# EFFECT OF A MODELED HUMAN TOOTH ON THE ACADEMIC ACHIEVEMENT AMONG UPPER BASIC SECONDARY SCHOOL IN BOSSO METROPOLIS OF NIGER STATE

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***Abstract***

*The study examined the effect of a modeled human tooth on the academic achievement in Basis science among upper Basic secondary school students in Bosso Metropolis of Niger state. A quasi-experimental pre-test, post-test control group design was adopted for the study. Two research questions were raised and two hypotheses tested at 0.05 level of significance. The population of the study comprised 2,078 JSSII students from 13 secondary schools in Bosso Metropolis of Niger state. The sample comprised 179 JSSII students selected from two out of the 13 secondary schools using intact class. Simple random sampling technique was used to select the two schools from which the two intact classes were selected. The instrument used for data collection was Achievement Test on Human tooth (ATOHUT), and the data was analyzed using mean for the research questions, and t-test for the hypotheses. The results indicated that students who were taught with a modeled human tooth had better academic achievement in Basic science, and that gender has no significance effect on the academic achievement of students who were taught Basic science with modeled human tooth, based on the findings, it was recommended among other things that Basic science teachers should be enlightened on the use of appropriate instructional material as this will aid teaching and learning in schools more effective.*

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# CHAPTER ONE

## 1.0 INRODUCTION

### 1.1 Background to the Study

Basic Science, formerly known as Integrated Science, is a subject taught in Lower, middle and upper Basic Education levels i.e. primary and junior secondary schools. It has occupied a very important position in the school curriculum and is made a core subject. In fact, there is so much emphasis on science, and science related subjects at all levels of education emphasizing the need for scientific thinking and application among the students, in which Basic Science is the foundation. Science education plays a vital role in the lives of individuals and the development of a nation scientifically and technologically (Alebiosu, 2016). It is widely and generally acknowledged that the gateway to survival of a nation is through science education. It has been a prerequisite subject for offering most science-oriented courses in the senior secondary schools and tertiary institutions and this calls for the need in teaching it effectively. In order to make our citizens show interest in science education, Nigerian government came up with a policy that 60% of the students seeking admission into the nations universities, polytechnics and colleges of education should be admitted for science-oriented courses, while 40% of the students should be considered for arts and social science courses (Ajibola, 2008).

Basic Science is a core subjects taught at the junior secondary school level of Universal Basic Education (UBE) Scheme. According to NPE (2013), the basic education which shall be 9 years duration comprising of six years of primary and three years of junior secondary education shall be free and compulsory. Based on the NPE (2013), the teaching of Basic science from the primary

school (lower basic) to the junior secondary school (upper basic) levels is intended to achieve the following objectives:

i. Inculcate in the learners the spirit of inquiry and creativity through exploration of nature and local environment by observation ii. Laying sound basic foundation for scientific innovation and reflective thinking iii. To develop in the child the ability to adapt to the child changing environment through Basic Science process skills; including observation, manipulating, classifying, communicating, inferring, hypotheses, interpreting data and formulating models iv. Functional knowledge of science concept and principles to Explain simple and natural phenomena and to provide the child with basic tools for further educational advancement including preparation for trades and craft of the locality.

v. Develop self-confidence and self –reliance through problems solving activities in science.

From the above objectives, Basic Science course is to be taught beginning with the understanding of the meaning of science and how the scientists work, since it is an activity- oriented programme.

Basic Science has been offered to enhance laboratory activity, provide concrete experience, stimulate interactions in school and increase scientific literacy. It also understands the process and product of science, maintaining the changes and showing relationship of science to society. It serves as a base for further scientific study in higher levels of education and consequently transformation of Nigerian society through science and technology. Despite the important position of Basic Science in the educational system and the efforts made by researchers to enhance students achievement in Basic Science and sciences in general the performance is still low Adesoji (2010),"Science instruction, especially in Nigeria, has had a limited success in terms of students achievement" ( Mohammed 2008).Also, the Federal Government of Nigeria has made several efforts at producing, improving and consolidating Basic Science Education in Nigeria (FRN 2013).

