectives are realized. It requires that the goals be clearly articulated and expressed in ways that are measurable to the programme outcome. This approach provides a clear and succinct description of the programme and as well delineates a process of measuring the degree to which the objectives are attained. According to Keating (2006), these objectives must have relevancy to the field of study and the overall curriculum.

This model obtains the curriculum objectives from three sources.

i. The student

ii. The society

iii. The subject matter

When defining the objectives of a learning experience, Tyler gives emphasis on the input of students, the community and the subject content. He believes that curriculum objectives that do not address the needs and interests of students, the community and the subject matter are not the best. The second part of the Tyler (1950) evaluation model involves the identification of learning activities that will allow students to meet the defined objectives. Hence, to emphasis the importance of identifying leaving activities that meets the defined objectives, he states that the important thing is for students to discover content that is useful and meaningful to them. From every indication, Tyler is seen as a strong supporter of the student-centered approach to learning. The model is designed to measure the degree to which pre-defined objectives and goals have been attained. That is to say that, the model primary focus is on the product rather than the process for achieving the goals and objectives of any curriculum. The Tyler's model is called decision objective model because, objectives serve as standards in any programme. Where the outcome of evaluation shows that objectives are being attained, that will lead to a decision by the programme manager, but where the objectives are not being attained or achieved to a limited extent, then this will lead to some sort of decision whether to continue, to modify or to terminate the programme.

Hence, the goal attainment or objectives centered model by Tyler (1950) was found most appropriate among other models for the evaluation of the senior secondary school Physics Curriculum in North Central States, Nigeria.

In support of the assertions above, is the work of Nwigbor and Obilor, (2019), which sought the evaluation of the objectives of the Universal Basic Education programme in Rivers State. Four research questions guided the study and four hypotheses were tested for the study. The study adopted evaluation research design, with a population of 16,182 teaching staff of Universal Basic Education across the 23 local government areas of Rivers State, out of which 7439 are primary schools' teachers and 8743 are junior secondary schools' teachers. A sample of 735 was drawn from the target population with the aid of Fluid Survey Online Sample Size Calculator, and the stratified random sampling technique was employed in selecting the respondents for the study. Two Local Government Areas were chosen from each Senatorial District of the State and four schools (2 primary schools and 2 junior secondary schools) were randomly selected. Checklist was the major instrument used for the study; the instrument was dully validated and it yielded a reliability index of 0.79. The research questions were answered using the mean and standard deviation, while hypotheses were tested using z-test at 0.05 level of significance. The result showed that there was significant difference in the mean response between higher basic and lower basic teachers on pupils/students perception on the importance of education; and that there is a different between the actual and expected outcomes of the UBE programmes. Based on these finding, it was concluded that the UBE objectives be revisited in order to put things right.

However, these Goal Evaluation Model originated by Tyler (1950) have many features:

i. Were conceptualized and developed in the late 1950s and 1960s in response to the need to evaluate projects funded through the Elementary and Secondary Education Act (ESEA) of 1965.
ii. Represented efforts to broaden the view of educational evaluation to include more than an assessment of the terminal objectives.

iii. Emphasized the systems view of the education by stressing the relationship between objectives, learning experience, processes, and products.

iv. Emphasized the importance of collecting information on key developmental factors to aid decision-makers in assessing program progress at a given point

In view of the aforementioned, the model was suitable to evaluate the implementation of senior secondary school physics curriculum in North Central States Nigeria.

2.2 Theoretical Framework

This study was guided by the cognitive constructivism theory of learning developed by Jean Piaget (1967). Constructivism theory emerged in the late 1980s, although its roots are much older. Constructivism theory is an alternative to behaviorism theory proposed by Skinner in 1961 which the researcher felt cannot suffice because of its emphasis on learning as an observable change in behavior; not caused by physical maturation or growth (Romiszowski 1994).

The basic belief of constructivism is that knowledge is actively constructed by learners rather than transmitted by the teacher (Jonassen, 1991). Nevertheless, there are minor distinctions between cognitive constructivism and social constructivism, which are two representative types of constructivism (Hirumi, 2002; Liaw, 2004).

However, in adopting constructivism theory for this study, the researcher was not ignorant of its shortcomings. Cognitive constructivists believe learners construct knowledge individually based on their prior experience and new information. Therefore, learning is considered as an internal cognitive activity. Social constructivists, however, argue that knowledge is the outcome of collaborative construction in a social context through interactive processes of information sharing, negotiation and discussion (Qiyun,

2008). Therefore, the social constructivist views learning as knowledge constructed through social interaction and discourse (Hirumi, 2002; Liaw, 2004).

This study was inclined to cognitive constructivism in which Physics as a science subject require learner activities using learning materials for effective learning and curriculum implementation. Although varying constructivist theories exist, there is agreement between the theories "that learning is a process of constructing meaning, it is how people make sense of their experience" (Jonassen, 1991).

Constructivists believe learner centric instructional methods in the classroom will strengthen the commitment and involvement of self-motivated learners because of their high level of interaction. In adapting this theory, this study views teaching methods like; Inquiry-Based Teaching, laboratory method, Project method, Discovery method, Mastery Learning Approach and ICT integration as methods that allow Knowledge construction in the teaching and learning process. This theory is related to this study in that the study sought to establish the evaluation of teaching methods on the implementation of the Physics curriculum in secondary schools in North Central States Nigeria.

Based on constructivism learning theory, the learning environment (school) must provide certain materials or tools so that the students can easily manipulate. In addition, teachers are facilitators in a constructivist learning environment; the pedagogical design must enable teachers to provide various learning resources (Learning materials) and learning activities (Qiyun, 2008). In relation to constructivist theory, this study sought to find out the extent of learning materials (instructional materials) on the implementation of the Physics curriculum.

Cognitive constructivists assert that learners build knowledge actively through the interactions in the teaching-learning activities within the learning environmental. The constructivist learning methods involves educators implementing curriculum using experiences of their learners who are active in the learning process. Cognitive and social learning constructivist theories give strong support to the design of pedagogical and social activities, respectively. The activities cause stimuli for learning. In addition, teachers are facilitators in a constructivist learning environment; the pedagogical design must enable teachers to provide various learning resources (Learning materials) and learning activities (Qiyun, 2008).

The teacher as instructor is responsible for making sure the information is in a format the students can comprehend. In other words, learning focuses on the learner's questions and exposure. In agreement with constructivist theory this study sought to determine the evaluation of teaching-learning activities on the implementation of Physics curriculum in secondary schools.

Based on cognitive constructivism, pedagogical design must support and satisfy the needs and learning intentions of individual learners. Therefore, the scope of the syllabus should not be a rigid frame to be covered in a specific period of time because unplanned knowledge can be acquired in the process. When applying this theory to independent learning, it was essential to understand that individual learners can construct different knowledge even given the same condition Jonassen (1991). In relation to constructionist theory, this study sought to find out the impact of coverage of syllabus on the implementation of Physics curriculum in secondary schools in North Central States Nigeria.

Therefore, cognitive constructivist theory was relevant guide to this study on the evaluation of the implementation of Physics curriculum in secondary schools, since it stresses on the fact that teaching methods and activity learning need to be learner-centered for effective curriculum implementation. It emphasized on provision of instructional material that leads to motivation to learn, a flexible coverage of the syllabus, hence effective implementation of curriculum in secondary schools.

2.2.1 Constructivism Theory

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

2.2.1.1 Analysis of structures and Contents of Senior Secondary School Physics curriculum and implementation.

The senior secondary school physics curriculum structure and its method of accessing level of implementation are made of the following parts:

i. Objectives

ii. Contents

iii. Activities (teaching-learning)

iv. Learner

v. Teacher

vi. Evaluation

vii. Teaching and learning

viii. Instructional materials

2.2.1.2 Constructivist Curriculum Objectives

According to Mehmet (2005) and Wilson (1997) the main objective people of constructivists curriculum is to educate people who know how to find and use knowledge, who know the method and means by which they can learn better and make use of their knowledge and facilitate new learning, using prior experiences. In addition, expected behavioral outcomes are expressed in a general manner, not strictly specific. This is based on the constructivists belief that each individual perceives the world differently and possessed different experiences, as such there is no single truth for all in constructions. Each individual may therefore construct a variety of ideas about a single phenomenon. So, objectives, in constructivism cannot be set strictly for all, but general objectives expected from/for students may be defined. (Wilson, 1997). Specifically, the Physics curriculum objectives according to constructivist approach are not deviation from the general principles and objectives. The California Department of Education which based the curriculum entirely on constructivists‟ theoretical framework described the objectives of Physics curriculum on constructivist approach as the provision of students who can think and communicate independently. Wilson (1997) summaries Physics curriculum objectives as:

a) Foster students' problem –solving skills independently;

b) Motivate learner, ability to use previous experience in solving new problems;

c) Encouraging learners‟ active participation in learning.

2.2.1.4 Constructivist Curriculum Content

According to Mehmet (2005) constructivist Curriculum contents lead to interdisciplinary studies, while learners are made to focus on a problem. Contents are not specifically designed but general, thus limits are not set. Contents are derived from the common interest of learners as well as their psychological needs. In addition, selected topics are created to serve as instructional units. All activities are related to primary goal and developed in an engaging meaningful context. Constructivist curriculum contents are also designed from simple to complex, from known to unknown and are based on learners'‟ experience".

2.2.1.4 Learners roles in constructivist curriculum

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

2.2.1.5 Teaching and learning process in Physics

In constructivist theory, teaching activities are based on dialogue and reflection process (Mehmet, 2005). In addition, teaching is supposed to be explicit, concrete, and exploratory and base on the principle of transfer of teach (Wood, 1998). Use of instructional materials, demonstration and drills/activities are highly encouraged. Schifter (1996) and Martin (1993) as reported in Mehmet (2005) explained that constructivist teaching and learning theory are based on the following principles: Encouraging learners initiative and autonomy; When assigning tasks to students cognitive terminology such as, "Classify, analyze, predict and create" are used; Use of learners responses when making "on – the – spot" decision about teacher behavior, instructional strategies, activities and content to be taught; Searching for students understanding and prior experiences about a concept before teaching it to them;

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

2.2.1.6 Constructivist Evaluation and Assessment

Constructivist evaluation of learning outcome is based on the application of the previous learning to new situations, not essentially on traditional method or tools. The evaluation is not focused on what is memorized, but on what is comprehended (Aminu, 2005). Rather than focusing on "error in thinking", constructivist teachers based that assessment on how learners view situation. For constructivist theory, the learning outcome of learners differs, as a result objective observation will be difficult (of learning outcome), and so the theory supports open-ended evaluation or learning experiences (Mehmet, 2005). The evaluation in constructivism focuses on students" ability to construct knowledge. Because of this, tests, oral expression, group discussion and problem –solving processes are all used for evaluation (Mehmet, 2005).

2.2.1.7 Analysis of Teachers and learners of Physics Senior Secondary School Curriculum

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

2.2.1.8 Constructivist Instructional Materials

Instructional materials according to constructivist approach are supposed to make learning real rather than abstract. They are also expected to make transfer of learning accessible, makes teaching explicit, motivating and encourage learners' perception of new world. Instructional materials are supposed to move students and make them active during teaching and learning situation. They are also expected to involve more than one

sense. In addition, facilitators are expected to select a wide range of relevant instructional materials for given topics, in an attempt to ensuring that the need of individual differences is effectively taken care of (Mehmet, 2005).

2.3 Empirical Studies

2.3.1 Studies on level of qualification and year of teaching experience of physics teachers in the implementation of physics curriculum in secondary schools

The implementation of national curriculum depends on the superiority and aptness of the teacher's transactional skills; which are a replication of his/her qualification and experience. In the study, Adesua, (2020) sought the examination of teachers` characteristics and implementation of national curriculum for secondary school Biology in Southwest, Nigeria. The study specifically examined the availability of qualified and level of experience of Biology teachers in implementing the curriculum. The descriptive research design of the survey type was used in this study. The population of the study comprised all Biology teachers in all the public secondary schools in Lagos, Ogun, Oyo, Osun, Ondo and Ekiti. The samples for the study consisted of 180 biology teachers drawn from 90 public secondary schools in Southwest, Nigeria. The sample was selected using multistage sampling procedure. An Inventory on Teachers' Characteristics (ITC) was used to collect data for the study. The validity methods used were face and content validity. The responses obtained were collated and analysed using descriptive statistics. The findings of the study revealed that less than half of the Biology teachers were qualified to teach Biology at the senior secondary school level but most of the teachers teaching Biology were experienced in the teaching of Biology at the senior secondary school level. It was recommended that school administrators should ensure that only qualified teachers are recruited to teach Biology in senior secondary schools. The different between this study and the present study is that while

the studies focus on biology teachers in South west and on teachers' characteristics and implementation of National Curriculum. The present study focuses on evaluation of the implementation of Physics Curriculum in North Central. The similarities are on instruments used which is questionnaire and the research design which is descriptive survey. Also, the study was conducted in south west on teachers only while the present study focused on both teachers and students as respondent.

In a related study, Thomas and Olugbenga (2012) examined the effect of teacher's qualification on the performance of Senior Secondary School students in Physics. The survey type of descriptive research design was adopted. The sample for the study consisted of 100 Senior Secondary Schools Physics students in Ekiti State and the teachers that prepared and presented the students in each school for 2009/2010 West African School Certificate Examination. The year's result summary for each school was collated with the bio-data of their respective Physics teachers. Four hypotheses were postulated and tested at 0.05 significance level. The data collated were analysed using inferential statistics. The results revealed that students taught by teachers with higher qualifications performed better than those taught by teachers with lower qualifications. It was also showed that students performed better in physics when taught by professional teachers. The result also showed that teacher's gender has no effect on their ability to impact knowledge on the students, much as he/she is a skilled teacher in that field of study. However, the experience of the teacher is significant at impacting the students' academic performance in Physics. This study was on teacher`s qualification and students' performance in Ekiti state while the present study is on evaluation of the implementation of senior secondary school physics curriculum using Tyler`s evaluative model in North Central states, Nigeria. Also, the study uses one state, Ekiti and her teachers to investigate the students` performance based on West African School

Certificate Examination. The similarity of the study was that both adopted the use of survey type of descriptive research design, both uses inferential statistics for the analysis of their respective data.

Adolphus (2020) investigated the influence of teacher qualification and experience on Physics students' enrolment and academic attainment in selected secondary schools in Rivers State, Nigeria. The study adopted mixed research methods involving both quantitative and qualitative methods. 378 subjects selected purposively, comprising 116 non-physics students, 248 physics students and 14 physics teachers recruited from 8 schools participated in the study. The results show a positive correlation between students' attainment and teachers' qualification. Resource availability and teachers' resource utilization also correlated positively with students' attainment. Teacher qualification and experience did not significantly correlate with students' attainment by gender. Also, students' enrolment was not influenced Teachers' qualification and experience. The different between this study and the present was that adopted mixed research methods of quantitative and qualitative which involved both students and teachers was used but the present study focuses on evaluation of the implementation of physics curriculum in senior secondary school using Tyler`s evaluation model with descriptive survey as research design. But the similarities between them are that both involved teachers and students as respondents, the use of questionnaires,

In a similar work of Jacob and John (2020) on Teachers' Academic Qualification as a Predictor of Attitude and Academic Achievement in Geography of Senior Secondary School Students in Adamawa State, Nigeria The research design employed was the predictive correlational design. The study, which sampled 400 teachers and 400 students from senior secondary schools in Adamawa State, employed the multistage sampling technique to actualize this. The participating teachers' and students' responses were

gathered using the Geography Teachers' Qualification Checklist (GTQC), Students' Attitudinal Scale in Geography (SASIG) and Geography Achievement Test (GAT). Two of the instruments (SASIG, GAT) were validated and trial-tested to obtain the reliability coefficients using Cronbach's Alpha statistic. The SASIG instrument had a reliability coefficient of 0.78 while the GAT instrument indicated a coefficient of 0.77. Frequency count and percentages were used to answer the lone question in the study while the null hypotheses were tested using simple linear regression statistic. The regression statistic showed that teachers' qualifications did predict students' academic achievement and the predictive value was significant. However, students' attitude to Geography was not predicted by teachers' qualification. These results emphasized the need for authorities concerned to strictly recruit qualified graduate teachers of Geography to teach in senior secondary schools in Adamawa State.

Furthermore, in the study of Olanrewaju (2020), the Researcher assessed teachers' qualification and students' numerical proficiency in solving physics problems in secondary schools in Ekiti State. The study employed descriptive research of the survey type. A sample of 200 students was selected through multistage and stratified random sampling technique. The instrument used in collecting data for this study was a self-constructed questionnaire titled Numerical Ability Test (NAT) that contained 20 items. The instrument was validated by giving it to experts in Physics Education and Tests and Measurement and both face and content validity were ensured. Reliability of the instrument was established using test re-test method of reliability with a coefficient of 0.67. Data collected were subjected to inferential statistics such as students' t-test and Analysis of Variance (ANOVA) to test the research hypotheses. Results of the finding showed that there was a significant difference in the mean score of male and female students on their numerical proficiency in solving physics problems. The finding also

showed there was a significant difference between teachers' qualification and students' numerical proficiency in solving physics problems. Therefore, it was recommended that class instruction should be structured in such a way that female students can catch up with calculation aspect of physics like their male counterparts and there should be a kind of training and retraining of physics teachers in secondary schools. The study focused on the assessment of teacher`s qualification in Ekiti State while the present study was on North Central states of Nigeria. Both studies are similar in the use of questionnaire for data collection and descriptive survey design.

In the study by Okpala (2019) which sought to investigate the effect of teachers' qualification and instructional materials on Basic science students' academic performance in Ukwuani LGA of Delta State? On the basis of this, four research hypotheses were formulated and tested. A total of one hundred (100) copies of questionnaire were distributed to one hundred (100) sampled students from five (5) different schools to elicit their responses. The instrument used in the study was questionnaire, the Chi-Square statistics was used to analyze the data collected from respondents. The findings include the following; it is evident there is a significant relationship between teachers qualification/experience and students' performance in basic science, it is evident there is a significant relationship between laboratory facilities and the effective teaching and learning of basic science, it is evident there is a significant relationship between teachers method of teaching basic science and students' performance, it is evident there is a significant relationship between teachers gender in teaching basic science and students' performance. This study was based on teachers` qualification and instructional materials in basic science with the use of questionnaire as the instrument. It was quite different in the present study in terms of subject matter,

evaluation of implementation of physics curriculum in senior secondary schools, also in terms of scope and location. But, similar in the instrument used which is questionnaire.

In a related study, Olaniyan and Omosewo (2013) sought investigation of Physics teachers' assessment of the implementation of senior school physics curriculum in Osun State, Nigeria. It examined the influence of their qualifications and experience on their assessment. The teachers were sampled from the 30 local governments in the state; 125 physics teachers were sampled with at least four physics teachers from each local government in Osun state. The instrument for the study was researcher-designed Teachers' Assessment Questionnaire (TAQ) which consisted of 40 items to assess Nature, Objectives and Content of the Senior School Physics Curriculum. The items also assessed the instructional materials and instructional personnel available for the implementation of the Curriculum. The items were on 4point likert-type scale. Strongly agree (SA) +2, Agree (A) +1, Disagree (D) -1 and Strongly disagree (SD) -2. Two major research hypotheses were formulated and tested using t-test statistical analysis. Findings from the study showed that; there was no significant difference in teachers' assessment of nature of physics based on teachers' qualifications and experience; there was no significant difference in the assessment of content of physics curriculum based on teachers' experience and qualifications but there was a significant difference in their assessment of the Objectives based on experience and qualifications. Also, no significant difference existed in the assessment of instructional materials available for the implementation of the Curriculum based on their experience and qualifications. There was a significant difference in their assessment of instructional personnel based on their qualification, but no significant difference existed based on their experience. It was therefore recommended that difficult and abstract contents of the physics

curriculum be reviewed and every physics teacher should have access to physics curriculum for effective implementation of the stated objectives.

In view of the review above, all the studies have similar constructs, research design and instruments but not similar to the present study which is on the evaluation of the implementation of senior secondary school physics in North Central states, Nigeria.

2.3.3 Studies on the perception of teachers on performance objectives in the implementation of physics curriculum in secondary school based on gender.