One of such major effort is the development of Basic Science core curriculum (Osuji 2009). This development is very necessary since earlier training in science will, to a large extent determine student's achievement in science at subsequent level of education. Achimugu (2012) pos=ited that, student comprehend and remember better when teaching materials are employed in teaching – learning process. The use of instructional materials if carefully and properly planned enhances teaching and learning of Basic Science. The effect of this is that they make the learning of science enjoyable, interesting, exciting and to see that a firm scientific base is developed in the students.

Instructional materials refer to those equipment, tools and materials that the teacher use for illustration, to explain a lesson in order to make the lesson clear to the students. Instructional materials according to Abdullahi (2009) are those materials, which a teacher uses or manipulates in the process of his teaching in order to enhance teaching-learning process. Yusuf (2009) described instructional materials as teaching materials used by the teacher to pass information to students in real life situation. teaching of Basic Science demands the use of instructional materials or media and this helps to bring effective instructions, which arouses and sustains the interest of the learners (Leghara and Okafor, 2006). This is because when the learners come face to face with teacher through the proper use of instructional materials, lesson is more likely to be effective. Instructional materials are meant to improve and supplement, not to replace the teacher. No matter how good instructional materials are, they should not substitute the teacher. the use of instructional materials in science teaching will enable the learner to acquire problem solving skills and positive attitude, acquire scientific appreciation and interest and to develop functional knowledge and manipulative skills. In a situation where, standard instructional materials are inadequate, the teacher could improvise. Researchers such as Ayodele (2010) Okonkwo (2012) Mkpanang (2015) and Obioha (2013) reported that there were inadequate resources for the teaching of Basic Science

in secondary school in Nigeria. They further stated that where there were little resource or not at all, they are not usually in good conditions while the few that are in good conditions were not enough to go round those that needed them.

Hence there is need for creativity. Also, Omosewo (2008) and Akinsola (2000), considered the human factors as the teacher's professional commitment, creativity, mechanical skills, initiative and resourcefulness. They found that many of Nigerian science teachers were aware of possibility of modeling but many exhibited poor attitudes towards it. They also noted that very few teachers practice modeling while majority depends on imported equipment's and claim that modeling of instructional materials is time-consuming and fund depleting. Adebimpe (1997) and Aguisiobo (1998) noted that modeling demands adventure, creativity, curiosity and perseverance on the part of the teacher. The author added that such skills are only realizable through well-planned training programme on modeling. Akinyemi (2013) noted that modeling whether they cost less than standard manufactured ones or not they cost money. He added this money is usually not readily available for the teacher.

Educational materials in teaching according to Babatunde (2016) helps to increase learners motivation, recall earlier learning, activate learners response, give speedy feedback and encourage appropriate practice. Educational resource materials store lessons that can be marched to the learners characteristics, contents, objectives, instructional approach and evaluation techniques as well as principles of learning. Instructional materials are essential aid to effective instruction but are not commonly found in contemporary schools in Nigeria due to;

i. High cost of production;
ii. Faulty development of curriculum- rushed coverage of syllabus; and iii. Teachers reluctant to spend their time, effort and money on improvisation.

In view of the above, this study is embarked upon in order to stimulate teachers to search for creative ways to beat technological imitations in order to challenge students mind. This can be done by encouraging and supplying teachers the necessary materials needed to improvise.

## 1.2 Statement of the Research problem

Education sector in Nigeria has series of challenges. One important area of the challenges is lack of availability and utilization of instructional materials in the post–primary school level to cope up with the modern technological challenges. According to the World Bank Report (2003), the quality of education in most developing countries is low, coverage is insufficient, and literacy level is low especially in the area of teacher quality, materials production and utilization. Improving quality in education requires adequate resources, competent teachers, appropriate facilities, materials and methods which are lacking, these form part of the problems in the study. Thus, the major challenge for the educational system in contemporary Nigeria is the lack of qualified teachers to teach at various levels of education (Hamza, 2010), this also has adverse effects on the teachers modeling of instructional materials for teaching at all levels, which also affect the quality delivery of educational institutions, teachers 'training and production. The scarcity of instructional materials in junior secondary schools is a problem to students learning, they do not learn at the same space (UNESCO, 2004). The poor quality or lack of instructional materials for different levels of learning increases the teacher's difficulties in teaching (UNESCO, 2004).