Gender has been identified as one of the factors influencing students' performance in sciences at senior secondary school level. Derbyshire's (2003) which in his review established that girls are less confident than boys in their computer skills, and some international studies have found that boys scored better than girls on computer related knowledge and skills in vast majority of countries.

Similarly, Khairulanuar *et al*., (2010) study on the effects of training method and gender on students' learning of two- and three-dimensional geometry discovered that gender difference existed as boys generally achieved higher geometrical understanding compared to girls. In addition, there were interaction effects between method of training and gender in favor of boys; however, animation condition was gender-neutral. In a study on gender influence on collaborative use of computer-based communication the group with minority women had low index of collaboration compared to homogenous group and group with majority women.

Serumu (2016) study the effects Of Teachers' Gender and Qualification on Students' Performance in industrial safety In Vocational Technical Two research questions guided the study and 2 hypotheses were tested at 0.05 level of significance. Ex-post facto research design was used and the population of the study was 334 students who

registered Industrial Safety (TED 112) from 2004/2005 to 2013/2014 Academic Session. Due to the results TED112 available at the time of request for TED112 results, purposive sampling technique was used to select the TED112 result of students for 4 sessions. Two sessions each was selected based on the lecturers' gender and qualification. However, 2007/2008, 2008/2009, 2009/2010, and 2013/2014 Session results were used as sample of the study. Therefore, the sample of the study was 91 undergraduate students. No instrument was developed in this study rather a letter was used to request for data. Data collected was analyzed using mean for the research questions and ANOVA (Analysis of variance) to test the hypotheses. The result revealed that the teachers' gender and qualification do not have any significant effects on students' performance in Industrial Safety. Hence, it was recommended among others that Delta State Ministry of Higher Education should employ qualified male and female lecturers to teach vocational technical education courses, since students' performance is not related to the gender and qualification of the teacher, there should be no gender and qualification preference in recruiting VTE teachers in schools.

The research conducted by Mitra (2000) on gender and computer use in an academic institution explored the nature of the relationships between genders, categories of computer use and attitudes toward computers in a computer enriched environment where all students were provided with network access and laptop computers over a four year period. The results indicated that women were less positive about computers than men and the use level of computers by women were less frequent than for men. This change in the relationship is a throwback to the earlier days of computing when research had indicated that men were more positively disposed toward computers than women were.

2.3.3 Studies on the extent to which the aims and objectives of the national curriculum for secondary school physics contents have been achieved.

Wafula (2019) sought the determination of instructional influences on the implementation of the Physics curriculum in secondary schools in Bungoma County Kenya. This study sought to determine the influence of teaching methods, learners' motivation, teaching-learning materials, teaching-learning activities and scope and coverage of the syllabus on implementation of Physics curriculum. This study was guided by cognitive constructivism theory of learning and adopted pragmatism research paradigm, mixed method approach and triangulation design.

This study targeted 224 teachers of Physics and 4140 Form three Physics students in 283 public secondary schools in Bungoma County. Stratified and simple random techniques were used to select 22 schools. The Head of Subject (HOS) were purposively sampled from each selected school. The sample size was 22 teachers and 393 students making a total of 415 respondents. Data was collected using Teacher Questionnaire (TQ), Student Questionnaire (SQ), Lesson Observation Schedule (LOS) and Observation Checklists (OC). Data was presented using frequency tables, figures and photographs and analyzed using both descriptive and inferential statistics. Descriptive statistics used to analyze quantitative data include; percentages and means while the inferential statistics used include; Chi-square, Pearson Product-Moment correlation and Regression analysis. Statistical Package for Social Sciences (SPSS) version 20 was used to compute the analysis at $\alpha = 0.05$ level of significance. Both quantitative and qualitative results showed that non-use of student-centered teaching methods, lack of learners' motivation, inadequate provision of teaching-learning materials, minimal learning activities in classrooms and failure to cover the syllabus on time influenced the implementation of Physics curriculum. The study was on determination of instructional

influences on the implementation of the Physics curriculum in secondary schools in Bungoma County Kenya, while the present study was on the assessment of the implementation of physics curriculum in North central state Nigeria. The studies were similar in terms of research design and the use of questionnaire for data collection.

The study concluded that for effective curriculum implementation, students-centered teaching methods should be used, learners be motivated, provide adequate learning material, many learning activities arranged and the scope of the syllabus be covered in-depth and timely. The study recommended that the teachers of Physics should be in-service on learner-centered methods, teachers should focus more on arousing learner's motivation, schools should be furnished with adequate learning materials, teachers should practice activity centered teaching and the syllabus for Physics should be revised. Curriculum of Physics for improved performance.

Similarly, Ajayi (2013), in his study sought to compare the intended senior secondary school Physics curriculum and the achieved one. The purpose was to determine whether there exist any disparity in the actual and the intended Physics curriculum in Nigeria senior secondary schools. The study tried to impact into the reading audience, the way, purpose and significance of effective evaluation of the Physics curriculum. Through this study, readers are aware of how to actually evaluate a curriculum at its implementation stage. The study employed the descriptive research design of the survey type. Discrepancy evaluation model proposed by Provus, in Ajayi (2013) was considered suitable for this study. The sample for this study comprised of three states (Oyo, Ekiti and Ondo) selected from the six states in south– west Nigeria. 10 senior secondary schools were selected from each of the three states given a total of 30 secondary schools for this study, 300 senior secondary school, three Physics students and 30 Physics teachers. The research materials included the senior secondary school Physics

curriculum by the Federal Ministry of Education (1985), Physics teacher's scheme of work and students' Physics notebooks. The instrument used to collect data was a self-inventory named Analysis of Curriculum Coverage in Physics (ACCP). The data generated were subjected to inferential analyses. Results of the study showed that there was a significant difference between the achieved Physics curriculum and the intended standard in Physics in Nigeria. Based on the findings of this study it was recommended that the implementation stage of senior secondary school Physics curriculum be reviewed and thoroughly supervised to enable total adherence by the implementation agents.

Anugwo *et al* (2023) in their study determined the level of implementation of science curriculum in secondary schools. The researchers' study was to evaluate the level of the implementation of the curriculum in terms of the contents of the core curriculum that stipulates what is taught to the child, the instructional materials used in teaching and the evaluation procedures used by teachers in assessing students' learning outcomes. The scope of the study was delimited to the level of implementation of the chemistry core curriculum in Ebonyi State of Nigeria. The design of the study was the program evaluation research design. The population was all the secondary schools in the state totaling 405. The state was stratified according to the three educational zones. Proportionate random sampling technique was used to sample 120 secondary schools out of 405 schools. A Checklist of the Nigerian core curriculum for chemistry education was used for data collection. Data collected were analyzed using mean, standard deviation and percentages. Findings revealed that the Level of Correspondence of the Contents of Chemistry Education taught in Ebonyi state secondary schools with the specification of the Chemistry Core Curriculum were achieved to a very high extent. The level of correspondence of the Instructional Materials used in teaching Chemistry

lessons to the specification of chemistry education core curriculum and evaluation procedures were achieved to a very low extent. The implication is that students are taught the required content areas without good instructional materials, and with the evaluation procedures like written and oral tests and not projects or the other performance assessment tools. These can lead to poor achievement of students and can generate scores that lead to poor inferences. The researchers therefore recommended for the retraining of teachers that will be well versed in the actual implementation of the core curriculum and for government to give more attention to education by providing essential facilities for teaching and learning. This study was conducted in Ebonyi state while the present study was conducted in North Central states, Nigeria. Also, the curriculum of chemistry was involved while the present study was on the evaluation of Physics curriculum. Proportionate random sampling technique was used for the study but the present study used multistage simple random technique.

Olatubosun *et al* (2017) sought to investigate the implementation process of physics curriculum in Ekiti State Secondary Schools. The major areas under study included teaching methods and techniques, instructional materials made available to schools, teachers' disposition to accepting new changes, relevance of the curriculum to daily living, school factors that influence the process of curriculum implementation. The study adopted descriptive research of survey design. Data collected via the validated questionnaire instrument from the randomly selected samples of 50 Physics teachers and 250 students offering Physics as a subject from senior secondary 1 to 3 (SSS I–III) across the three senatorial districts of the state was analyzed using frequency counts, percentage and inferential statistics of t-test.

All hypotheses formulated were tested at 0.05 level of significance. The result revealed that the implementation process of Physics in Ekiti State Public Schools showed

differences between qualified, experienced and less experienced and less-qualified teachers. Other factors that influence implementation process are the physical structure and facilities of schools, efficiency of Physics teachers and also the government. Based on the findings it is recommended that teachers should be involved in curriculum planning and government agencies responsible for monitoring curriculum implementation should carryout spontaneous checks on teachers lesson note and observe classroom teaching and learning interaction.

In the work of Nwigbor and Obilor (2019) the study sought the evaluation of the objectives of the Universal Basic Education programme in Rivers State. Four research questions guided the study and four hypotheses were tested for the study. The study adopted evaluation research design, with a population of 16,182 teaching staff of Universal Basic Education across the 23 local government areas of Rivers State, out of which 7439 are primary schools' teachers and 8743 are junior secondary schools' teachers. A sample of 735 was drawn from the target population with the aid of Fluid Survey Online Sample Size Calculator, and the stratified random sampling technique was employed in selecting the respondents for the study. Two Local Government Areas were chosen from each Senatorial District of the State and four schools (2 primary schools and 2 junior secondary schools) were randomly selected. Checklist was the major instrument used for the study; the instrument was dully validated and it yielded a reliability index of 0.79. The research questions were answered using the mean and standard deviation, while hypotheses were tested using z-test at 0.05 level of significance. The result showed that there was significant difference in the mean response between higher basic and lower basic teachers on pupils/students perception on the importance of education; and that there is a different between the actual and expected outcomes of the UBE programmes. Based on these finding, it was concluded

that the UBE objectives be revisited in order to put things right. The study was conducted in River state while the present study was carried out in North central states, Nigeria.

Similarly, Nwona and Madu (2018), on the Assessment of Senior Secondary School Physics Teachers' Content Knowledge in Kogi Central Zone of Kogi State, Nigeria. This study focused on the Physics teachers' subject content knowledge. It adopted a survey research design using the physics teachers in Kogi central zone of Kogi State, Nigeria. Thirty-five senior secondary school physics teachers were drawn purposively from the forty-five public secondary schools in the zone. Three research questions and two null hypotheses guided the study. The research questions were answered using mean and standard deviation while the hypotheses were tested using t-test at .05 level of significance. Relevant data were collected using Content Knowledge Assessment Instrument for Physics Teachers (CoKAIPT). Results of this study revealed high incidence of educationally non-qualified physics teachers in Kogi central zone of Kogi State. It also showed that there was no statistically significant difference between the mean content knowledge of the educationally qualified and non-qualified physics teachers.

Ugwu *et al* (2019) sought the assessment of the effectiveness of physics teaching in Senior Secondary Schools, Owerri Education Zone of Imo State. Descriptive survey research design was adopted. 289 respondents made up of 150 male and 139 female physics students were used for the study. Purposive stratified random sampling technique was used to select the respondents. A forced choice five -point likert type questionnaire was used to collect data for the research while mean, standard deviation and t-test statistics were employed to answer the research questions and hypothesis. Results showed that the physics teachers were effective in all the factors of physics

teaching effectiveness. They demonstrated greatest effectiveness in knowledge of subject matter and least effectiveness in content coverage. There is a significant difference $p<0.05$ between the mean response ratings of male and female effectiveness students in the physics teacher effectiveness in favour of female physics students which shows that they are more favorably disposed to their physics teachers. It is recommended that supervision and inspection of teachers should be a regular exercise by the education authorities so as to maintain and sustain standards.

However, Nwoye and Okafor (2019) investigate on Nigerian's nascent secondary school physics curriculum and its implementation problems. Four research questions guided the study. The study adopted a descriptive survey design. The research was carried out in Otuocha education zone, Anambra State. The sample constituted of 465 respondents. Teachers Students Assessment Questionnaire (TSAQ) was used for data collection. The data collected were analysed using frequency and mean. Findings showed that; government policy, environmental among others related problems impede the implementation of the new curriculum. Based on the findings, it was recommended that university courses in science education should also inculcate the secondary school curriculum content among others. The different between this study and the present study is that the present study is on the assessment of the implementation of senior secondary school Physics curriculum in North-central states, Nigeria while the study was in Otuocha educational zone of Anambra state. The study is similar in terms of the instrument used which is questionnaire.

In another study Eze (2009) investigated the effects of meta-cognitive strategy of self-monitoring on students' achievement in integrated science. The study involved the manipulation of three independent variables of treatment, gender and the school type (Mixed sex and same sex) to see the effect on the dependent variable-students' learning

as reflected in their achievement in integrated science. Five research questions were asked and answered while five hypotheses were tested using analysis of covariance. A quasi-experimental design was employed using six non equivalent class groups. The population of the study was 2500 junior secondary class two (JS II) students within Nsukka education zone, while the sample was 233 JS II students drawn from six classes from six schools. The six classes were drawn, two each from mixed sex schools; all boys schools and all girls' schools, with one serving as the treatment and the other as the control in each cluster. The treatment consisted of the detached content independent approach (DCIA) whereby the researcher explained to the students the steps involved in using self-monitoring and guided them to learn how to apply same in the course of learning. An instructional package on how to use self-monitoring as a strategy was designed and used while achievement test on JS II integrated science served as the instrument. It was found among others that the treatment involving use of self-monitoring strategy had significant effect on students' achievement. It was then concluded that equipping students with skills in using self-monitoring strategy facilitate their learning and so improved academic achievement in schools. This study uses experimental design and it was based in one educational zone while the present study is a descriptive survey design which uses a questionnaire as her instrument and it is evaluation of the implementation of physics curriculum in North Central states, Nigeria.

In line with the above, Maduwuesi (2008) in a study titled: "present Nigeria secondary school curriculum and goals of Nigeria secondary education" formulated hypothesis on the influence of secondary school curriculum on goal of Nigeria education. He used 120 students as sample for the study and further applied the independent t-test statistical tool at 0.05 alpha levels, to check whether a significant influence of secondary school curriculum on the goals of Nigeria secondary school education exists. At the end of the

analysis, it was found that there is a positive influence of the curriculum on the goals of Nigeria secondary education. This in any case, implied that the present Nigeria secondary school curriculum meets the goals of Nigeria's achievement in English language and integrated science.

AbdulRahaman (2017) in his paper discussed about research carried out to determine the level of adequacy and acceptability of the Biology Senior Secondary Education Curriculum. The sample for the study consists of 102 Teachers handling Biology in some selected secondary schools in the Northern region of Nigeria. A descriptive research design was adopted for use while the data were collected through a questionnaire. This data was analyzed using Frequency count, percentage and an ANOVA Statistics was used to test all the hypotheses generated in the study. Findings of the study revealed among other things: that the Course content and the Objectives were adequate; there were inadequate Instructional materials and Training services for the staff. Although better than it was in the past, there are no enough qualified and trained teachers to handle Biology and some other Sciences subjects. In view of all the findings, appropriate recommendations were made to include increase in funding of education from the Government Annual Budget, needs to employ more Qualified and trained teachers in some subjects` areas in public schools; workshops and In-service training for teachers to update knowledge and acquire necessary skills in order to perform their Primary assignment or teach more effectively.

For effective teaching and learning of physics to take place, there must be use of instructional materials. The skillful teacher needs to use many different methods and techniques at his/her facility. The use of instructional materials in teaching physics is of vital importance. Instructional materials are designed to enhance the teachers' art of communication. In this regard, to make science more meaningful to the students,

material that can be handled and manipulated should be used. Some teachers emphasize that the use of instructional materials enhances teacher effectiveness in the teaching of Physics.

In line with the study above, Ihekwoaba (2022) evaluated the implementation of the national curriculum for Basic science in South East, Nigeria. Specifically, the study intends to determine the extent of achievement of the aims and objectives of the national curriculum for Basic science, the availability and adequacy of materials and facilities needed for effective teaching and learning of the subject in South East zone, find out the extent of utilization of available resources, compliance by teachers on the use of recommended teaching methods, quantity and quality of teachers, the evaluation techniques employed by teachers in getting feedback, find out gender and location influences on Basic science curriculum implementation and identify factors that militate against the proper implementation of the Basic science programme in upper basic Schools in South East, Nigeria. The study involved the collection of data and the use of data to assess the effectiveness of the quality of the reformed science programme. Nine research questions and seven null hypotheses were formulated for the study. The descriptive survey design was adopted for the study. The target population for the study comprised all the upper basic 3 students and teachers of South East Nigeria numbering about 146,637 from which a total of thirty (30) upper basic schools were sampled for the study while the research was carried out in the five South East states of Nigeria including Abia, Anambra, Ebonyi, Enugu and Imo states but sampled three states: Abia, Anambra and Imo states as representatives for the study.

The instruments used were questionnaires and interview schedules which were validated by three experts – two from measurement and evaluation and one from Integrated science Departments. Cronbach Alpha reliability method was used to ascertain the

reliability of the instrument and reliability indices of 0.81, 0.79, 0.71, 0.89, 0.77, 0.80, 0.82, 0.69 and 0.83 were obtained for the instruments which were later administered to 557 respondents (512 students and 45 Basic science teachers) in order to gather the necessary information for the study.

The descriptive statistics frequency, percentages, ratios, mean and standard deviations were used to analyze the research questions while the t-test statistic was used to analyze the hypotheses at 0.05 level of significance and 43 and 555 degrees of freedom for teachers and students respectively. The result of the study revealed these findings: the materials and facilities needed for effective implementation of the Basic science programme in South East Nigeria is grossly inadequate, available instructional materials are not well utilized by teachers for instruction, teachers compliance to use of recommended teaching methods is poor, qualified Basic science teachers are not enough in schools, evaluation techniques employed for feedback are adequate, gender has no influence in the implementation but school location exerts great influence on Basic science implementation and lastly many other factors that hinder Basic science curriculum implementation abound.

Finally, recommendations were proffered to enhance the effective implementation of the Basic Science programme in upper basic schools in south east Nigeria, some of which were: federal and state governments should make it a point of duty to provide well-furnished Basic Science laboratories to schools and not basing on senior secondary science laboratories. more qualified Basic science teachers should be recruited to schools to ensure sound foundation of scientific skills and Basic science teachers should strive to teach the subject within the context of the recommended teaching methods enshrined in the curriculum and government should from time to time involve experts to evaluate Basic science implementation paradigms in schools to enable her be well

informed of how far the programme is achieving its desired objectives as well as tackling its inherent challenges. The study was carried out in south eastern Nigeria while the present study was carried out in North central states, Nigeria. Also, the study was on Basic science programe while the present study was on Physics curriculum. The similarities of the study were on the instruments, the use of questionnaire, the construct of the questionnaire and the samples used for the study.

Similarly, Audi *et al* (2022) assessed the implementation of basic education curriculum for sustainable development of Junior Secondary Schools. The study was carried out to ascertain the adequacy of available school facilities, teachers and instructional resources for implementation of Basic Education Curriculum. Descriptive survey design was used for the study. The population of the study comprised of 1,907 teachers in Public Junior Secondary Schools in Nasarawa State. Stratified and simple random sampling techniques were used to select 320 as respondents. A modified four points Likert – Type rating scale questionnaire was used to gather data and the data was analyzed using both descriptive and inferential statistics to answer research questions and hypotheses respectively.

The study found that the was in adequate school facilities, supply of teachers and instructional resources for teaching and learning. Some of the recommendations were provision of adequate school facilities, massive recruitment of teachers and State Universal Basic Education Board should carry out awareness campaign on the need for effective implementation of UBE curriculum. The study was conducted in Nasarawa State while the present study was carried out in North central Nigeria. Also, the study involved basic education in junior secondary school while the present study was in physics curriculum in Senior secondary school but the similarities is on the research design and the use of questionnaire to gather data for analysis.

Also, Hassan (2019) sought the study of evaluation of the extent of Implementation of Biology Curriculum in Public Senior Secondary School in Maiduguri Metropolis, Borno State, Nigeria. The objectives of the study were to determine the extent to which the objectives of Biology curriculum for public Senior Secondary School have been achieved, the extent to which the contents of the public Senior Secondary School Biology curriculum are relevant in achieving the objectives of the curriculum, the extent of types of teaching methods used in implementing Public Senior Secondary School biology curriculum and the extent of types of assessment methods used in implementing Public Senior Secondary School Biology curriculum.

The study used survey research design. The population of the study was fifty-nine (59) biology teachers and four thousand five hundred and five (4505) SS3 students of Biology in Public Senior Secondary Schools, the researcher selected a sample of four hundred and fifty one (451) SS3 students of biology and fifty nine (59) biology teaches in Maiduguri Metropolis of Borno State. Questionnaire was used as instruments for data collection. Mean and standard deviation was used to analyze the data.

The finding of the study revealed that the objectives of biology curriculum have been achieved to a moderate extent. Contents of the biology curriculum are very relevant in achieving the objectives of the biology curriculum. Demonstration, discussion, lecture and team-teaching method were often while laboratory method, project method, excursion/field trip and discovery method are seldom used. Essay writing, multiple choice alternative, true or false, completion of blanks and assignment assessment methods are very often used while Oral questioning and Laboratory work are seldom used in the implementation of biology curriculum. it was recommended that the fact that the objectives of the curriculum for Public Senior Secondary School biology have only been achieved to a moderate extent suggests that better results could be achieved if the

teachers' welfare practices are looked into, since teachers are the final implementers of the curriculum.

Curriculum could be reviewed regularly to meet the needs of the society. School management should encourage biology teachers to utilise the appropriate recommended teaching methods and assessment methods in the implementation of biology curriculum. The study conclude that Pubic senior secondary school biology teachers are not comply with the recommended teaching methods and assessment methods which contribute to the poor teaching and learning of biology and subsequently lead to the achievement of biology objectives at a moderate extent.

In their work, Ityokyaa and Adejoh (2014) evaluated the implementation of biology programme in secondary schools in Benue State. The study employed the survey and expost-facto designs. Two instruments, Biology Programme Evaluation Questionnaires for Teachers (BPEQT), Biology Material Resources Assessment Checklist (BMRAC) were developed, validated and used by the researchers to elicit data from 170 biology teachers in 119 secondary schools randomly selected from 284 schools in the State. The sampling technique was multi-stage sampling. The study revealed among others, that majority (60%) of the biology teachers were not qualified to teach biology, teaching methods often used by teachers were not the same as those recommended for teaching the subject. The study found a significant mean difference in the achievement scores of rural and urban students in West African Secondary School Certificate Examination (WASSCE). For effective implementation of biology programme, more qualified biology teachers should be recruited and unqualified serving ones should be made to go in for in-service trainings. The study was conducted in Benue state while the present study was conducted in North central states Nigeria. The similarities was on the use of research design, the use of questionnaire for data collections.

2.3.4 Studies on the extent to which the contents of the physics curriculum for secondary schools cover the aims and objectives of the curriculum.

In the study of the assessment of the implementation of contents for secondary school biology curriculum in three states in Southwest, Nigeria by Akinnodi (2020). The descriptive research design of the survey type was used in his study. The population of the study comprised all Biology teachers in all the public secondary schools in Ondo, Osun and Oyo States. The samples for the study consisted of 180 biology teachers drawn from 180 public secondary schools in the three states. The sample was selected using multistage sampling procedure. An instrument tagged Inventory on Implementation of Biology Curriculum (IIBC) was used for collecting the data for the study. The validation process was exempted since an inventory was used. The responses obtained were collated and analysed using descriptive and inferential statistics. The findings of the study revealed that Biology curriculum contents were not fully covered. It was also revealed that most of the schools do not meet the recommended standard of at least 2 periods per week for practical work in Biology. It was further revealed that the implementation of the contents of Biology curriculum in secondary schools do not differ among the three states considered in this study. It was recommended among others that Biology teacher should intensify efforts to see that the biology curriculum contents are covered and implemented.

Henrrietta (2016) research paper specifically investigated evaluation techniques and the implementation of the curriculum content of secretarial education in selected colleges of education in south-south, Nigeria. Two research questions and a corresponding one hypothesis was formulated to be tested. The survey research design was adopted for this study. The population of the study comprised 77 secretarial education teachers and 77 secretarial education teachers were used as the sample for the study. The instrument

used was the structured questionnaire and it was validated by experts in the field. The test re-test method of reliability was used in ascertaining the reliability of the instrument and it yielded a co-efficient of 0.82. The mean, standard deviation and t-test were used in analyzing the data collated and some of the findings include: evaluation techniques were moderately utilised by teachers. One of the major recommendations advanced in this paper was that NCCE should develop standardized and appropriate evaluation techniques for us.

Omiko (2016) evaluated the Classroom Experiences of Basic Science Teachers in Context of Competencies and Opinions. Two instruments were developed and used for the study, the instructional skills performance level (ISPL) based on five-point performance scale and questionnaire. The two instruments were developed by the researcher and validated by 3 specialists in Science Education, one from measurement and evaluation and two from biology and Chemistry. The questionnaire was administered on 200 Basic Science Teachers randomly selected from Ebonyi State Junior Secondary schools. The questionnaire was divided into 2 sections. Section I contains all the variables. Section II contains a 10-point item scale constructed by the researcher seeking the opinions of basic Science Teachers. It also contains a list of 76 instructional materials used in teaching Basic Science. The Results showed that Basic Science teachers seem to have a title performance level in classroom management and students participations and in evaluation/summary. They performed averagely in the remaining 3 instructional skills; it was also found that most teachers who teach Basic Science used lecture and demonstration method in teaching. Based on the findings, recommendations were made.

Similarly, in the work of Abdu (2014) this study was set to primarily investigate the issue of the implementation of Mathematics curriculum in Senior Secondary Schools in

Kano State. In other words, the study was an attempt to study the level of curriculum content implementation. Research objectives, Questions and hypothesis were made to guide the study. Relevant research findings, studies and scholastic analysis related to this study were sought.

The research design of the study was non experimental or Qualitative Descriptive Design. The instrument used for the collection of data from the randomly selected sample of 624 out of the population of 3,679, was questionnaire. Two types of questionnaires were used in the study; one Questionnaire for Teachers and the other for Supervisors. Teacher's Questionnaire was made up of thirty items that were adopted from Mehmet (2005) and Ismet (2005) while supervisor's questionnaire was made up of twenty items. The response pattern or format of the questionnaire is open ended on the-spot collection technique (Mkpa, 2004) was employed in the collection of the questionnaire distributed to subjects.

Descriptive and Inferential Methods of Data Analysis were both employed in the analysis of the collected data. The Descriptive method of Simple Percentage was employed to test the research questions of the study, while the inferential analysis of Chi-square was used to test the stated research hypothesis of the study. Findings of study revealed that Mathematics curriculum contents in Senior Secondary Schools in Kano State were not fully implemented. In addition, it was discovered that some internal factors i.e. those inclusive aspects within the curriculum, and other external factors such as provision of teaching and learning facilities, Qualified Teachers were influential to effective implementation of Mathematics curriculum. Based on the findings of the study, recommendations were provided at the concluding part. Part of the recommendations emphasised on the need for review of the entire curriculum contents in order to make it relevant to the needs and demand of this modern era.

In another study Ifeobu (2014) evaluated the content of eight biology texts using what she termed Quantitative Approach to Content Evaluation Science Textbooks (QACEST). Evaluated in the study were suitability and reliability of the texts, relevance of content to students' background and needs. And up to authenticity of information. In the study, the texts were related on the number of topics/ sub-topics in the curriculum covered by the texts, learning activities, study questions, texts illustrations, chapter summaries, readability/suitability, content relevance and up-to datedness. The result was that all the eight texts had flairs. For instance, none of them covered all the topics in the biology curriculum, the study questions in all of them were not good, illustrations in the text encouraged only listening, seeing and viewing with no challenges for students to perform other kinds of activities higher than those illustrated. Such finding should also guide school authorities, students, parents etc. in making recommendations/ choosing books for both institutions and individuals use. Future authors will also be guided by such findings.

In the same vein, Agugoesi *et al* (2022), evaluated teachers' implementation of basic science curriculum content areas in junior secondary schools in Nsukka Education Zone of Enugu State, Nigeria. Four research questions were posed and three null hypotheses were formulated to guide the conduct of the study. The study employed evaluation research design (survey method). The population of this study consists of 32 Basic Science teachers drawn from 31 state owned Junior Secondary Schools in Nsukka Zone of Enugu State, Nigeria. The sample for the study consisted of 32 Basic Science teachers constituting 100% of the total population size. The instrument for data collection was 37-item questionnaire for teachers titled "Teachers' Implementation of Basic Science Curriculum Questionnaire (TIBSCQ)" developed by the researcher based on Nigerian Educational Research and Development Council (NERDC) curriculum. 32

questionnaires were administered and returned. The reliability of the instrument was tested using Cronbach's Alpha which yielded the internal consistency of the reliability coefficient of 0.927. The data collected from the study were analyzed using means and standard deviations to answer the research questions and t-test was used to test hypothesis one and Analysis of Variance (ANOVA) was used to test hypotheses two and three at 0.05 level of significance. The findings revealed that gender has no influence in teachers' implementation of Basic Science curriculum content areas. While Basic Science teachers' education qualifications and teaching experiences significantly influenced the implementation of Basic Science curriculum content areas in junior secondary school. It was recommended among others that to improve the academic performance of junior secondary school students Basic Science, government should employ professional, qualified and experienced teachers. The study was conducted in Nsukka zone of Enugu state while the present study was conducted in North Central of Nigeria. Both studies Involved the use of questionnaire for data collection.

2.3.5 Studies on the rate at which Physics teachers utilize the available teaching equipment and materials

For effective teaching and learning of physics to take place, there must be use of instructional materials. For effective teaching to take place the skillful teacher needs to use many different methods and techniques at his/her command. The use of instructional materials in teaching Physics is of vital importance. Instructional materials are designed to enhance the teachers' art of communication. In this regard, to make science more meaningful to the students, material that can be handled and manipulated should be used.

Some teachers emphasize that the use of instructional materials enhances teacher effectiveness in the teaching of Physics. Akporobaroh (2020) carried out investigation

on the relationship between availability of instructional aids and students' interest in studying physics in secondary school. This research was conducted using physics students in public senior secondary schools in Oredo Local Government Area of Edo State, Nigeria. The specific purpose of the study was to find out the instructional aids that are available for teaching physics in secondary schools. It also investigated if the deployment of these materials in teaching physics influenced the interest of secondary school students in learning different topics in physics. The study utilized the correlation design while the population comprised all SS II students who offered physics in public senior secondary schools in Oredo Local Government Area of Edo state with a total number of 1,223. Out of the population, 123 physics students, that is 10%, was selected using the simple random sampling technique, and this formed the sample of the study. The instrument used for this study was a questionnaire which elicited the respondents' bio data, checklist of instructional aids for teaching physics and items designed to measure students' interest. Mean, percentage, standard deviation and Pearson product Moment Correlation were the statistics used for analyzing the data generated. Findings showed that most of the instructional materials needed by the teacher for effective teaching of physics were available but not functioning; however, it found that there was no significant relationship between availability of instructional aids and students' interest in studying of physics in public senior secondary schools in the area of study. Finally, teachers are encouraged to design simple instructional aids that could be used as alternatives for teaching relevant topics in physics in senior secondary schools in Edo State in the absence of standard teaching devices.

Isa *et al* (2020) The impact of teaching method on academic performance of secondary school students in Nigeria. The study adopted descriptive research design but with mixed approaches of data collection and analysis. Target population comprised of 180

students in three secondary schools in Nasarawa Local Government, Kano. A total of 60 respondents were selected. The research instrument was a questionnaire. The research question was answered using descriptive statistics of percentages and pie chart. The hypotheses were subjected to inferential statistics. Hypothesis with tested at 0.05 level of significance. The findings from this study revealed that most of the teachers' methods of teaching have a great effect on students' academic performance; based on these findings, student-centered method and teacher-students academic performance; based on the findings, students-centered method and teacher-students interactive method were recommendation in order to improve students' academic performance.

Eze (2007) in an evaluative study, assessed the status of primary science teaching in Anambra state during which he found out among others, that some primary science teachers (30% of his sample) were teaching the subject without the core curriculum. The study also revealed the absence and inadequacy of most of the conventional primary science facilities, equipment and materials in schools in the state.

The crucial position of physics in the education of secondary school students is to give the students the opportunity to manipulate and experiment with suitable equipment and materials, to prepare them for acquiring adequate laboratory and field skills in physics. It is because of the importance of instructional materials, of simple, common and cheap materials can be used to make the lesson interesting and the students to acquire skills and concepts of durable benefits. Material resources can substantially enable education to achieve its goals particularly when the individualisation of the learning materials in relation to their effectiveness is carefully considered.

In a related study, on the evaluation of the instructional resources commonly used in the teaching of Mathematics in junior secondary schools (JSS) in Ekiti State by Adebule

and Ayoola (2015), the purpose of the study was to determine the availability, functionality and level of usage of instructional materials for teaching the subject. The descriptive research design of the survey was adopted. The sample for the study consisted of 360 Mathematics teachers selected through the multistage sampling technique from selected secondary schools in the state. Three research questions were raised and the data collected were analyzed using descriptive statistics. The results from the teachers' responses revealed that instructional materials are available for teaching Mathematics but are not adequate. It was also found out that to a certain extent, the instructional materials are functioning. However, teachers are not putting the materials into good use. The study was conducted in teaching of mathematics in JSS in Ekiti state while the present study was conducted in North central states Nigeria in Physics curriculum.

Similarly, Asubiojo and Aladejana (2013) study investigation of the level of use of Instructional Materials by Professionals and non-professional Physics teachers in Ekiti State Secondary Schools. The purpose is to determine the availability of Instructional materials in schools and its level of use by professional and non-professional Physics teachers. The study employs the descriptive survey as its research design. The population for the study consisted of all physics teachers and physics students in senior secondary schools in Ekiti State. Stratified random sampling technique was employed to select 120 physics teachers and 240 physics students from the population. Data were analysed using descriptive and inferential statistics. It was revealed through the result of this study that most of the instructional materials that can improve the teaching and learning of Physics in schools were not available while the little ones available were not put into effective use. Based on the finding of this study, it is recommended among others that efforts should be made by all the stakeholders in the educations sector

towards the provision of adequate instructional materials in schools for effective teaching and learning of physics in Ekiti State Secondary Schools. The study was conducted in Ekiti State while the present study was conducted in North central states, Nigeria, the study involved investigation of the use of instructional materials by professional and Nonprofessional physics teachers while the present study was on the assessment of the implementation physics curriculum using Tyler`s evaluation model. The study was similar in the use of both physics teachers and physics students from the population and through the use of descriptive and inferential statistics for data analysis.

2.3.6 Studies on the evaluation techniques used by physics teachers in assessing their students

Results of evaluation studies have helped to strengthen and clear some doubts about education programmes. Such evaluation studies provide useful guides that help to make meaningful choices among alternatives. For instance, the work of Ali (2006) who evaluated science mathematics textbooks provides such guide. The rating scale approach was adopted and data collected using questionnaire. Total percentage mean rating was employed in the analysis of data. The study covered the content, language, methodology evaluation and other feature aspects of the books. The result of the study was that the average mean rating on the five aspects covered was 75.5% and which, in the opinion of the researcher was fairly standard. The researcher therefore concluded that the texts were fairly standard for the class they were designed for. Such research findings would guide individuals, schools and even organisations in choosing and recommending textbooks.

Mogbo (2006) in an experimental study assessed the effectiveness of improvisation as a learning model. A total of four hundred and forty-four (444) SSI Chemistry students randomly selected from the areas of the study were the subjects. Two research questions

answered with the mean and standard deviation, and a null hypothesis tested using Z score guided the study. The result of the study was that the two categories of the subjects performed averagely, with the experimental group having a better overall mean. A significant difference was found to exist between the two categories of students.

It could be noted that all these studies on evaluation of science discussed are indigenous, which is in conformity with the idea of making education, particularly science education, relevant to the learner by taking into consideration his own environment. Evaluating educational curricular programmes, texts and systems in relation to the socio-cultural environment of the users or those involved in it, makes the findings of such studies more elegant and useful.

Science, an indispensable ingredient for economic, social and even political growth and development of any nation, was introduced into the nations' school curriculum in the second half of the last century (Bajah, 2003). Its' importance at the primary school level was emphasized in the nations; educations policy. Specifically (FRN, 2014), among other stated general objectives primary science education are the laying of a sound basis for scientific and reflective thinking and provide basic tools for further educational achievement, including preparation for trades and crafts of the locality (FRN, 2014).

Blue print on the implementation of the policy recommended that science education should inculcate in the children the scientific attitude, the spirit of enquiry and skills in problem solving. It also enables the m observe, interpret, understand and appreciate the world in which they live in. Also, the policy statements for manpower development as contained in the National Policy on Science and Technology (FMST, 2012) is that the education should emphasize science at all levels. The objectives of the society are towards scientific thinking in order to develop new technologies and adapt existing

ones. The strategies for the implementation of the policy to enhance the achievement of the objectives include:

i. Making it possible for the average child to have early contact with the concepts and materials related to science and technology even before attaining primary school age.
ii. Ensuring a sound scientific foundation during the first six years of 6-3-3- 4 educational structure through
iii. Entrenchment of science teaching in the primary school curriculum
iv. Provision of adequate teaching laboratory aids
v. Provision of well-trained and well-motivated science teachers and
vi. Introduction of gainful practical activities such as model-making, handcraft, gardening and farming (FMST 2012).

According to the Wokocha (2007) within the context of the national policy of education; the general objectives of teaching science in Nigerian primary schools and post primary schools gives the Nigerian child the opportunity to manipulate and experiment suitable equipment and materials in a situation encouraging social interaction. Science education should enable the Nigerian child to:

i. Observe and explore the environment
ii. Develop observing, manipulating, classifying, communicating informing, hypothesising, interpreting data and formulating models
iii. Develop functional knowledge of science concepts and principles
iv. Explain simple natural phenomena.
v. Develop a scientific attitude including curiosity, critical reflection and objective
vi. Apply the skills and knowledge gained through science to solving everyday problems in his environment

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

viii. Develop a functional awareness and the orderliness and beauty in nature.

2.3.7 Studies on evaluation of physics teaching and learning

Henrrietta (2016) this research paper specifically investigated evaluation techniques and the implementation of the curriculum content of secretarial education in selected colleges of education in south-south, Nigeria. Two research questions and a corresponding one hypothesis was formulated to be tested. The survey research design was adopted for this study. The population of the study comprised 77 secretarial education teachers and 77 secretarial education teachers were used as the sample for the study. The instrument used was the structured questionnaire and it was validated by experts in the field. The test re-test method of reliability was used in ascertaining the reliability of the instrument and it yielded a co-efficient of 0.82. The mean, standard deviation and t-test were used in analysing the data collated and some of the findings include: evaluation techniques were moderately utilized by teachers. One of the major recommendations advanced in this paper was that NCCE should develop standardized and appropriate evaluation techniques for us.

Omiko (2016) evaluate the Classroom Experiences of Basic Science Teachers in Context of Competencies and Opinions. Two instruments were developed and used for the study, the instructional skills performance level (ISPL) based on five-point performance scale and questionnaire. The two instruments were developed by the researcher and validated by 3 specialists in Science Education, one from measurement and evaluation and two from biology and Chemistry. The questionnaire was administered on 200 Basic Science Teachers randomly selected from Ebonyi State

Junior Secondary schools. The questionnaire was divided into 2 sections. Section I contains all the variables. Section II contains a 10-point item scale constructed by the researcher seeking the opinions of basic Science Teachers. It also contains a list of 76 instructional materials used in teaching Basic Science. The Results showed that Basic Science teachers seem to have a title performance level in classroom management and students participations and in evaluation/summary. They performed averagely in the remaining 3 instructional skills; it was also found that most teachers who teach Basic Science used lecture and demonstration method in teaching. Based on the findings, recommendations were made.

In another evaluative study Ali (2006) evaluated in-service sandwich programme of the Institute of Education, University of Nigeria, Nsukka. The four sets of population for the study were 40 secondary school teachers, 60 primary school teachers; 100 primary school headmasters and 50 secondary school principals. The instruments used were the leadership role questionnaire; an inventory of final results on the ACE and PGDE programmes and an actual classroom teaching observation questionnaire. Five research questions and one hypothesis guided the study. Mean scores were used to answer the research questions. The results of the study among others showed that:

1. The vast majority of participants in ACCE and PGDE sandwich programmes consider the programmes very relevant to their professional needs and competence in schools where they currently work.
2. Those who completed the ACE or PGDE sandwich programme produced pupils and students whose academic achievement in teacher-made exams were superior to those of their counterparts taught by those who did not participate in the ACE or PGDE sandwich programme.
3. The admission criteria do not affect the end of the course.