Ineffective methods of teaching coupled with absence of instructional materials were some of the factors responsible for students 'inability to keep to the desired behavioral changes in the teaching and learning process (Jibril, 2006). Traditionally, in the schools system today, instructional materials might not be available or the skills of using them is missing among the teachers, in such cases, looking for an alternative might be the best way to get them to solve the additional problems

in the schools. The poor quality and uneven development and utilization of instructional materials for different levels of learning increase the teachers difficulties in teaching (Baikie, 2002). Despite the effort made so far to achieve these objectives by the government, there is the issue of ―Falling standards‖ of education which manifested in students poor performance in public examinations. The importance of instructional materials to teaching and learning of Basic Science in Upper Basic education cannot be over-emphasized. So many efforts have been made to improve the poor academic achievement in Basic Science, yet there is persistent failure in the subject which could be due to lack of use of instructional materials. The declining rate of the achievement of upper Basic Science students is a problem of serious concern to science educators, educationist and examination bodies Usman (2002) and Dyel (2011). Student's achievement in Basic Science in junior school certificate examination over the years showed that as the enrolment increases, the level of passes is not encouraging, therefore something needs to be done to improve their academic achievement. Thus, without solving the problems of inadequate use of instructional materials the persistent of poor achievement in Basic science will continue.

Hence, this study is out to determine the effects of a modeled human tooth on academic achievement among upper basic secondary school students in Bosso Metropolis of Niger State.

### 1.3 Aims & Objectives of the study

The aim of this study is to determine the effect of a modeled human tooth on academic achievement among upper basic secondary school students in Bosso Metropolis of Niger State. Specifically, this study will achieve the following objectives: a

1. Determine the effects of a modelled human tooth on the academic achievement among upper Basic secondary school students in Bosso metropolis of Niger state.

2. To find out whether there is any difference in the Academic achievement of boys and girls taught Basic Science with a modeled Human tooth in Bosso metropolis of Niger State.

## 1.4 Research Questions

The following research questions were formulated in order to obtain answer to the problems under investigation:

1. What is the effect of a modeled Human tooth on upper Basic Secondary school student's academic achievement in Bosso metropolis of Niger State?
2. Will there be any difference in the academic achievement of Boys and Girls taught with a modeled Human tooth in Bosso metropolis of Niger State?

## 1.5 Hypotheses

The following null hypotheses were formulated and tested 0.05 significant levels:

$Ho_1$ There is no significant difference in the academic achievement of upper Basic secondary school students taught with a modeled human tooth and those taught without.in Bosso metropolis of Niger State.

$Ho_2$ There is no significant difference in the academic achievement of boys and girls of upper Basic secondary school students taught with a modeled improvised human tooth in Bosso metropolis of Niger State.

## 1.6 Significance of the Study

The findings of the study we benefit the followings;

i. **Basic Science Teachers**: It will help them to understand and develop the positive attitude of using instructional materials in the process of teaching and learning Basic science in secondary school in Niger State.

ii. **To Students**: It will improve students performance, because learning is made more practical (realia) which may foster greater understanding among students. When that is achievement, students enrollment motivation to learning and truancy is reduced to minimal.

iii. **Policy Makers**: The study will provide empirical data that supports continuous investment in the pursuit of quality instructional materials that will make teaching and learning more beneficial.

## 1.7 Scope of the Study

The study is to determine the effects of improvised human tooth model on the pupils achievement in Basic science in Bosso metropolis of Niger state. The topic to be taught is Parts of Human drawn from Nigeria Basic Science Book II under JSS syllabus. The topic forms a good representation of major areas of Basic science, i.e. Biology and Chemistry. This topic contains activities that involve the use of instructional materials to enhance teaching and learning.