4. There is a significant difference in the teaching effectiveness between those who successfully completed the ACE or PGDE with programme versus those who did not participate in it.

In another study, Aguokagbuo (2008) assessed the factors militating against effective implementation of adult literacy programme in Aguata L.G.A. of Anambra State. The population comprised all the 314 learners and instructors in 6 functional adult night schools in Aguata L.G.A. Three out of the six-night schools were sampled. The sample of the study comprised all the learners and instructors. A questionnaire named Adult Literacy programme instrument was used. The findings were that:

1. The problems that militate against the effective implementation of the programme are: lack of equipment; lack of fund; inadequate time for study; lack of trained instructors etc.
2. The most effective solution to these problems includes organizing workshops and seminars for instructors; making centres comfortable by providing suitable accommodation and by providing adequate learning materials.

Okoye (2005) had attempted to evaluate the extent of implementation of secondary education system in Anambra State between 1982-1992. Although, the researcher described the design adopted as qualitative evaluation. The evaluation model adopted was Provus discrepancy model. The population of the study comprised all the two hundred and nineteen (219) secondary schools in the five education zones of Anambra State. A sample of 35 schools was drawn through a multi-stage sampling procedure to present various strata by school enrolment and school type in Awka and Ogidi Education Zones. The pertinent data were collected via three modes documenting sources, interviews and observation. Data generated from the study were both qualitatively and quantatively analysed. Descriptive statistics and chi-square test of

independence were used in analysing the research questions and hypothesis respectively.

Results indicated that Anambra State did not fully implement the provisions of the secondary education system as stipulated in the National Policy of Education. There existed glaring discrepancies between policy stipulated standards and actual implementation strategies.

In another study, Ogunleye (2019) evaluate the implementation of the Basic Science curriculum in junior schools in Lagos, Nigeria. A sample of 591 students randomly selected from ten junior secondary schools in Lagos State Educational District II was used for the study. The evaluative study adopted the Stufflebeam's CIPP model which involved the evaluation of the Context, Input, Process and the Product aspects of the Programme. Five research questions were raised and answered in the study. The instruments developed and deployed for collecting data were: Teachers' Questionnaire on Science Laboratories, Classroom Teaching Observation Schedule (0.89); Basic Science Test (0.87); and Students' Attitude Scale (0.87). Frequency count, percentage, mean and standard deviation were the statistics used to analyse the data collected. The Basic Science classes were found to be larger than the prescribed and teaching effectiveness of the subject was poor. The equipment and facilities were also not adequate. Although students had fairly good performance with positive attitude to Basic Science but these could still be better improved upon with the gaps identified getting closed with more effective implementation of the curriculum. In view of the above, the study was carried out in basic science in junior secondary school in Lagos state while the present study was on the assessment of physics curriculum in North central states. The study adopted the Stufflebeam's CIPP model which involved the evaluation of the

Context, Input, Process and the Product aspects of the Programme while the present study adopted Tyler`s evaluation model.

In a related study by Athanatius (2020) on the assessment of the implementation of senior secondary school Curriculum, the study focused on the evaluation of the implementation of senior secondary schools' mathematics curriculum in Abakaliki education zone of Ebonyi State. Four research questions are posed to guide the study, and three null hypotheses are formulated and tested at 95% confidential level. Evaluation research design was adopted in the study. The design was chosen because of evaluative nature of the study. The population is made up of all the teachers teaching mathematics and SSS students in all the public secondary schools in Abakaliki Education zone totally 119 schools, 142 teachers and 43,323 students respectively. The sample size is made up of 74 mathematics teachers and 600 students using purposive sampling Technique. Two instruments were adopted for the study proforma and observational checklist. The proforma helped the researcher to collect data of the qualification of the sampled mathematics teachers and also yield data that was used to answer the research question one and for testing null hypothesis one. Observational checklist for collecting data of content coverage of mathematics curriculum, availability of the mathematics instructional material and extent of the utilization of the recommended assessment practices. Proportions, mean and standard deviations were used to answer the research questions while z-test and chi-square statistics were used to test the null hypotheses at 0.05 significant levels. The findings of the study show that for the proportion of qualified mathematics teachers, out of the 74 mathematics teachers only 46 of them which is the proportion of 0.62 or percentage of 62% is qualified. The mathematics curriculum content coverage is fairly covered with mean coverage of 2.41. It is significantly below an average since the expected bench mark of 2.50 as

recommended in Ho_2. Result also shows that out of 25 listed mathematics instructional materials only one is sufficiently available while 8 are insufficiently available and 16 is not available. This situation certainly does not enhance effective teaching and learning. Based on the findings of the study the following recommendation were made; Government should ensure that more qualified mathematics teachers are employed. Vice principals' academics and principals should ensure that mathematics teachers sufficiently cover the mathematics curriculum content. Government should ensure that adequate mathematics instructional materials are provided apart from chalk, chalkboard and textbooks. This study was carried on in Ebonyi state while the present study was carried out in North central states of Nigeria. The similarities were that the study uses both teachers and the students for the sample of the study.

Dan *et al* (2012) carried out study on the assessment of the implementation of social studies curriculum in Junior Secondary Schools in Kaduna State. The researcher made use of the survey research design with two hundred and twenty (220) social studies teachers' respondents as sample size and questionnaire was used as research instrument. In the data analysis, percentage scores was used in analyzing personal data, while mean and standard deviation was used to answer the research questions. Pearson Product Moment correlation co-efficient (r) was used to test the null hypotheses (1, 2, 3, 4 and 5) at 0.05 level of significant. The research findings show that the implementation of social studies curriculum in junior secondary schools is significantly affected by the adequacy of content of social studies curriculum and awareness of teachers. In addition, there is a significant relationship that exists between qualification and experience of teachers involved in the implementation of social studies curriculum in junior secondary schools. Furthermore, it was revealed that significant relationship exists between strategies/methods used and the implementation of social studies curriculum in Junior

Secondary Schools. Also, the findings reveal that the implementation of social studies curriculum in junior secondary schools level is significantly affected by availability of instructional materials adequacy. The study also reveals that significant relationship exists between learning environment and its adequacy in social studies and its implementation in junior secondary school level. Also, teachers with high working experience are larger in number compared to teachers with low working experience. Finally, the research work recommended among others that there should be general awareness on the importance of social studies as an agent of positive change in the society; employ qualified and trained social studies teachers to implement the curriculum; send social studies teachers to in-service courses and sponsor them for workshops and seminars. Also, social studies teachers should endeavor to give frequent assignment or homework that will encourage critical and reflective thinking for self-discovery of knowledge and also teachers should be encouraged to engage in comparative learning to improve the implementation of social studies curriculum in junior secondary school level. Service courses and sponsor them for workshops and seminars. Also, social studies teachers should endeavor to give frequent assignment or homework that will encourage critical and reflective thinking for self-discovery of knowledge and also teachers should be encouraged to engage in comparative learning to improve the implementation of social studies curriculum in junior secondary school level. The study was conducted in junior secondary school in kaduna state while the present study was carried out in North central states Nigeria. While the study focused on assessment of the implementation of social studies, this present study was on assessment of physics curriculum.

Abdu (2014) carried out a work titled "Assessment of the implementation of mathematics curriculum in senior secondary schools in Kano state" This study was set

to primarily investigate the issue of the implementation of Mathematics curriculum in Senior Secondary Schools in Kano State. In other words, the study was an attempt to study the level of curriculum content implementation. Research objectives, Questions and hypothesis were made to guide the study. Relevant research findings, studies and scholastic analysis related to this study were sought. The research design of the study was non-experimental or Qualitative Descriptive Design.

The instrument used for the collection of data from the randomly selected sample of 624 out of the population of 3,679, was questionnaire. Two types of questionnaires were used in the study; one Questionnaire for Teachers and the other for Supervisors. Teacher's Questionnaire was made up of thirty items that were adopted from Mehmet (2005) and Ismet (2005) while supervisor's questionnaire was made up of twenty items. The response pattern or format of the questionnaire is open ended. On the-spot collection technique was employed in the collection of the questionnaire distributed to subjects. Descriptive and Inferential Methods of Data Analysis were both employed in the analysis of the collected data. The Descriptive method of Simple Percentage was employed to answer the research questions, while the inferential analysis of Chi-square was used to test the hypothesis.

Findings of the study revealed that Mathematics curriculum contents in Senior Secondary Schools in Kano State were not fully implemented. In addition, it was discovered that some internal factors i.e., those inclusive aspects within the curriculum, and other external factors such as provision of teaching and learning facilities, Qualified Teachers were influential to effective implementation of Mathematics curriculum. Based on the findings of the study, recommendations were provided at the concluding part. Part of the recommendations emphasized on the need for review of the entire curriculum contents in order to make it relevant to the needs and demand of this modern

era. While this study was conducted in Kano State, the present study was conducted in North- Central States, Nigeria. Also, both studies adopted questionnaire for the study.

Pepple and Esu (2020) carried out study on influence of teacher qualification on teachers; effectiveness and student academic performance in Rivers State. The subjects for the study comprised of all the 200 final year sandwich social studies students of university of Portharcourt in 2009 contact session. Five research questions guided the study. Research developed questionnaire containing 32 items and demographic information on students and lecturers were used to collect data. Frequencies and percentage were used to answer the research question. The findings of the study revealed that there is gender balance than gap in the implementation of social studies curriculum, more females offered social studies than their males counter parts, also there are more males than females academics teaching social studies. Finally, the study showed ways through which the social studies curriculum can be further improved for gender equity. This study was done on social studies in port Harcourt while the present study is on the assessment of the physics curriculum in North central states Nigeria.

Olaniyan and Omosewo (2013) investigated teachers' assessment of the implementation of senior secondary school physics curriculum in Osun State, Nigeria. The teachers were sampled from 30 local governments in the state. 125 physics teachers were sampled with at least four physics teachers from each local government in Osun State. The instrument for the study was research-designed Teachers Assessment Questionnaire (TAQ) which consisted of 40 items to assess Nature objectives and content of the senior school physics curriculum. The items also assessed the instructional materials and instructional personnel available for the implementation of the curriculum. The items were on 4 point Likert-type scale. SA=4, A=3, D=2 and SD= 1. Two major research hypotheses were formulated and tested

using t-test statistical analysis. Findings from the study showed that, there was no significant difference in the assessment of nature of physics based on teachers' qualification and experience, there was no significant difference in the assessment of the objectives based on experience based on experience and qualification. Also, no significant difference existed in the assessment of instructional materials available for implementation of the curriculum based on their experience and qualification. There was significant difference in their assessment of instructional personnel based on their qualification, but no significant difference existed based on their experience. It was therefore recommended that difficult and abstract contents of the physics curriculum be reviewed and every physics teachers should have access to physics curriculum for effective implementation of the stated objectives. The study was carried out in Osun State while the present study was carried out in North Central states Nigeria.

Ewetan and Ewetan (2015) who investigated the influence of teachers' teaching experience on the academic performance of public secondary school students in Mathematics and English Language in Ado-Odo/Ota and Ifo Local Government Areas in Ogun State. The study adopted descriptive research design. Study population comprised all the 31 Senior Secondary Schools in the selected two local government areas.

A sample of 20 Schools was drawn from the population through the process of simple random sampling technique, made up of 14 schools in Ado-Odo/Ota, and 6 schools in Ifo Local Government Areas. An inventory schedule was the instrument used for data collection. 400 questionnaires, 20 questionnaires per school were administered. 388 (97%) questionnaires were returned. Their responses were analysed through content analysis. The regression analysis and t-test were used to test hypotheses generated for the study at 0.05 alpha levels. Findings reveal that teachers' teaching experience has

significantly influenced students' academic performance in Mathematics and English Language as measured by their performance in the SSCE examinations and as perceived by the respondents. Schools having more teachers with above 10 years teaching experience achieved better results than schools having more teachers with 10 years and below teaching experience. This study was carried out in a local government of a state using mathematics and English Language while the present study is on Assessment of the implementation of National Curriculum of Physics in secondary school in North-Central States Nigeria. Both Studies are similar in terms of the research design and instruments, the questionnaire used for data collection.

Patra and Guha *(*2017) conducted a study to compare the pedagogical content knowledge and self-efficacy of geography teachers in relation to school location and gender and to also find out the relationship between the pedagogical content knowledge and self-efficacy in southern part of West Bengal, India. The design of the study was descriptive survey. The population of the study was all the secondary school geography teachers from West Bengal. 401 geography teachers from 327 schools which were randomly selected constituted the sample. Two researcher developed tools was used for data collection. The collected data were analyzed by using mean, SD, t-test and Pearson correlation. The study raised four (4) research questionnaire and 5 hypotheses. The study found that, there was no significant difference in pedagogical content knowledge and self-efficacy of rural and urban geography teachers; there was also no significant difference in pedagogical content knowledge and self-efficacy of male and female geography teachers; and the pedagogical content knowledge and self-efficacy of geography teachers was positive and significantly related, Based on the findings, it was recommended that, different authorities are engaged to train both pre-service and in-service programme for making and developing of geography teachers have to improve

teachers‟ self-efficacy and to support them to face professional requirements with high level of PCK. The study was conducted in southern part of West Bengal, India while the present study was conducted in North Central states, Nigeria. The Study were similar in terms of the use of questionnaire, research design and hypotheses.

Ahmed (2018) investigated teachers' level of compliance on the implementation of physics curriculum in secondary school physics in Zaria, Kaduna State. The sample that was used for the study was 46 senior secondary school physics teachers (29 males and 17 females). Questionnaire on level of compliance of physics curriculum was used for study. The questionnaire includes 10 items. Reliability coefficient was calculated using Cronbach's alpha with value of level of compliance indicated 0.78 which is having high internal consistency. Results of t-test analysis showed that there was no gender difference in the teachers' level of compliance of implementation of physics curriculum in secondary school physics. The study was entirely teachers` affairs consisting of males and females, it`s involves the use of questionnaire to elicit the data for analysis. This is similar to the present study in the use of Questionnaire but different in location and statistics used. The study was carried out in Zaria while the present study was carried out in north central states, Nigeria.

Bolakale (2017) investigates the teachers' level of availability and utilization of physics apparatus in physics curriculum implementation in secondary school in Ikare Akoko town, Ondo State. The study used descriptive survey design. The participants consist of 31 physics teachers that was randomly selected for the study. The qualitative data were collected using Availability and Utilization of Physics Curriculum Questionnaire (AUPCUQ). Data were collected and analyzed using independent samples t-test. It was also revealed that physics apparatus are not fully available and utilized. It was also revealed from the results that there was no significant difference in the teachers' level

of availability and utilization of physics curriculum in secondary school physics-based gender. It was recommending among others that all the needed physics apparatus should be provided for the effective implementation of physics curriculum in Ikare-Akoko town. This study was carried out in Ikare Akoko town in Ondo State, while the present study was carried out in North Central state Nigeria. The study studies were similar in the use of descriptive survey design.

2.4 Summary of Reviewed Literature

Evaluation has been defined in various ways by different scholars who emphasised different aspect of the process of the definitions. However, there are certain points similar to all the definitions of assessment. These include that: evaluations is a process, assessment involves identifying, obtaining and providing information (data); the information collected must be based on the stated objectives of the programme to be assessed; and such information is made available to decision-maker, who makes decision as regards the programme evaluation.

The new trend towards a more comprehensive approach to curriculum definition viewed curriculum in terms of major components. The order to be followed for a more dynamically conceived and placed curriculum includes: diagnosis of need; formulation of content; selection of content; organization of learning experiences; and determination of what to assess and the ways and means of doing it. The development and recommendation of a number of models as guides for carrying out process of evaluation was variously viewed. Attention has been given to related studies on the extent to which the aims and objectives of the physics curriculum for secondary school contents have been achieved; extent to which the contents of the physics curriculum for secondary schools cover the aims and objectives of the curriculum; the rate at which physics teachers utilize the available input factors such as teaching equipment and

materials and other teaching support facilities; level of compliance of teachers with the recommended teaching methods as indicated in the physics curriculum; the evaluation techniques used by physics teachers in assessing their students.

Finally, most of the studies reviewed concentrated on certain aspects of the implementation of the national curriculum for senior secondary school physics. A gap in knowledge therefore exists, which makes this present study necessary. Thus, this study is an attempt to remedy the lack of information concerning evaluation of the implementation of the physics curriculum succeeded in achieving the set objectives of physics education, with regards to achieving aims and objectives; content coverage; teachers' utilization of the available input factors; level of compliance of teachers with the recommended teaching methods as well as evaluation techniques used by physics teachers in assessing their students. It was against this background that this present study was set to evaluate the implementation of senior secondary school physics curriculum using Tyler`s evaluation model in North Central states, Nigeria.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Research Design

The research design that was adopted for this study was a descriptive survey design. Survey research is suitable where a group of people or items is studied by collecting and analyzing data from their representatives. The descriptive survey design is used to identify the relationship between variables and describing them. Descriptive research surveys are those studies which aim at collecting data on, and describing in a systematic manner, the characteristics, features or facts about a given population (Bernard, 2012). The independent variables are evaluation of teachers on the implementation of performance objectives, organization of the learning activities, coverage of the learning activities, availability and the rate of utilization of instructional materials, level of compliance of learning activities and evaluation techniques in the implementation of physics curriculum and dependent variable is curriculum implementation while moderating variable are gender and year of experiences

3.2 Population of the study

The population of this study comprises of all physics students and physics teachers of Senior Secondary Schools in North Central States Nigeria, namely Benue, Kogi, Kwara, Nassarawa, Niger, Plateau and FCT Abuja. The estimated population of public secondary schools as at the time of this study comprised 1,505 secondary schools in the North Central geo-political zones (Respective State Ministries of Education 2020). SSS two physics students was the target population. There are one thousand five hundred and five Senior Secondary Schools (1505) located in North Central States, Nigeria.

The total population of Senior Secondary School Students in North Central States, Nigeria as at 2021/2022 session was five hundred and forty thousand, three hundred and sixty students (540,360). The population of Senior Secondary School Physics two students (SSS 2) is One hundred and twelve thousand, eight hundred and thirty five students (112,835). The population of the Physics teachers in North Central Geopolitical zone is five hundred and fourty-eight (548). Senior Secondary School Physics two students were used because of their stability in secondary school more than SSSI students, who are yet to gain much academic experience and the SSS three students who are preparing for SSCE examinations. Senior Secondary School two students for the 2021/2022 session were used for the study. The use of only public senior secondary schools is based on the ground that they operate uniform physics curriculum standards and are more accessible to the researcher.

Table 3.1: Distribution of States by No of Senior Secondary Schools, No of Senior Secondary Students and No of SSS 2 Students in North Central Nigeria.

S/N	States	Number of Senior Secondary Schools	Number of Senior Secondary Students	Number of SSS Two Physics Students
1	Benue	216	72360	12060
2	FCT Abuja	77	83520	8324
3	Kogi	248	89280	14880
4	Kwara	232	92160	18769
5	Niger	296	52560	27175
6	Nassarawa	222	73440	18787
7	Plateau	214	77040	12840
	Total	**1,505**	**540,360**	**112,835**

Source; Respective States Planning and Statistics unit, Ministry of Education 2022

Table 3.2: Distribution of Sample States by Senior Secondary Schools, No of Secondary Students and No of SSS2 Physics Students Selected for the Study.

S/N	States	Number of Senior Secondary Schools	Number of Senior Secondary Students	Number of SS Two Physics Students
1	Niger	296	52,560	27,175
2	Nassarawa	222	73,440	18,787
3	Kwara	232	92,160	18,769
	Total	**750**	**218,160**	**64,731**

Source: Respective States Planning and Statistics unit, Ministry of Education 2022

3.3 Sample and Sampling Techniques

Multi-stage sampling technique was used to select the sample. At the first stage, was the sampling of three states from the seven North-Central states using simple random sampling technique. In the three sampled states of Kwara, Niger and Nasarawa, then simple random sampling techniques was used to select one hundred and thirty (130) physics teachers from respective state planning and statistics unit, Ministry of Education. Therefore, the sample for teachers consisted of 130 (81 male and 49 female) trained physics teachers.

Two hundred and fifty one (251) SSS II students offering physics was selected using purposive sampling technique because these students would have experienced in teaching physics for almost two years and would therefore be in position to share their experiences in relation to the teaching and learning of physics.

Therefore, the total size of the sample is three hundred and eighty one (381) respondents. This numbers three hundred and eighty one (381) was chosen according to Krejcie and Morgan (1970) in Sample size table, as shown in Appendix L.

Table 3.3:1: Sample States by Physics Teachers and Gender in North- Central

State	Gender		Total
	Male	Female	
Kwara	88	72	160
Niger	57	41	98
Nasarawa	96	79	175
Total	**241**	**192**	**433**

Table 3.3:2 Sample of Students and Teachers used for the Main Study

State	Teachers	Students
Kwara	54	95
Niger	36	77
Nasarawa	40	79
Total	**130**	2**51**

3.4 The Research Instrument

The study adopted descriptive survey design questionnaires were used to elicit information from the respondents. Participants can respond in a place and time convenient to them.

Two instruments were used for collecting the data of the study. The instruments are:

i. Teachers' Evaluation of Curriculum Implementation Questionnaire (TECIQ)
ii. Students` Evaluation of Curriculum Implementation Questionnaire (SECIQ)

3.4.1 Teachers' Evaluation of Curriculum Implementation Questionnaire (TECIQ)

Teachers' Evaluation of Curriculum Implementation Questionnaire (TECIQ) as presented in Appendix D was used to collect information on the following objectives;

performance objectives, learning activities, scope of the syllabus, teaching-learning materials, teaching methods and evaluation methods. It is a research instrument to be administered to all the secondary physics teachers in North Central, Nigeria.

Teachers' Questionnaire consisted of (86 items) closed-ended based on the Likert-type of scale having four degree of agreement. Questionnaire items were arranged in the order of research objectives. The first five questions asked for background information on: Name of school, position or rank, gender, academic qualification and teaching experience in physics. There were eleven questions on performance objectives, nineteen on scope on syllabus, twenty five on learning materials, eighteen on teaching methods and eight on evaluation techniques. The response was on four point scale having four degree of agreement such as; strongly agree = 4; Agree = 3; Disagree = 2; strongly disagree = 1. The response was also on four point scale having four degree of agreement such as; Very Adequately Covered = 4; Adequately Covered = 3; Inadequately Covered = 2; Very Inadequately Covered = 1. Also, on level of availability and frequency of usage of teaching materials. The response was on four point scale having four degree of agreement such as: Very Frequently Used = 4, Frequently Used = 3, Rarely Used = 2, Not Used =1.

There were eighteen on teaching methods. Finally four point scale on teaching methods in teaching Physics, the scale having four degree of agreements such as; Very often used= 4; Often used= 3; Sometimes used = 2; Not used = 1. The decision mean for the rating scale was 2.50, obtained by dividing the sum of the numerical value by the number of scaling items.

3.4.2 Students` Evaluation of Curriculum Implementation Questionnaire (SECIQ).

Students` Evaluation of Curriculum Implementation Questionnaire (SECIQ) as presented in Appendix E was used to collect information on the following objectives; learning activities, scope of the syllabus and teaching-learning materials. It is a research instrument to be administered to all the secondary Physics Students in North Central, Nigeria.

Students' Questionnaire consisted of (44 items) based on four point scale. Questionnaire items were arranged in the order of research objectives. The first four questions asked for background information on: gender, age, class level and name of school. There were nineteen on scopes on syllabus and twenty five on learning materials. The respondents were asked to rate the statements on scope and coverage of the syllabus in your school" The response was on point scale having four degree of agreement such as; Very Adequately Covered = 4; Adequately Covered = 3; Inadequately Covered = 2; Very Inadequately Covered = 1. There were twenty five questions on teaching-learning materials. The respondents were asked "Indicate the level of availability and frequency of usage of the following teaching materials in your school". The response was on point scale having four degree of agreement such as: Very Frequently Used = 4, Frequently Used = 3, Rarely Used = 2, Not Used =1. The cut-off point for the rating scale will be 2.50, obtained by dividing the sum of the numerical value by the number of scaling items.

3.5 Validity of the Instruments

In order to measure the face and content validity of the instruments that was used in this study, validity was done in the following way:

3.5.1 The Teachers' Evaluation of Curriculum Implementation Questionnaire (TECIQ)

The Teachers' Evaluation of Curriculum Implementation Questionnaire was validated by the following experts. Two senior lecturers from Science Education Department, Federal University of Technology (FUT), Minna, Curriculum expert from Federal University of Technology, Minna, two experienced physics teachers from secondary schools and experts from Test and Measurement department, National Examination Council (NECO). These experts examined the items of the instrument in relation to the research questions posed for the study and see whether the item statements are simple and unambiguous. They also examined the face and content of the instrument. The comment obtained from the experts was used in restructuring the items of the instrument.

3.5.2 Students` Evaluation of Curriculum Implementation Questionnaire (SECIQ)

The Students` Evaluation of Curriculum Implementation Questionnaire was validated by the following experts for validation. Two senior lecturer from Science Education Department, Federal University of Technology (FUT), Minna, Curriculum expert from Federal University of Technology, Minna, two experienced physics teachers from secondary schools and experts from Test and Measurement department, National Examination Council (NECO). These experts examined the items of the instrument in relation to the research questions posed for the study and see whether the item statements are simple and unambiguous. They also examined the face and content of the instrument. The comment obtained from the experts was used in restructuring the items of the instrument.

3.6 Reliability of Research Instrument

The modified questionnaire had undergone pilot test. The idea behind this is that, it enabled the researcher to make corrections on the research instrument before final administration in the schools under study. Reliability is the degree to which measures are free from error and therefore produces consistent result. To do this exercise, forty (40) copies of the modified questionnaire were administered to ten (10) Physics teachers and thirty (30) Physics students in senior secondary schools II (SSS II) Abuja. Five schools were selected from Gwagalada and Abuja Municipal Area Council of Federal Capital Territory, Abuja which were outside the study area. From the schools, the scores were analysed with the aid of Computer Software named Statistical Package for Social Science (SPSS) to obtain a Cronbach's alpha reliability coefficient (r) for each of the set of items used.

Evaluation of teachers on the implementation of curriculum objectives 0.963, coverage of the learning activities in the physics curriculum contents 0.994, 0.979 availability and the rate of utilization of instructional materials 0.911, level of compliance of learning activities 0.951 and evaluation techniques in the implementation of physics curriculum 0.85 reliability coefficient respectively. The average of reliability coefficient is 0.941. Also, syllabus coverage 0.96 and level of availability of instructional materials 0.95 of students as shown in (see Appendix K). The average reliability coefficient is also 0.955.

3.7 Method of Data Collection

Prior to the collections of the data, the secondary school authorities in which the study was conducted were notified and their approvals were sort and obtained. Collection of data for the study was done in two stages – administration of questionnaires to physics teachers and students. The researcher administered the questionnaire with the aid of

research assistants. The copies of the questionnaire were administered and collected through direct delivery and recovery method to enhance high return rate. The researcher when administering the instrument explained the need for the study, including the objectives of the study to remove suspicion from the respondents. The researcher and the research assistants then retrieved already completed questionnaire from respondent. For the purpose of confidentiality, the completed questionnaire was packaged and sealed. These lasted for three weeks in all the secondary schools sampled in North Central states, Nigeria and used for this study.

3.8 Method of Data Analysis

The data generated from the study was analyzed using descriptive and inferential statistics. Essentially, data collected from the administered research instrument (questionnaire) was analyzed using mean and standard deviation to answer the stated research questions. The null hypotheses were tested using Mann-Whitney U-test and Kruskal-Walis test statistics from the Statistical Package for Social Sciences (SPSS) version 21.0.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 Results

4.1.1 Answering of the Research Questions.

Research Question One: What is the mean response of teachers' evaluation of the implementation of performance objectives of senior secondary schools' physics curriculum?

Table 4.1: Teacher's evaluation of the implementation of performance objectives of senior secondary schools Physics curriculum

S/N	Items	N	Mean ($\bar{X}$)	Sd	Decision
1	The performance objectives for learning experience in physics curriculum are adequate and appropriate	130	3.22	.718	Agree
2	The performance objectives for learning experience in Physics curriculum leads to the attainment of aims and objectives of the curriculum	130	2.95	.892	Agree
3	The performance objectives for learning experience in Physics curriculum meet the needs of the society	130	3.14	.833	Agree
4	The performance objectives for learning experience in Physics curriculum place emphasis on conceptual thinking.	130	3.09	.687	Agree
5	The performance objectives for learning experience in Physics curriculum recognize learning objectives of the students.	130	3.09	.772	Agree
6	The performance objectives assist in review aims and objectives of Physics curriculum	130	3.06	.860	Agree
7	The performance objectives for learning experience in Physics curriculum develop society scientifically.	130	3.16	.680	Agree
	Grand mean		**3.10**	**0.777**	

Decision Mean =2.5

Table 4.1 shows the mean and standard deviation of mean evaluation of teachers on the implementation of performance objectives of senior secondary schools Physics curriculum. This indicates that almost all the items' scores more than 2.5 decision mean,

which imply that all the items were accepted, an indication that the evaluation of teachers on the implementation of performance objectives of senior secondary schools physics curriculum was adequate and appropriate. The implication is that, mean evaluation of teachers on the implementation of performance objectives of senior secondary schools' physics curriculum is favourable, since all the items on evaluation of teachers on the implementation of performance objectives show agreed based on decision mean.

Research Question Two: What is the mean response on organization of the learning activities in the Physics curriculum contents, syllabus and scheme of work in senior secondary schools?

Table 4.2: Teacher's perception of Organization of the learning activities in the Physics curriculum contents, syllabus and scheme of work in senior secondary schools

S/N	Items	N	Mean ($\bar{X}$)	Sd	Decision
1	The organization of the learning activities in Physics curriculum are appropriate and adequate	130	3.12	1.039	Agree
2	The organization of the learning activities in Physics curriculum shows how Physicists work in the real world.	130	3.24	.595	Agree
3	The organization of the learning activities in Physics curriculum shows that Practical exercise is an important part of learning Physics.	130	3.35	.553	Agree
4	The organization of the learning activities in Physics curriculum make Physics an interesting subject to learn	130	2.93	.799	Agree
5	The organization of the learning activities in Physics curriculum do not lead to the attainment of aims and objectives of the curriculum	130	3.38	.589	Agree
	Grand mean	**3.20**			**0.715**

Decision Mean =2.5

Table 4.2 shows the mean and standard deviation of organization of the learning activities in the physics curriculum contents, syllabus and scheme of work in senior secondary schools. This indicates that all the items scores more than 2.5 decision mean, which imply that all the items were accepted, an indication that the organization of the learning activities in the physics curriculum contents, syllabus and scheme of work in senior secondary schools was appropriate and adequate. The implication is that, the organization of the learning activities in the physics curriculum contents, syllabus and scheme of work in senior secondary schools is favourable since all the items on organization of the learning activities show agreed based on decision mean.

Research Question Three: What is the mean response of the coverage of the learning activities in the Physics curriculum contents, syllabus and scheme of work in the implementation of Physics curriculum by teachers?

Table 4.3: Coverage of Content in the Physics curriculum contents, syllabus and scheme of work in the implementation of Physics curriculum by teachers

S/N	Items	N	Mean ($\bar{X}$)	Sd	
1	Fundamentals and Derived Quantities and Units	130	2.98	.777	Adequately
2	Position, Distance and Displacement	130	3.25	.957	Adequately
3	Concept and Measurement of Time	130	3.05	1.113	Adequately
4	Motion (i) Type of Motion (ii) Relative Motion (iii) Cause and effect of Motion (iv) Type of Force (v) Reducing Friction (vi) Simple Idea of Circular Motion	130	3.22	.707	Adequately
5	Speed and Velocity	130	3.27	.462	Adequately
6	Rectilinear Acceleration	130	3.24	.595	Adequately
7	Scalars and Vectors	130	3.17	.515	Adequately
8	Work, Energy and Power (i) Concept of work, energy & power (ii) Determination of work, energy & power (iii) Work done in a force field (iv) Type of Energy (Mechanical) (v) Conservation of Mechanical Energy	130	3.30	.566	Adequately
9	Heat Energy (i) Concept of temperature (ii) Effect of heat (iii) Expansivity (iv) Transfer of heat	130	3.04	.741	Adequately
10	Electric Charges (i) Production of charges (ii) Types of Charges (iii) Distribution of Charges (iv) Storage of Charges	130	3.02	.880	Adequately

11	Description and property of Field (i) Concept of fields (ii) Types of Field (iii) Properties of a force field	130	3.03	.746	Adequately
12	Gravitational Fields (i) Acceleration due to gravity (ii) Shape and dimension of the earth.	130	3.15	.827	Adequately
13	Electric Field (i) Electric line of force (ii) Potential difference and electric current. (iii) Production of electric current (iv) Electric circuit (v) Electric Conduction through materials Ohms law (vi) Conversion of Electrical energy into Mechanical	130	3.06	1.032	Adequately
14	Particulate Nature of Matter (i) Structure of Matter (ii) Molecules (iii) State of matter	130	2.09	1.000	Inadequately
15	Elastic Properties of solids (i) Hooke`s law (ii) Young`s modulus (iii) Work done in springs and elastic string.	130	3.22	.757	Adequately
16	Crystal Structure (i) Crystals (ii) Arrangement of atoms in crystal structures (iii) Crystalline and Amorphous Substances.	130	3.22	.777	Adequately
17	Fluids at Rest and in Motion (i) Surface Tension (ii) Viscosity (iii) Application	130	2.19	.916	Inadequately
18	Electrical Continuity testing	130	2.68	.917	Adequately
19	Solar Collector (i) Solar Energy (ii) Solar panel for energy supply **Grand Mean 3.02 , Sd 0.748**	130	3.15	.858	Adequately

Decision Mean =2.5

Table 4.3 shows the mean and standard deviation of coverage of the learning activities in the Physics curriculum contents, syllabus and scheme of work in the implementation of Physics curriculum by teachers. Grand Mean is 3.02, while SD is 0.748. This indicates that eighteen out of nineteen items' scores more than 2.5 decision mean, which imply that all the items were accepted, an indication that the coverage of the content in the Physics curriculum contents, syllabus and scheme of work in the implementation of Physics curriculum by teachers was observed meticulously. The implication is that, coverage of the content in the physics curriculum contents, syllabus and scheme of work in the implementation of physics curriculum by teachers is in line with the curriculum implementation, since eighteen out of nineteen items show agreed based on decision mean of 2.5.

Research Question Four: What is the mean response of availability and the utilization of instructional materials in the implementation of Physics curriculum in the secondary schools by physics teachers?

Table 4.4: Mean Response on Availability and the utilization of instructional materials in the implementation of Physics curriculum in the secondary schools by physics teachers

S/N	Items	N	Mean ($\bar{X}$)	Sd	Decision Available and usage
1	Physics Laboratory	130	3.67	.640	Used
2	Charts	130	3.08	.881	Used
3	Micrometre Screw Gauge	130	3.00	1.188	Used
4	Vernier Calippers	130	3.03	.889	Used
5	Stop Watch/Clock	130	3.20	.893	Used
6	Metre Rule	131	5.31	30.188	Used
7	String	130	2.93	1.072	Used
8	Spiral Spring	130	3.20	.820	Used
9	Masses	130	3.33	.857	Used
10	Spring Balance	130	3.09	.858	Used
11	Weighing Balance	130	3.14	1.025	Used
12	Measuring Cylinder	130	2.65	1.205	Used
13	Pendulum Bob	130	3.18	.922	Used
14	Iron Weight	130	2.82	1.040	Used
15	Spring Balance	130	2.64	1.188	Used
16	Weighing Balance	130	3.05	1.003	Used
17	Retort Stand, Clamp and Boss	130	3.14	1.025	Used
18	Thermometers	130	3.17	.949	Used
19	Known Mass	130	2.64	1.175	Used
20	Voltmeter	130	3.08	.912	Used
21	Ammeter	130	2.93	1.080	Used
22	Rheostat	130	2.90	1.174	Used
23	Switch/ Key	130	2.97	1.071	Used
24	Specific Density Bottle	130	2.90	1.003	Used
25	Physics Textbooks	130	3.03	1.099	Used

Decision Mean =2.5

Table 4.4 shows the mean response and standard deviation of availability and the utilization of instructional materials in the implementation of Physics curriculum in the secondary schools by physics teachers. This indicates that all the items scores more than 2.5 decision mean, which imply that all the items were accepted, an indication that instructional materials are available and utilized by physics teachers in the implementation of physics curriculum in secondary schools. The implication is that, availability and the utilization of instructional materials in the implementation of physics curriculum in the secondary schools by physics teachers is favourable since all the items on availability and the utilization show agreed based on decision mean.

Research Question Five: What is the mean of level of compliance of recommended teaching strategies in Physics in the implementation of Physics curriculum in the secondary schools by physics teachers?

Table 4.5: Mean and Standard Deviation of Level of compliance of teaching strategies in Physics in the implementation of Physics curriculum in the secondary schools by physics teachers

S/N	Items	N	Mean ($\bar{X}$)	Sd	Decision
1	Inquiry Method	130	2.85	.910	Used
2	Demonstration Method	130	2.89	.910	Used
3	Individualized Method	130	3.07	.906	Used
4	Cooperative Method	130	2.84	.906	Used
5	Discussion Method	130	2.97	.770	Used
6	Simulation and Game Method	130	2.99	.995	Used
7	Laboratory Practical Method	130	2.98	.912	Used
8	Scaffolding Method	130	2.88	.998	Used
9	Project Method	130	2.92	1.098	Used
10	Lecture Method	130	2.73	1.116	Used

11	Discovery Method	130	2.72	1.014	Used
12	Analogy	130	2.91	1.021	Used
13	Team Teaching	130	2.90	1.064	Used
14	Role Playing	130	2.39	1.026	Not Used
15	Excursion/Field Trip	130	2.45	1.015	Not Used
16	Programmed Instruction	130	2.35	.985	Not Used
17	Teacher led whole class discussion	130	2.65	.923	Used
18	Free flowing whole class discussion	130	2.48	.911	Used

Decision Mean =2.5

Table 4.5 shows the mean and standard deviation of level of compliance of teaching strategies in Physics in the implementation of physics curriculum in the secondary schools by physics teachers. This indicates that most of the items scores more than 2.5 only three (3) items scores less than 2.5 decision mean, which imply that fifteen out of eighteen items were accepted, an indication that the level of compliance of teaching strategies in Physics in the implementation of physics curriculum in the secondary schools by physics teachers was observed. The implication is that, level of compliance of teaching strategies in physics in the implementation of physics curriculum in the secondary schools by physics teachers show agreed based on decision mean and that the recommended teaching strategies/ methods is being implemented.

Research Question Six: What is the mean of evaluation techniques used in the implementation of Physics curriculum in the secondary schools by physics teachers?

Table 4.6: Evaluation techniques used in the implementation of Physics curriculum in the secondary schools by physics teachers

		N	Mean ($\bar{X}$)	Sd	Decision
1	Assignments are given at regular interval	130	3.00	.923	Agree
2	Multiple choice alternative is appropriate	130	2.78	1.011	Agree
3	Essay test and examinations	130	2.90	.692	Agree
4	Practical/Laboratory assessment well conducted and appropriate for practical skills assessment.	130	2.83	.855	Agree
5	Project assessments techniques used by teachers appropriate to assess skill acquisitions among students	130	2.79	.794	Agree
6	Matching of items are relevant to contents covered	130	2.77	.849	Agree
7	True or false	130	2.39	1.191	Disagree
8	Concept Mapping	130	2.20	1.123	Disagree
	Grand mean		**2.707**	**0.929**	

Decision Mean =2.5

Table 4.6 shows the mean and standard deviation of evaluation techniques in the implementation of Physics curriculum in the secondary schools by physics teachers. This indicates that six out of eight items' scores more than 2.5 decision mean, which imply that six items were accepted, an indication that the evaluation techniques used in the implementation of Physics curriculum in the secondary schools by physics teachers was observed. This means that multiple evaluation techniques are being used in the implementation of the physics curriculum except the case of concept mapping and true or false. The implication is that, the evaluation techniques used in the implementation of Physics curriculum in the secondary schools by physics teachers is in line, since six out of eight items show agreed based on decision mean of 2.5.

Research Question Seven: What is the mean response of content coverage of the Physics curriculum contents, syllabus and scheme of work in senior secondary schools by teachers based on gender?

Table 4.7: Mean and Standard Deviation of content coverage in the Physics curriculum contents, syllabus and scheme of work in senior secondary schools by physics teachers based on gender?

Gender	N	Mean ($\bar{X}$)	Sd
Male	81	57.62	4.51
Female	49	56.82	4.63

Table 4.7 shows the mean and standard deviation of content coverage of the learning activities in the Physics curriculum contents, syllabus and scheme of work in senior secondary schools by teachers based on gender (male and female). The result revealed the mean and standard deviation responses of male physics teacher are $\bar{X}$ = 57.62, SD = 4.51 respectively. Similarly, the mean and standard deviation responses of female physics teachers are $\bar{X}$ = 56.82, SD = 4.63 respectively on the other hand. The results also revealed male teachers had the highest content coverage in the implementation of physics curriculum contents, syllabus and scheme of work in senior secondary schools compare to female teachers.

Research Question Eight: What is the mean response of level of compliance of teaching strategies in the physics in the implementation of physics curriculum in the secondary schools based on gender?

Table 4.8: Mean and Standard Deviation of level of compliance of teaching strategies in the Physics in the implementation of Physics curriculum in the secondary schools by physics teachers based on gender

Gender	N	Mean ($\bar{X}$)	Sd
Male	81	50.91	8.74
Female	49	48.43	8.25

Table 4.8 shows the mean and standard deviation of level of compliance of learning activities in the Physics in the implementation of Physics curriculum in the secondary schools by physics teachers based on gender (male and female). The result revealed the mean and standard deviation responses of male physics teachers are $\bar{X}$ = 50.91, SD = 8.74 respectively. Similarly, the mean and standard deviation responses of female physics teachers are $\bar{X}$ = 48.43, SD = 8.25 respectively on the other hand. The results also revealed male teachers had the highest level of compliance in implementing teaching strategies in the Physics curriculum in the secondary schools with mean of 50.91compare to female physics teachers.

Research Question Nine: What is the mean response of evaluation techniques used in the implementation of Physics curriculum in the secondary schools based on gender?

Table 4.9: Mean and Standard Deviation of evaluation techniques used in the implementation of Physics curriculum in the secondary schools by physics teachers based on gender

Gender	N	Mean ($\bar{X}$)	Sd
Male	81	21.51	2.98
Female	49	21.94	3.47

Table 4.9 shows the mean and standard deviation of evaluation techniques in the implementation of Physics curriculum in the secondary schools by physics teachers based on gender. The result revealed the mean and standard deviation responses of male physics teachers are $\bar{X}$ = 21.51, SD = 2.98 respectively. Similarly, the mean and standard deviation responses of female teachers are $\bar{X}$ = 21.94, SD = 3.47 respectively. The results also revealed female physics teachers had the highest evaluation techniques in the implementation of Physics curriculum in the secondary schools compare to male physics teachers.

Research Question Ten: What is the mean response of syllabus coverage of students in the implementation of Physics curriculum in the secondary schools?

Table 4.10: Mean and Standard Deviation of syllabus coverage by students in the implementation of Physics curriculum in the secondary schools

	Items	N	Mean ($\bar{X}$)	Sd	Decision
1	Fundamentals and Derived Quantities and Units	251	3.41	.952	Covered
2	Position, Distance and Displacement	251	2.94	1.188	Covered
3	Concept and Measurement of Time	251	3.30	.885	Covered
4	Motion (i) Type of Motion (ii) Relative Motion (iii) Cause and effect of Motion (iv) Type of Force (v) Reducing Friction (vi) Simple Idea of Circular Motion	251	2.96	1.004	
5	Speed and Velocity	251	2.92	1.193	Covered
6	Rectilinear Acceleration	251	3.08	1.012	Covered
7	Scalars and Vectors	251	3.23	1.090	Covered

8	Work, Energy and Power (vi) Concept of work, energy & power (vii) Determination of work, energy & power (viii) Work done in a force field (ix) Type of Energy (Mechanical) (x) Conservation of Mechanical Energy	251	3.12	1.000	Covered
9	Heat Energy (v) Concept of temperature (vi) Effect of heat (vii) Expansivity (viii) Transfer of heat	251	2.63	1.277	Covered
10	Electric Charges (v) Production of charges (vi) Types of Charges (vii) Distribution of Charges (viii) Storage of Charges	251	2.98	1.083	Covered
11	Description and property of Field (iv) Concept of fields (v) Types of Field (vi) Properties of a force field	251	2.89	1.052	Covered
12	Gravitational Fields (i) Acceleration due to gravity (ii) Shape and dimension of the earth.	251	2.71	1.282	Covered
13	Electric Field (vii) Electric line of force (viii) Potential difference and electric current. (ix) Production of electric current (x) Electric circuit (xi) Electric Conduction through materials Ohms law (xii) Conversion of Electrical energy into Mechanical	251	2.92	1.114	Covered
14	Particulate Nature of Matter (iv) Structure of Matter (v) Molecules (vi) State of matter	251	2.69	1.120	Covered

15	Elastic Properties of solids (iv) Hooke`s law (v) Young`s modulus (vi) Work done in springs and elastic string.	251	2.88	1.192	Covered
16	Crystal Structure (iv) Crystals (v) Arrangement of atoms in crystal structures (vi) Crystalline and Amorphous Substances.	251	2.97	1.092	Covered
17	Fluids at Rest and in Motion (iv) Surface Tension (v) Viscosity (vi) Application	251	2.93	1.233	Covered
18	Electrical Continuity testing	251	2.87	1.145	Covered
19	Solar Collector (iii) Solar Energy (iv) Solar panel for energy supply	251	2.83	1.245	Covered

Decision Mean =2.5

Table 4.10 shows the mean and standard deviation of syllabus coverage of students in the implementation of Physics curriculum in the secondary schools. This indicates that all the items scores more than 2.5 decision mean, which imply that all the items were accepted, an indication that the syllabus coverage of students in the implementation of Physics curriculum in the secondary schools was adequately covered. Since all the items on syllabus coverage of students in the implementation of Physics curriculum are covered in the secondary schools show agreed based on decision mean.

Research Question Eleven: What is the mean response of availability of instructional materials for students in the implementation of Physics curriculum in the secondary schools?

Table 4.11: Mean and Standard Deviation of availability of instructional materials for students in the implementation of Physics curriculum in the secondary schools

	Items	N	Mean ($\bar{X}$)	Sd	
1	Physics Laboratory	251	3.24	.798	Available
2	Charts	251	2.98	.975	Available
3	Micrometre Screw Gauge	251	3.21	.794	Available
4	Vernier Calippers	251	3.13	.680	Available
5	Stop Watch/Clock	251	3.21	.769	Available
6	Metre Rule	251	3.13	.852	Available
7	String	251	3.14	.718	Available
8	Spiral Spring	251	3.00	.920	Available
9	Masses	251	3.09	.958	Available
10	Spring Balance	251	3.26	.871	Available
11	Weighing Balance	251	3.15	.900	Available
12	Measuring Cylinder	251	3.19	.843	Available
13	Pendulum Bob	251	2.93	1.041	Available
14	Iron Weight	251	3.12	.893	Available
15	Spring Balance	251	3.00	.967	Available
16	Weighing Balance	251	3.10	1.022	Available
17	Retort Stand, Clamp and Boss	251	2.99	1.092	Available
18	Thermometers	251	3.03	.935	Available
19	Known Mass	251	3.05	1.033	Available
20	Voltmeter	251	3.10	.944	Available
21	Ammeter	251	2.89	1.019	Available
22	Rheostat	251	2.94	.998	Available
23	Switch/ Key	251	2.78	1.181	Available
24	Specific Density Bottle	251	2.76	1.152	Available
25	Physics Textbooks	251	2.93	1.082	Available

Decision Mean = 2.5

Table 4.11 shows the mean and standard deviation of availability of instructional materials of students in the implementation of Physics curriculum in the secondary schools. This indicates that all the items scores more than 2.5 decision mean, which imply that all the items were accepted, an indication that instructional materials for students are available in the implementation of physics curriculum in the secondary schools. The implication is that, availability of instructional materials in the implementation of Physics curriculum in the secondary schools is available, since all the items on availability of instructional materials agreed based on decision mean.

Research Question Twelve: What is the mean response of evaluation of physics teachers on the implementation of performance objectives of senior secondary schools Physics curriculum based on their years of teaching experiences?

Table 4.12: Mean and Standard Deviation mean Evaluation of physics Teachers on the implementation of performance objectives of senior secondary schools Physics curriculum based on their years of teaching experiences

Year of experience	N	Mean($\bar{X}$)	Sd
20 year and Above	68	34.37	3.19
11-20	38	33.87	3.15
6-10	24	35.08	4.05

Table 4.12 shows the mean and standard deviation of assessment of physics teachers on the implementation of performance objectives of senior secondary schools Physics curriculum based on their years of teaching experiences? The result revealed that the mean and standard deviation of assessment of physics teachers on the implementation of performance objectives of senior secondary schools Physics curriculum based on their years of teaching experiences as follows; 6-10 year $\bar{X}$ = 35.08, SD = 4.05 respectively.

Similarly, the mean and standard deviation of 11-20 years $\bar{X}$ = 33.87, SD = 3.15 respectively on the other hand mean and standard deviation of 20 years and above $\bar{X}$ = 34.37, SD = 3.19 respectively. The results also revealed that assessment of teachers on the implementation of performance objectives of senior secondary schools Physics curriculum based on their years of teaching experiences 6-10 years above had highest mean response follow by 20 years and above and 11-20 years' experience respectively.

4.1.2 Testing of the Null Hypotheses

Hypothesis One: Null Research Hypotheses

The following null hypotheses were formulated and tested at $p \leq 0.05$.

Hypothesis One: There is no significant difference in evaluation of implementation of Physics curriculum by physics teachers in senior secondary school based on gender.

Table 4.13: **Mann-Whitney U-test of evaluation of implementation of physics curriculum by physics teachers in senior secondary school based on gender**

Gender	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Sign
Male	81	63.93	5178.00	1857.000	5178.000	-0.618	0.54
Female	49	68.10	3337.00				

Table 4.13 shows hypothesis that stated no significant difference in assessment of implementation of physics curriculum by physics teachers in senior secondary school based on gender was tested. The table 4.13 shows p-value = 0.54 since value of p > 0.05, $H0_1$, was not rejected that is accepted. Therefore, there was no significant difference in evaluation of implementation of physics curriculum by physics teachers in senior secondary school based on gender.

Hypothesis Two: There is no significant difference in evaluation of implementation of Physics curriculum by Physics teachers based on the year of experience.

Table 4.14: Kruskal-Walis test of mean response of evaluation of implementation of Physics curriculum by Physics teachers based on the year of experience

Year of Experiences	N	Mean Rank	Chi-Square	df	Sig
20 years and above	68	65.24			
11-20	38	62.76	0.653	2	0.72
6-10	24	70.58			

Table 4.14 shows the hypothesis that stated that no significant difference in the evaluation of implementation of Physics curriculum by Physics teachers based on the year of experience was tested. The findings of the table show df = 2, with p = 0.72 Since p > 0.05, $H0_2$, was not rejected but accepted. Therefore there was no significant difference in the assessment of implementation of physics curriculum by physics teachers based on the year of experience.

Hypothesis Three: There is no significant difference in response on the organization of physics curriculum by Physics teachers based on the year of experience.

Table 4.15: Kruskal-Wali's test of mean response of organization of physics curriculum by Physics teachers based on the year of experience.

Year of Experiences	N	Mean Rank	Chi-Square	Df	Sig
20 years and above	68	68.30			
11-20	38	61.55	1.059	2	0.59
6-10	24	63.81			

Table 4.15 shows the hypothesis that stated significant difference in the organization of physics curriculum by Physics teachers based on the year of experience was tested. The findings of the table show df = 2, with p = 0.59 since p > 0.05, $H0_3$, was accepted. Therefore, there was no significant difference in the organization of physics curriculum by Physics teachers based on the year of experience.

Hypothesis Four: There is no significant difference in coverage of content in Physics curriculum implementation between the Physics teachers and the Physics students.

Table 4.16: Mann Whitney analysis of coverage of content in Physics curriculum implementation between the Physics teachers and their students.

Group	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Sign
Physics Students	251	245.33	61577.00	2679.000	11194.000	-13.385	0.00
Physics Teachers	130	86.11	11194.00				

Table 4.16: The hypothesis that stated no significant difference in the syllabus coverage in Physics curriculum implementation between the Physics teachers and the Physics students was tested. The table shows value of $p = 0.00$ since value of $p < 0.05$, $H0_4$, was rejected. Therefore, there was significant difference in the syllabus coverage in physics curriculum implementation between the physics teachers and the physics students.

Hypothesis Five: There is no significant difference in mean response on availability of instructional materials used in teaching and learning physics between the physics teachers and physics students.

Table 4.17: Mann Whitney analysis of availability of instructional materials used in teaching and learning physics among the physics teachers and physics students.

Group	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Sign
Physics Students	251	181.85	45644.00	14018.000	45644.000	-2.256	0.02
Physics Teachers	130	208.67	27127.00				

Table 4.17: The hypothesis that stated no significant difference in availability of instructional materials used in teaching and learning physics among the physics teachers and physics students was tested. The table show $df = 379$ with $p = 0.02$ Since $p < 0.05$, H05, was rejected. Therefore, there was significant difference in availability of

instructional materials used in teaching and learning physics among the physics teachers and physics students.

Hypothesis Six: There is no significant difference in the level of compliance by teachers on recommended teaching strategies on implementation of Physics curriculum in senior secondary school based on gender.

Table 4.18: Mann-Whitney U-test of the level of compliance by teachers on recommended teaching strategies on implementation of Physics curriculum in senior secondary school based on gender

Gender	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Sign
Male	81	68.80	5573.00	1717.000	2942.000	-1.288	0.19
Female	49	60.04	2942.00				

Table 4.18: The hypothesis that stated no significant difference in the level of compliance by teachers on recommended teaching strategies on implementation of Physics curriculum in senior secondary school based on gender was tested. The table show value of p = 0.19 since p>0.05, $H0_6$, was accepted. Therefore, there was significant difference in the level of compliance by teachers on recommended teaching strategies on implementation of Physics curriculum in senior secondary school based on gender.

4.2 Summary of the Findings

Finding of the study are as follows:

1. The performance objectives of National Physics curriculum for senior secondary school by teachers in the implementation of curriculum has been adequate and appropriately achieved
2. The organization of the learning activities in physics curriculum content are appropriately adequate.

3. The contents of the physics curriculum for senior secondary schools are adequately covered but not very adequate for achieving the objectives of the curriculum.
4. The Physics teachers indicated that they utilize the available instructional materials for teaching and learning of physics often but not very often. The students also indicated the use of available instructional material but not often
5. The Physics teachers often comply with the recommended teaching strategies for use in the implementation of physics curriculum but not very often.
6. Teachers use the recommended evaluation technique in assessing their students a moderate extent in the implementation of physics curriculum.
7. There was no significant difference in evaluation of implementation of physics curriculum by physics teachers in senior secondary school based on gender.
8. There was no significant difference in the evaluation of implementation of physics curriculum by physics teachers based on the year of experience
9. There was no significant difference in the organization of physics curriculum by physics teachers based on the year of experience.
10. There was significant difference in the content coverage of syllabus in physics curriculum implementation between the physics teachers and the physics students.
11. There was significant difference in availability of instructional materials used in teaching and learning physics among the physics teachers and physics students.
12. There was no significant difference in the level of compliance by teachers on teaching strategies in implementation of Physics curriculum in senior secondary school based on gender.

4.3 Discussion of Findings

This study revealed that the performance objectives of National Physics curriculum for senior secondary school by teachers in the implementation of curriculum has been adequate and appropriately achieved. This finding is in line with the finding of Ifeobu (2014) that investigated the evaluation of the implementation of national curriculum for secondary school biology in Anambra state, Nigeria. Findings of the study revealed the aim and objectives were moderately achieved by the teachers.

The study also revealed that the organization of the learning activities in physics curriculum content are appropriately adequate. This is in line with the finding of Henrrietta (2016) that investigated evaluation techniques and the implementation of the curriculum content of secretarial education in selected colleges of education in south-south, Nigeria. Findings of the study revealed evaluation techniques and organization of learning activities were moderately utilized by teachers.

The contents of the physics curriculum for senior secondary schools are adequately covered but not very adequate for achieving the objectives of the curriculum. This is in agreement of the study of Patra and Guha *(*2017) who conducted a study to compare the pedagogical content knowledge and self-efficacy of geography teachers in relation to school location and gender and to also find out the relationship between the pedagogical content knowledge and self-efficacy in southern part of West Bengal, India. The study found that, there was no significant difference in pedagogical content knowledge and self-efficacy of rural and urban geography teachers. Also, there was no significant difference in pedagogical content knowledge and self-efficacy of male and female geography teachers; and the pedagogical content knowledge and self-efficacy of geography teachers was positive and significantly related. Also concur with the study of Agugoesi, et al (2022), evaluated teachers' implementation of basic science curriculum

content areas in junior secondary schools in Nsukka Education Zone of Enugu State, Nigeria. The findings revealed that gender has no influence in teachers' implementation of Basic Science curriculum content areas. While Basic Science teachers' education qualifications and teaching experiences significantly influenced the implementation of Basic Science curriculum content areas in junior secondary school.

The Physics teachers indicated that they utilize the available instructional materials for teaching and learning of physics often but not very often. The students also indicated the use of available instructional material but not often. This study is in agreement with the study of Akporobaroh, (2020) who carried out investigation on the relationship between availability of instructional aids and students' interest in studying physics in secondary school. Findings showed that most of the instructional materials needed by the teacher for effective teaching of physics were available but not functioning; however, it found that there was no significant relationship between availability of instructional aids and students' interest in studying of physics in public senior secondary schools in the area of study. Also aligned with study of Adebule and Ayoola (2015) who determined the availability, functionality and level of usage of instructional materials for teaching the subject. The results from the teachers' responses revealed that instructional materials are available for teaching Mathematics but are not adequate. It was also found out that to a certain extent, the instructional materials are functioning. However, teachers are not putting the materials into good use.

The Physics teachers often comply with the recommended teaching strategies for use in the implementation of physics curriculum but not very often. This is in agreement with the study of Isa *et al* (2020) who examined the impact of teaching method on academic performance of secondary school students in Nigeria. It was revealed that most of the teachers' methods of teaching have a great effect on students' academic performance.

Teachers use the recommended evaluation technique in assessing their students a moderate extent in the implementation of physics curriculum. This is in support of the findings of Henrrietta (2016) this research paper specifically investigated evaluation techniques and the implementation of the curriculum content of secretarial education in selected colleges of education in south-south, Nigeria. It was found that evaluation techniques were moderately utilized by teachers.

The study also reveals that there was no significant difference in the assessment of implementation of physics curriculum by physics teachers based on the year of experience. This is in line with the finding of Ewetan and Ewetan (2015) who investigated the influence of teachers' teaching experience on the academic performance of public secondary school students in Mathematics and English Language in Ado-Odo/Ota and Ifo Local Government Areas in Ogun State. Findings reveal that teachers' teaching experience has significantly influenced students' academic performance in Mathematics and English Language as measured by their performance in the SSCE examinations and as perceived by the respondents. This is also in agreement with the study of Olatubosun, *et al* (2017) who sought to investigate the implementation process of physics curriculum in Ekiti State Secondary Schools. It was revealed that the implementation process of physics in Ekiti State public schools showed differences between qualified, experienced, less experienced and less-qualified teachers. It was also concurred with the study of Nwona and Madu (2018) who carried out the assessment of senior secondary school physics teachers' content knowledge. The results showed that there was no statistically significant difference between the mean content knowledge of the educationally qualified and non-qualified physics teachers.

There was no significant difference in the organization of physics curriculum by physics teachers based on the year of experience. This is in support of the study of Pepple and

Esu (2020) who conducted a study to examine the possible influence of teaching qualification on effectiveness and student achievement in Rivers State in mathematics. The result showed that students taught by qualified teachers performed significantly better than those taught by unqualified teachers but there was no significant difference in academic performance of students taught by experienced and inexperienced ones.

There was significant difference in the syllabus coverage in physics curriculum implementation between the physics teachers and the physics students. This is in disagreement with the study of Dan *et al* (2012) who carried out the study on the assessment of the implementation of Social Studies Curriculum in Junior Secondary Schools in Kaduna State. The study revealed that the implementation of social studies curriculum in junior secondary schools level is significantly affected by availability of instructional materials adequacy.

There was no significant difference in availability of instructional materials used in teaching and learning physics among the physics teachers and physics students. This is in disagreement with the work of Adebule and Ayoola (2015) who investigated the availability, functionality and level of usage of instructional materials for teaching the mathematics as a subject. The results from the teachers' responses revealed that instructional materials are available for teaching mathematics but are not adequate. It was also found that to a certain extent, the instructional materials are functioning. However, teachers are not putting the materials into good use.

There was significant difference in the level of compliance by teachers on implementation of Physics curriculum in senior secondary school based on gender. This is in support of the findings of Pepple and Esu (2020) that carried out study on influence of teacher qualification on teachers` effectiveness and students` academic performance

in Rivers State. It was revealed that there is gender balance than gap in the implementation of social studies curriculum. More females offered social studies than their males counter parts; also, there are more males than females in academics teaching of social studies.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

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

From the findings of this study, it could be deduced that there was significant difference in evaluation of implementation of physics curriculum by physics teachers in senior secondary school based on gender. Majority of male respondents' teachers responded positively in the evaluation of implementation of physics curriculum by physics teachers in senior secondary school. Also, most of the respondents aligned on the responses on the items on the evaluation of the implementation of physics curriculum by physics teachers based on the year of experience. There was no significant difference in the content coverage and organization of physics curriculum by physics teachers based on the year of experience.

Furthermore, it was further revealed that there was no significant difference in the level of compliance with recommended teaching strategies and availability of instructional materials used in teaching and learning physics among the physics teachers.

5.2 Recommendations

From the findings, the following recommendations are made;

1. Physics teachers should endeavour to be learner-centered when teaching and use learner centered strategies in teaching and learning, so that students will contribute in the process and make learning more concrete.
2. Curriculum planners should emphasis more on the use of interactive method of instruction like student activities (inquiry method, demonstration method, cooperation method, laboratory practices among others), which will not

only make the teacher's work easier but also boost physics students' performance in curriculum implementation.

3. The ministry of education should organize workshops and seminars to re-train teachers on implementation of physics curriculum in senior secondary schools to enhance teachers understanding of physics curriculum implementation
4. The school administrators should make instructional materials available to make learning easier and also invite resource persons that can help educate teachers on the procedures and uses of those materials.

5.3 Limitations of the Study

1. The limitation of this study was that the study could not be carried out in other five geopolitical zones in Nigeria.
2. The findings may not be generalized to other federal and private institutions. Therefore, further studies would be needed before more meaningful generalizations based on the results of the study can be made.
3. The researcher chooses and used North-Central states of Nigeria.

5.4 Implication of the Study

The educational implications of the findings are that;

1. Since effective/proper implementation of the physics curriculum promotes learning, enhance student-student interaction, boosts self-esteem in students and promotes personal interdependence, improper implementation of the physics curriculum by teachers will not enhance students' performance in physics.
2. Also proper implementation of assessment by physics teachers can mar the essence of learning, which is to make learning more interactive and more effective for better academic performance in physics.

5.5 Suggestions for Further Study

Due to the limitation of this study, the researcher suggests the following for further study;

1. That the study be replicated in the other geopolitical zone in Nigeria.
2. Evaluation of the implementation of physics content, physics objectives, and its effectiveness.
3. Further research on the problems of implementing physics curriculum in the other higher institution of learning should be carry out by other researchers.
4. Further research is needed to explore other factors like; influencing curriculum implementation, students' entry mark, teachers' competence, peer influence, family back ground and type of school on implementation of Physics secondary schools in Nigeria.

5.6. Contributions of the Study to Knowledge

The study has added to the pool of knowledge in the following ways:

1. It has succeeded in determining the assessment of implementation of physics curriculum in senior secondary school using Tyler`s evaluation Model in North-Central States, Nigeria.
2. It was also confirmed from this study that no difference exist in the organization of physics curriculum by physics teachers based on the year of experience.
3. The study contributed to the existing literature and provided a platform for further researches on evaluation of implementation of physics curriculum using Tyler`s evaluation model.
4. Its discovered from the study that the need to review present physics curriculum is inevitable in order to enhance students performance in the subject.

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APPENDIX A

WAEC Performance of candidates in Physics, SSCE (2011 -2015)

Year	Total Number of Candidates	Number of Credit Pass	% Pass	Number of Fail	% Fail
2011	563,161	157,543	26.80	430,229	73.20
2012	624,658	429,415	68.74	195,243	31.26
2013	636,857	296,910	46.42	339,947	53.38
2014	241,161	72,522	29.27	68639	70.72
2015	529,425	165,604	31.22	363820	68.72

WAEC Research and Statistics Unit Zonal office Minna (2016)

APPENDIX B

Teachers' Evaluation of Curriculum Implementation Questionnaire (TECIQ)

DEPARTMENT OF SCIENCE EDUCATION,

SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION,

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGER STATE.

PHYSICS TEACHERS` QUESTIONAIRE ON EVALUATION OF THE IMPLEMENTATION OF SENIOR SECONDARY SCHOOL PHYSICS CURRICULUM USING TYLER`S EVALUATION MODEL IN NORTH-CENTRAL STATES, NIGERIA.

Dear Physics Teacher,

This questionnaire seeks your opinions and concerns about the Evaluation of the implementation of Physics Curriculum for secondary schools in North Central states, Nigeria. The purpose of this study is to assess the implementation processes recommended by the Federal Ministry of Education. Your responses will be treated confidentially and will be used for research purposes only. Your cooperation is greatly appreciated.

Thank You.

BUSARI, Taofeeq

SECONDARY SCHOOL PHYSICS IMPLEMENTATION EVALUATION QUESTIONNAIRE FOR TEACHERS

SECTION A

BIO DATA

Name of School _____

Position or Rank of Respondent_____

Sex: M ☐ F ☐

Educational qualification

NCE (Physics) ☐

B.Sc. Ed. (Physics) ☐

B.Ed. (others) ☐

B.Sc. (Physics) ☐

B.Sc. E.d. (Others) ☐

M.Ed. (Physics) ☐

M.Ed. (others) ☐

M.Sc. (Physics) ☐

PhD ☐

Years of teaching experience

6-10years ☐

11-20 years ☐

20 years and above ☐

SECTION B

Instruction: Kindly read each statement and tick (√) in the column provided that best represent your Evaluation of the Implementation of Senior Secondary School Physics Curriculum using the following response scale.

Response Categories

Strongly Agreed (SA) = 4, Agree (A) = 3, Disagree (D) =2, Strongly Disagree (SD) = 1

S/NO	Candidates Responses Items (Objectives & learning Experience)	SA	A	D	SD
1.	The performance objectives for learning experience in Physics curriculum are adequate and appropriate				
2.	The performance objectives for learning experience in Physics curriculum do not lead to the attainment of aims and objectives of the curriculum				
3.	The performance objectives for learning experience in Physics curriculum do not meet the needs of the society				
4.	The performance objectives for learning experience in Physics curriculum place emphasis on conceptual thinking.				
5.	The performance objectives for learning experience in Physics curriculum does not recognize learning objectives of the students to be very important				
6.	The performance objectives leads to the attainment of aims and objectives of Physics curriculum				
7.	The performance objectives for learning experience in Physics curriculum meet the need of the society.				
8.	The stated learning activities in the Physics curriculum meet the stated performance objectives				

	Candidates Responses Items (Organization)	**SA**	**A**	**D**	**SD**
1	The organization of the learning activities in Physics curriculum are appropriate and adequate				
2	The organization of the learning activities in Physics curriculum shows how Physicists work in the real world.				
3	The organization of the learning activities in Physics curriculum shows that Practical exercise is an important part of learning Physics.				
4	The organization of the learning activities in Physics curriculum make Physics an interesting subject to learn				
5	The organization of the learning activities in Physics curriculum do not lead to the attainment of aims and objectives of the curriculum				

Indicate the extent to which the syllabus coverage of the Physics curriculum is Adequate for achieving the objectives of the curriculum.

Response Categories

Very Adequately Covered (VAC) = 4, Adequately Covered (AC) =3, Inadequately Covered (IC) = 2, Very Inadequately Covered (VIC) = 1

S/NO	TOPICS	VAC	AC	IC	VIC
1	Fundamentals and Derived Quantities and Units				
2	Position, Distance and Displacement				
3	Concept and Measurement of Time				
4	Motion (i) Type of Motion (ii) Relative Motion (iii) Cause and effect of Motion (iv) Type of Force (v) Reducing Friction (vi) Simple Idea of Circular Motion				
5	Speed and Velocity				
6	Rectilinear Acceleration				
7	Scalars and Vectors				
8	Work, Energy and Power (xi) Concept of work, energy & power (xii) Determination of work, energy & power (xiii) Work done in a force field (xiv) Type of Energy (Mechanical) (xv) Conservation of Mechanical Energy				

9	Heat Energy (ix) Concept of temperature (x) Effect of heat (xi) Expansivity (xii) Transfer of heat				
10	Electric Charges (ix) Production of charges (x) Types of Charges (xi) Distribution of Charges (xii) Storage of Charges				
11	Description and property of Field (vii) Concept of fields (viii) Types of Field (ix) Properties of a force field				
12	Gravitational Fields (i) Acceleration due to gravity (ii) Shape and dimension of the earth.				
13	Electric Field (xiii) Electric line of force (xiv) Potential difference and electric current. (xv) Production of electric current (xvi) Electric circuit (xvii) Electric Conduction through materials Ohms law (xviii) Conversion of Electrical energy into Mechanical				
14	Particulate Nature of Matter (vii) Structure of Matter (viii) Molecules (ix) State of matter				
15	Elastic Properties of solids (vii) Hooke`s law (viii) Young`s modulus (ix) Work done in springs and elastic				

	string.				
16	Crystal Structure (vii) Crystals (viii) Arrangement of atoms in crystal structures (ix) Crystalline and Amorphous Substances.				
17	Fluids at Rest and in Motion (vii) Surface Tension (viii) Viscosity (ix) Application				
18	Electrical Continuity testing				
19	Solar Collector (v) Solar Energy (vi) Solar panel for energy supply				

The availability of materials. Please indicate with a tick (√) under appropriate column that which best describes your opinion about the level of availability and the rate of utilization of each of the following items.

Note that: Very Frequently Used (VFU) = 4 Frequently Used (FU) =3: Rarely Used (RU) =2: Not Used (NU) = 1.

S/NO	**Facilities**	**Quantity Available**	**VFU**	**FU**	**RU**	**NU**
1	Physics Laboratory					
2	Charts					
3	Micrometre Screw Gauge					
4	Vernier Calippers					
5	Stop Watch/Clock					
6	Metre Rule					
7	String					
8	Spiral Spring					

9	Masses					
10	Spring Balance					
11	Weighing Balance					
12	Measuring Cylinder					
13	Pendulum Bob					
14	Iron Weight					
15	Spring Balance					
16	Weighing Balance					
17	Retort Stand, Clamp and Boss					
18	Thermometers					
19	Known Mass					
20	Voltmeter					
21	Ammeter					
22	Rheostat					
23	Switch/ Key					
23	Specific Density Bottle					
25	Physics Textbooks					

Teachers' level of compliance with the appropriate teaching methods recommended for use in the Physics curriculum.

What are the teaching methods employed by the teachers in the schools?

Response Guides, Very Often Used (VOU) = 4, Often Used (OU) = 3, Sometimes Used (SU) = 3, Not Used (NU) =1

S/NO	Teaching Methods	VOU	OU	SU	NU
1	Inquiry Method				
2	Demonstration Method				
3	Individualized Method				
4	Cooperative Method				
5	Discussion Method				
6	Simulation and Game Method				
7	Laboratory Practical Method				
8	Scaffolding Method				
9	Project Method				
10	Lecture Method				
11	Discovery Method				
12	Analogy				
13	Team Teaching				
14	Role Playing				
15	Excursion/Field Trip				
16	Programmed Instruction				
17	Teacher led whole class discussion				
18	Free flowing whole class discussion				

Evaluation Techniques Used by Physics Teachers in Assessing Their Students

Response Categories.

Strongly Agreed (SA) = 4, Agree (A) = 3, Disagree (D) =2, Strongly Disagree (SD) = 1

S/NO	**Evaluation Techniques**	**SA**	**A**	**D**	**SD**
1	Assignments are given at regular interval				
2	Multiple choice alternative is appropriate				
3	Essay test and examinations				
4	Practical/Laboratory assessment well conducted and appropriate for practical skills assessment.				
5	Project assessments techniques used by teachers appropriate to assess skill acquisitions among students				
6	Matching of items are relevant to contents covered				
7	True or false				
8	Concept Mapping				

APPENDIX C

Students` Evaluation of Curriculum Implementation Questionnaire (SECIQ)

DEPARTMENT OF SCIENCE EDUCATION,

SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION,

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGER STATE.

PHYSICS STUDENTS` QUESTIONAIRE ON EVALUATION OF THE IMPLEMENTATION OF SENIOR SECONDARY SCHOOL PHYSICS CURRICULUM USING TYLER`S EVALUATION MODEL IN NORTH-CENTRAL STATE, NIGERIA.

Dear Physics Student,

This questionnaire seeks your opinions and concerns about the evaluation of the implementation of Physics Curriculum for secondary schools in North Central States, Nigeria. The purpose of this study is to assess the implementation processes recommended by the Federal Ministry of Education. Your responses will be treated confidentially and will be used for research purposes only. Your cooperation is greatly appreciated.

Thank You.

BUSARI, Taofeeq

SECONDARY SCHOOL PHYSICS IMPLEMENTATION EVALUATION

QUESTIONNAIRE FOR STUDENTS

SECTION A

Background Information

About you

Sex: Male ☐

Female ☐

Age: ……. years.

Your class level: …….

About your school

Name of School:

……

……

……

Indicate the extent to which the syllabus coverage of the Physics curriculum is Adequate for achieving the objectives of the curriculum.

Response Categories

Very Adequately Covered (VAC) = 4, Adequately Covered (AC) =3, Inadequately Covered (IC) = 2, Very Inadequately Covered (VIC) = 1

S/NO	TOPICS	VAC	AC	IC	VIC
1	Fundamentals and Derived Quantities and Units				
2	Position, Distance and Displacement				
3	Concept and Measurement of Time				
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5	Speed and Velocity				
6	Rectilinear Acceleration				
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9	Heat Energy (xiii) Concept of temperature (xiv) Effect of heat (xv) Expansivity (xvi) Transfer of heat				
10	Electric Charges (xiii) Production of charges (xiv) Types of Charges (xv) Distribution of Charges (xvi) Storage of Charges				
11	Description and property of Field (x) Concept of fields (xi) Types of Field (xii) Properties of a force field				
12	Gravitational Fields (i) Acceleration due to gravity (ii) Shape and dimension of the earth.				
13	Electric Field (xix) Electric line of force (xx) Potential difference and electric current. (xxi) Production of electric current (xxii) Electric circuit (xxiii) Electric Conduction through materials Ohms law (xxiv) Conversion of Electrical energy into Mechanical				
14	Particulate Nature of Matter (x) Structure of Matter (xi) Molecules (xii) State of matter				
15	Elastic Properties of solids (x) Hooke`s law (xi) Young`s modulus (xii) Work done in springs and elastic string.				
16	Crystal Structure (x) Crystals (xi) Arrangement of atoms in crystal structures (xii) Crystalline and				

	Amorphous Substances.				
17	Fluids at Rest and in Motion (x) Surface Tension (xi) Viscosity (xii) Application				
18	Electrical Continuity testing				
19	Solar Collector (vii) Solar Energy (viii) Solar panel for energy supply				

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Note that: Very Frequently Used (VFU) = 4 Frequently Used (FU) =3: Rarely Used (RU) =2: Not Used (NU) = 1.

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6	Metre Rule					
7	String					
8	Spiral Spring					
9	Masses					
10	Spring Balance					
11	Weighing Balance					
12	Measuring Cylinder					

13	Pendulum Bob					
14	Iron Weight					
15	Spring Balance					
16	Weighing Balance					
17	Retort Stand, Clamp and Boss					
18	Thermometers					
19	Known Mass					
20	Voltmeter					
21	Ammeter					
22	Rheostat					
23	Switch/ Key					
24	Specific Density Bottle					
25	Physics Textbooks					

APPENDIX D

Distribution of States by No of Senior Secondary Schools, No of Senior Secondary Students and No of SSS 2 Students in North Central Nigeria.

S/N	States	Number of Senior Secondary Schools	Number of Senior Secondary Students	Number of SSS Two Physics Students
1	Benue	216	72360	12060
2	FCT Abuja	77	83520	8324
3	Kogi	248	89280	14880
4	Kwara	232	92160	18769
5	Niger	296	52560	27175
6	Nassarawa	222	73440	18787
7	Plateau	214	77040	12840
	Total	**1,505**	**540,360**	**112,835**

Source; Respective States Planning and Statistics Ministry of Education 2022

APPENDIX E

Distribution of Sample States by Senior Secondary Schools, No of Secondary Students and No of SSS2 Physics Students Selected for the Study.

S/N	States	Number of Senior Secondary Schools	Number of Senior Secondary Students	Number of SS Two Physics Students
1	Niger	296	52,560	27,175
2	Nassarawa	222	73,440	18,787
3	Kwara	232	92,160	18,769
	Total	**750**	**218,160**	**64,731**

Source: Respective States Planning and Statistics, Ministry of Education 2022

APPENDIX F

Distribution of Teachers of Sample States Selected for the Study

S/N	States	Number of Physics Teachers
1.	Kwara	160
2.	Nasarawa	175
3.	Niger	98
Total		**433**

APPENDIX G

Sample States by Physics Teachers and Gender in North- Central

State	**Teachers**	**Gender**	
		Male	Female
Kwara	160	88	72
Niger	98	57	41
Nasarawa	175	96	79
Total	**433**		

APPENDIX H

Sample of Students and Teachers used for the Main Study

State	Teachers	Students
Kwara	54	95
Niger	36	77
Nasarawa	40	79
Total	**130**	2**51**

APPENDIX I

Implementation of Senior Secondary School Physics Curriculum Instrument Pilot Test

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded[a]	0	.0
	Total	40	100.0

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

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.963	.965	2

Item Statistics

	Mean	Std. Deviation	N
ISSPCPILOT 1	41.6000	4.35478	40
ISSPCPILOT 2	41.0750	3.95090	40

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	41.338	41.075	41.600	.525	1.013	.138	2

Extent of Coverage of Physics Syllabus Instrument Reliability test

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded[a]	0	.0
	Total	40	100.0

a. Listwise deletion based on all variables

in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.906	.923	2

Item Statistics

	Mean	Std. Deviation	N
ECPSPILOT 1	57.0250	8.43828	40
ECPSPILOT 2	57.5750	6.49216	40

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	57.300	57.025	57.575	.550	1.010	.151	2

Organization of the learning activities

[DataSet2]

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded[a]	0	.0
	Total	40	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.761	5

Availability of Materials and usage Instrument Reliability Test

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded[a]	0	.0
	Total	40	100.0

a. Listwise deletion based on all variables

in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.994	.995	2

Item Statistics

	Mean	Std. Deviation	N
AMPILOT1	65.7500	18.23739	40
AMPILOT2	65.5500	17.60820	40

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	65.650	65.550	65.750	.200	1.003	.020	2

Level of compliance

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded[a]	0	.0
	Total	40	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.798	18

Teaching Methods Instrument Reliability Test

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded[a]	0	.0
	Total	40	100.0

a. Listwise deletion based on all variables

in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.979	.980	2

Item Statistics

	Mean	Std. Deviation	N
TMPILOT1	40.0250	7.93398	40
TMPILOT2	39.7500	7.61830	40

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	39.888	39.750	40.025	.275	1.007	.038	2

Evaluation Techniques Instrument Reliability test

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded[a]	0	.0
	Total	40	100.0

a. Listwise deletion based on all variables

in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.911	.925	2

Item Statistics

	Mean	Std. Deviation	N
ETPILOT 1	21.8500	3.60591	40
ETPILOT 2	21.7250	2.82831	40

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	21.788	21.725	21.850	.125	1.006	.008	2

Students Questionnaire Reliability Results

```
GET DATA /TYPE=XLSX
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  /SHEET=name 'Syllabus Coverage'
  /CELLRANGE=full
  /READNAMES=on
  /ASSUMEDSTRWIDTH=32767.
EXECUTE.
DATASET NAME DataSet1 WINDOW=FRONT.
RELIABILITY
  /VARIABLES=Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16
Q17 Q18 Q19
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

```
[DataSet1]
```

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded[a]	0	.0
	Total	40	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.969	19

```
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  /CELLRANGE=full
  /READNAMES=on
  /ASSUMEDSTRWIDTH=32767.
EXECUTE.
DATASET NAME DataSet2 WINDOW=FRONT.
RELIABILITY
  /VARIABLES=Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16
Q17 Q18 Q19 Q20 Q21 Q22 Q23 Q24
    Q25
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

```
[DataSet2]
```

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded[a]	0	.0
	Total	40	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.951	25

APPENDIX J

Sample Size Table

Required Sample Size†

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

The formula used for these calculations was:

$$n = \frac{X^2 * N * P * (1-P)}{(ME^2 * (N-1)) + (X^2 * P * (1-P))}$$

Where:

n = sample size

X^2 = Chi – square for the specified confidence level at 1 degree of freedom

N = Population Size

P = population proportion (.50 in this table)

ME = desired Margin of Error (expressed as a proportion)

This formula is the one used by Krejcie & Morgan in their 1970 article "Determining Sample Size for Research Activities" (*Educational and Psychological Measurement*, #30, pp. 607-610).

APPENDIX K

Local Government Distribution in Kwara Senatorial Districts

State	Senatorial Districts		
Kwara	**North**	**Central**	**South**
	Baruten	Asa	Ekiti
	Edu	Ilorin East	Oke Ero
	Patigi	Ilorin South	Ifelodun
	Kaiama	Ilorin West	Irepodun
	Moro	Offa	Isin
			Oyun

Local Government Distribution in Nasarawa Senatorial Districts

State	**Senatorial Districts**		
Nasarawa	**North**	**West**	**South**
	Akwanga	Nasarawa	Lafia
	Nasarawa*	Keffi	Awe
	Eggon	Kokona	Doma
	Wamba	Karu	Keana
		Toto	Obi

Local Government Distribution in Niger Senatorial Districts

State	**Senatorial Districts**		
Niger	**East**	**North**	**South**
	Bosso	Agwara	Agaie
	Chanchaga	Borgu	Bida
	Gurara	Kotongora	Katcha
	Paikoro	Mariga	Batagi

	Rafi	Rijau	Lapai
	Shiroro	Wushishi	Lavun
	Muya	Mashegu	Edati
	Suleja	Magama	Mokwa
	Tafa		

APPENDIX L

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION
DEPARTMENT OF SCIENCE EDUCATION

Dear Sir/Madam,

Instrument Validation Form

The bearer is a student of the above named University and Department. He/She is conducting a research and you have been selected as one of those with requisite expertise to validate his/her instrument. Kindly grant him/her all necessary assistance to make the exercise a success.

Your competency and expertise was considered as factors that will serve to improve the quality of his/her research instrument. We therefore crave for your assistance in validating the instrument. The completion of the form serves as evidence that the student actually validated the instrument.

Thanks for your anticipated assistance.

Dr (Mrs) R. Ishaq Gambo
Head of Department (Signature, Date & Official Stamp

Head of Dept. Science Education
29 AUG 2018
Fed. University of Tech. Minna

Student's Surname: BUSARI Other Names: TAOFEEQ

Registration Number: PhD/SSTE/2016/909 Programme: PhD

Title of the Instrument: EVALUATION OF THE IMPLEMENTATION OF SENIOR SECONDARY SCHOOL PHYSICS CURRICULUM USING TYLER AND PROVUS MODELS IN NORTH CENTRAL

ATTESTATION SECTION

Summary of the Remark on the Instrument: It is explicit, appropriate, precise and adequate for the Study

I hereby attest that the above named student brought his instrument for validation

Name of Attester: AJI Omoniyi Elias

Designation: Physics Teacher (Class room Teacher)

Name and Address of Institution: Fr. O'Connell Science College

Phone No: 08038386405 E-mail: ajiniyi4success@gmail.com

Signature, Date and Stamp

Please Turn Over

Please comment on the following:

1. Appropriateness of the instrument for the purpose it's designed for: Adequate
2. Clarity and simplicity of the language used: Clear and Simple
3. Suitability for the level of the targeted audience: Appropriate
4. The extent in which the items cover the topic it meant to cover: adequate
5. The structuring of the Questionnaire: Simple and Precise
6. Others (grammatical errors, spelling errors and others): Negligeable.
7. General overview of the instrument: Satisfactory

Suggestions for improving the quality of the instrument

1. .....
2. .....
3. .....
4. .....
5. .....

Name of Validator: AJI Omeiza Elias

Areas of Specialization: Physics

Name of Institution: Fr O'Connell Science College Designation: Physics Teacher

Signature: ..... Date: 6/NOV/2019

Thank You

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION
DEPARTMENT OF SCIENCE EDUCATION

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Thanks for your anticipated assistance.

Dr (Mrs) R. Ibrahim
Head of Department (Signature, Date & Official Stamp

Head of Dept. Science Education
29 AUG 2018
Fed. University of Tech. Minna

Student's Surname: BUSARI Other Names: TAOFEEQ

Registration Number: PhD/SSTE/2016/909 Programme: PhD

Title of the Instrument: EVALUATION OF THE IMPLEMENTATION OF SENI
SECONDARY SCHOOL PHYSICS CURRICULUM USING TYLER AND PROV
MODELS IN NORTH CENTRAL

ATTESTATION SECTION

Summary of the Remark on the Instrument

SATISFACTORY

I hereby attest that the above named student brought his instrument for validation

Name of Attester: MR. OBABORI HEZEKIAH

Designation: EDUCATION OFFICER

Name and Address of Institution: FED. GOVT. COL., MINNA

Phone No: 08063583731 E-mail: Hezeking78@gmail.com

8/NOV/2018
Signature, Date and Stamp

Please Turn Over

Please comment on the following:

1. Appropriateness of the instrument for the purpose it's designed for: Very appropriate
2. Clarity and simplicity of the language used: The language used is unambiguous
3. Suitability for the level of the targeted audience: Very Suitable
4. The extent in which the items cover the topic it meant to cover: The Coverage is good. Topics well covered
5. The structuring of the Questionnaire: It's Okay
6. Others (grammatical errors, spelling errors and others): Minima
7. General overview of the instrument: The instrument is appropriate for what it is designed for

Suggestions for improving the quality of the instrument

1. For availability of materials - check item no 6, 38, 8, 24, 12, 26, 15, 29
2.
3.
4.
5.

Name of Validator: OBADDIAH HEZEKIAH

Areas of Specialization: PHYSICS

Name of Institution: FED. GOVT. COLL. MINNA Designation: EDU. OFFICER

Signature: [signature] Date: 8/NOV/2018

Thank You

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION
DEPARTMENT OF SCIENCE EDUCATION

Dear Sir/Madam,

Instrument Validation Form

The bearer is a student of the above named University and Department. He/She is conducting a research and you have been selected as one of those with requisite expertise to validate his/her instrument. Kindly grant him/her all necessary assistance to make the exercise a success.

Your competency and expertise was considered as factors that will serve to improve the quality of his/her research instrument. We therefore crave for your assistance in validating the instrument. The completion of the form serves as evidence that the student actually validated the instrument.

Thanks for your anticipated assistance.

Head of Dept. Science Education
29 AUG 2018
Fed. University of Tech. Minna

Dr (Mrs) R. Ishaku Gumbe
Head of Department (Signature, Date & Official Stamp

Student's Surname: BUSARI Other Names: TAOFEEQ

Registration Number: PhD/SSTE/2016/909 Programme: PhD

Title of the Instrument: EVALUATION OF THE IMPLEMENTATION OF SENIOR SECONDARY SCHOOL PHYSICS CURRICULUM USING TYLER AND PROVUS MODELS IN NORTH CENTRAL

ATTESTATION SECTION

Summary of the Remark on the Instrument: The Instrument is Standard

I hereby attest that the above named student brought his instrument for validation

Name of Attester: Dr Kamar Hamza

Designation: Lecturer Science Kaduna State University, Dept of Political

Name and Address of Institution: Dept. of Political Science KASU

Phone No: 08028408885 E-mail: Kamarhamza01@gmail.c

9/9/2019
Signature, Date and Stamp

Please Turn Over

Please comment on the following:

1. Appropriateness of the instrument for the purpose it's designed for: It is appropriate for field surveys.
2. Clarity and simplicity of the language used: The language is simple and straightforward.
3. Suitability for the level of the targeted audience: The two target are good for the questionnaire & interview schedule.
4. The extent in which the items cover the topic it meant to cover: The item cover the range of topic to be covered.
5. The structuring of the Questionnaire: It is structured to reflect the hypothesis for ease of interpretation
6. Others (grammatical errors, spelling errors and others): The items were well edited
7. General overview of the instrument: The instrument is of high standard

Suggestions for improving the quality of the instrument

1. NIL
2.
3.
4.
5.

Name of Validator: Dr Kamar Hamza

Areas of Specialization: Research method and Discourse analysis

Name of Institution: Kaduna State Univ Designation: Lecturer

Signature: Hamza Date: 9/9/2019

Thank You

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION
DEPARTMENT OF SCIENCE EDUCATION

Dear Sir/Madam,

Instrument Validation Form

The bearer is a student of the above named University and Department. He/She is conducting a research and you have been selected as one of those with requisite expertise to validate his/her instrument. Kindly grant him/her all necessary assistance to make the exercise a success.

Your competency and expertise was considered as factors that will serve to improve the quality of his/her research instrument. We therefore crave for your assistance in validating the instrument. The completion of the form serves as evidence that the student actually validated the instrument.

Thanks for your anticipated assistance.

Dr (Mrs) R. Ld. Gumbo
Head of Department (Signature, Date & Official Stamp

Head of Dept. Science Education
29 AUG 2018
Fed. University of Tech. Minna

Student's Surname: BUSARI Other Names: TAOFEEQ

Registration Number: PhD/SSTE/2016/909 Programme: PhD

Title of the Instrument: EVALUATION OF THE IMPLEMENTATION OF SENIOR SECONDARY SCHOOL PHYSICS CURRICULUM USING CYLER AND PROVUS MODEL IN NORTH CENTRAL

ATTESTATION SECTION

Summary of the Remark on the Instrument: The instrument for the study is relevant and adequate.

I hereby attest that the above named student brought his instrument for validation

Name of Attester: Dr Bashir Ahmadu Usman

Designation: LII

Name and Address of Institution: F.U.T. Minna

Phone No: 08065542625 E-mail: bashmazyan@yahoo.com

Signature, Date and Stamp

Please Turn Over

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION
DEPARTMENT OF SCIENCE EDUCATION

Dear Sir/Madam,

Instrument Validation Form

The bearer is a student of the above named University and Department. He/She is conducting a research and you have been selected as one of those with requisite expertise to validate his/her instrument. Kindly grant him/her all necessary assistance to make the exercise a success.

Your competency and expertise was considered as factors that will serve to improve the quality of his/her research instrument. We therefore crave for your assistance in validating the instrument. The completion of the form serves as evidence that the student actually validated the instrument.

Thanks for your anticipated assistance.

Dept. Science Education
29 AUG 2018
Fed. University of Tech. Minna

Dr (Mrs) R. Ibi Gumbe
Head of Department (Signature, Date & Official Stamp

Student's Surname: BUSARI Other Names: TAOFEEQ

Registration Number: PhD/SSTE/2016/909 Programme: PhD

Title of the Instrument: EVALUATION OF THE IMPLEMENTATION OF SENIOR SECONDARY SCHOOL PHYSICS CURRICULUM USING BLOOM AND BRUNER MODES IN NORTH CENTRAL

ATTESTATION SECTION

Summary of the Remark on the Instrument: The instrument for the study is relevant and adequate.

I hereby attest that the above named student brought his instrument for validation

Name of Attester: Dr Bashir Ahmad Usman

Designation: LII

Name and Address of Institution: F.U.T. Minna

Phone No: 08065542625 E-mail: bashmazyan@yahoo.com

Signature, Date and Stamp

Please Turn Over

Please comment on the following:

1. Appropriateness of the instrument for the purpose it's designed for: The instrument is appropriate
2. Clarity and simplicity of the language used: Very clear and simple language
3. Suitability for the level of the targeted audience: Satisfactory
4. The extent in which the items cover the topic it meant to cover: Okay
5. The structuring of the Questionnaire: Satisfactory
6. Others (grammatical errors, spelling errors and others): Satisfactory
7. General overview of the instrument: Generally the instrument is relevant and okay for the study

Suggestions for improving the quality of the instrument

1. The observed correction need to be effected
2.
3.
4.
5.

Name of Validator: Dr Bashir Ahmed Usman

Areas of Specialization: Science Education

Name of Institution: F.U.T Minna Designation: Lect

Signature: Date: 15th Oct. 2018

Thank You

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION
DEPARTMENT OF SCIENCE EDUCATION

Dear Sir/Madam,

Instrument Validation Form

The bearer is a student of the above named University and Department. He/She is conducting a research and you have been selected as one of those with requisite expertise to validate his/her instrument. Kindly grant him/her all necessary assistance to make the exercise a success.

Your competency and expertise was considered as factors that will serve to improve the quality of his/her research instrument. We therefore crave for your assistance in validating the instrument. The completion of the form serves as evidence that the student actually validated the instrument.

Thanks for your anticipated assistance.

Dr (Mrs) R. Ishaq Gumbo — 29 AUG 2018
Head of Department: (Signature, Date & Official Stamp

Student's Surname: BUSARI Other Names: TAOFEER

Registration Number: PhD/SSTE/2014/909 Programme: PhD

Title of the Instrument: EVALUATION OF THE IMPLEMENTATION OF SENIOR SECONDARY SCHOOL PHYSICS CURRICULUM USING TYLER AND PROVUS MODEL IN NIGER CENTRAL

ATTESTATION SECTION

Summary of the Remark on the Instrument: The instrument is well designed and constructed based on the main constructs or variables of the study.

I hereby attest that the above named student brought his instrument for validation

Name of Attester: DR. I. I. Kafa

Designation: SL

Name and Address of Institution: FUT, Minna

Phone No: 08035837865 E-mail: —

18/10/18
Signature, Date and Stamp

Please Turn Over

Please comment on the following:

1. Appropriateness of the instrument for the purpose it's designed for:
   The instruments are within the Conceptual framework of the variables under study
2. Clarity and simplicity of the language used
   Clear, Simple and unambiguously raised items
3. Suitability for the level of the targeted audience
   Suitable for the intending subjects to be used
4. The extent in which the items cover the topic it meant to cover
   Adequate coverage of the variables
5. The structuring of the Questionnaire
   Satisfactory
6. Others (grammatical errors, spelling errors and others)
   Very minimal
7. General overview of the instrument
   The instrument is valid

Suggestions for improving the quality of the instrument

1. Effect all the areas of correction as pointed out
2. accordingly
3.
4.
5.

Name of Validator: Dr. I. I. Kuta

Areas of Specialization: Educational Technology

Name of Institution: FUT, Minna Designation SL

Signature: [signature] Date 18/10/18

Thank You

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION
DEPARTMENT OF SCIENCE EDUCATION

Dear Sir/Madam,

Instrument Validation Form

The bearer is a student of the above named University and Department. He/She is conducting a research and you have been selected as one of those with requisite expertise to validate his/her instrument. Kindly grant him/her all necessary assistance to make the exercise a success.

Your competency and expertise was considered as factors that will serve to improve the quality of his/her research instrument. We therefore crave for your assistance in validating the instrument. The completion of the form serves as evidence that the student actually validated the instrument.

Thanks for your anticipated assistance.

Head of Dept. Science Education
29 AUG 2018
Fed. University of Tech. Minna

Dr (Mrs) R. Kd. Gambo
Head of Department (Signature, Date & Official Stamp

Student's Surname: BUSARI Other Names: TAOFEEQ

Registration Number: PhD/SSTE/2016/909 Programme: PhD

Title of the Instrument: EVALUATION OF THE IMPLEMENTATION OF SENIOR SECONDARY SCHOOL PHYSICS CURRICULUM USING TYLER AND PROVUS MODELS IN NORTH CENTRAL

ATTESTATION SECTION

Summary of the Remark on the Instrument: Recommended to be used on the Students for which it was designed.

I hereby attest that the above named student brought his instrument for validation

Name of Attester: Dr. Mohammed U. S Kpaka

Designation: Lecturer I

Name and Address of Institution: FUT, Minna

Phone No: 08035965281 E-mail: M.Ucpaka@futminna.edu.ng

24/10/18
Signature, Date & Official Stamp

Please Turn Over

Please comment on the following:

1. Appropriateness of the instrument for the purpose it's designed for: Very appropriate
2. Clarity and simplicity of the language used: Simple and Straight forward Language was used
3. Suitability for the level of the targeted audience: Very Suitable
4. The extent in which the items cover the topic it meant to cover: All the topical areas of the topic were covered
5. The structuring of the Questionnaire: Well Structured
6. Others (grammatical errors, spelling errors and others): Minor.
7. General overview of the instrument: Recommended to be used for the purpose it was designed

Suggestions for improving the quality of the instrument

1. All the Corrections and Suggestions Made
2. Should be effected.
3.
4.
5.

Name of Validator: Dr. Mohammed U. S. Kpanka

Areas of Specialization: Science Education (Biology)

Name of Institution: FUT, Minna Designation: Lecturer I

Signature: Date: 24/10/18

Thank You

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION
DEPARTMENT OF SCIENCE EDUCATION

Dear Sir/Madam,

Instrument Validation Form

The bearer is a student of the above named University and Department. He/She is conducting a research and you have been selected as one of those with requisite expertise to validate his/her instrument. Kindly grant him/her all necessary assistance to make the exercise a success.

Your competency and expertise was considered as factors that will serve to improve the quality of his/her research instrument. We therefore crave for your assistance in validating the instrument. The completion of the form serves as evidence that the student actually validated the instrument.

Thanks for your anticipated assistance.

Head of Dept. Science Education
29 AUG 2018
Fed. University of Tech. Minna

Dr (Mrs) R. M. Gumbo
Head of Department (Signature, Date & Official Stamp

Student's Surname: BUSARI Other Names: TAOFEEQ

Registration Number: PhD/SSTE/2016/909 Programme: PhD

Title of the Instrument: EVALUATION OF THE IMPLEMENTATION OF SENIOR SECONDARY SCHOOL PHYSICS CURRICULUM USING TYLER AND PROVUS MODELS

ATTESTATION SECTION

Summary of the Remark on the Instrument: The Questionnaire as comprise found valid if only it is separated independently and observation implemented

I hereby attest that the above named student brought his instrument for validation

Name of Attester: I. Isaac Idris S.R.

Designation: L.1

Name and Address of Institution: F.U.T. Minna

Phone No: 08 E-mail: hourmax2008@gmail.com

12/10/18
Signature, Date and Stamp

Please Turn Over

Please comment on the following:

1. Appropriateness of the instrument for the purpose it's designed for: It is appropriate to some extent
2. Clarity and simplicity of the language used. It is OK
3. Suitability for the level of the targeted audience. OK
4. The extent in which the items cover the topic it meant to cover. Very high
5. The structuring of the Questionnaire. It needs restructure due to simplicity
6. Others (grammatical errors, spelling errors and others). Certainly
7. General overview of the instrument. Valid only if segmented

Suggestions for improving the quality of the instrument

1. Title to be restructured
2. Questionnaire be segmented
3. Scale should be restructured
4. as advised
5. Generally, the instrument need partitioning

Name of Validator: [illegible]

Areas of Specialization: Science Education

Name of Institution: F. U. T. Minna Designation: L I

Signature: [illegible] Date: 12/11/2018

Thank You

APPENDIX M

PHYSICS LEARNING MATERIALS LABORATORY

APPENDIX N

SS 2 STUDENT IN THE CROWDED LABORATORY