An in-depth research of all the junior secondary schools in the metropolis cannot be conducted due to financial constraints, instead a few secondary schools students were selected which are Bosso Secondary school and Ahmadu Bahago secondary school for the study where Basic science students responded to the test instrument after a classroom teaching-experiment.

## 1.8 OPERATIONAL DEFINITION OF TERMS

1. **Model:** this refers to any improvised instructional material used in the process of teaching and learning.
2. **Human Tooth:** this refers to modelled tooth that is used in the classroom by the science teacher in order to make learning more comprehensive and enjoyable.
3. **Achievement:** this refers to the level of attainment of success recorded by students after undergoing a period of learning with improvised instructional materials.
4. **Upper Basic Students:** these are students in the Junior Secondary School Level between JSI – JS III.

# CHAPTER TWO

## 2.0 REVIEW OF RELATED LITERATURE Literature

are reviewed under the following headings:

### 2.1 Conceptual Framework

2.1.1 Curriculum Reforms and Teaching of lower and upper Basic Science.

2.1.2 Improvisation in Basic science, it concepts and problems

2.1.3 Factors to Be Considered in Planning modeling.

2.1.4 Academic Achievement in basic science

2.1.5 Factors Influencing Student Achievement

### 2.2 Theoretical Framework

2.2.1 Gagne Conditions of Learning

2.2.2 Merrill Component Display Theory

2.2.3 Instructional Transaction Theory

## 2.3 Review of Related Empirical Studies

## 2.1 CONCEPTUAL FRAMEWORK

### 2.1.1 Curriculum Reforms and Teaching of Upper Basic Science.

In Nigeria, the zeal to promote Basic Science started as far back as late 1960s. The science curriculum was geared toward the fulfillment of overseas examinations requirement namely, the Cambridge school certificate examination or London general certificate in Education. In recent times, a clear pattern for science project development at the primary and junior secondary schools' levels has been the integration of subjects from the field of science and technology. At the secondary, the emphasis has been on inquiry and problem-solving activities.

The appreciation of the science as a major drive to technological and industrial development was triggered off in October 1957 when the then Soviet Union launched the sputnik; the first orbiting satellite ever Ogunleye (2008). This led to the awareness of the need to re-examine the school science circular, objectives, content and evaluation.

Subsequently, several new sciences curricular were developed in many countries such as (U.S.A) and Britain to reconsider their Science curriculum (Ogunleye, 2008 and Yoloye,2002). This development yielded several curriculum reform projects such as the Science A Process Approach (SAPA) of the American Association of Science; the Physical Science Study Committee (PSSC); Elementary Science Study (ESS); Chemical Education Materials study (CHEM study), Biological Science Curriculum study (BSCS) all evolved in the U.S.A while in the Britain the Nuffields and school's science projects evolved (Bichi, 1998; Yoloye, 1998).

The focus of the curriculum reforms was to bring about a positive change in pedagogies (Bichi, 1998 & Yoloye 1998) that could express science as a process rather than a mere body of knowledge (Ogunleye, 2008). The reform projects were not limited to the U.S.A and Britain but were also extended to African countries that were then colonies of western Nations. One of such reforms was the African Primary Science Project (APSP) by the African Development Council (ADC) later to be known as Science Education Programme for Africa (SEPA). This project was aimed at enhancing the scientific of understanding citizens through the presentation of science as a process that is capable of arousing and maintaining interest in science in particular through the use of appropriate instructional procedures and materials Consequently, a new core curriculum known as the Nigeria Primary School Science and Mathematics Project (NPSSMP) was developed. Recently, in 2007 another new curriculum came up called Basic Science curriculum. This is a restructuring and re-alignment of the revised core curriculum for Primary Science and Integrated Science of JSS level (Danmole, 2011). This curriculum places more emphasis on practical, exploratory and experimental method of teaching science. This is in line with the statement of Iwuazor (2006) and FME (2013) which states that curriculum contents meant to be activity or process oriented. It is therefore, observed that the use of instructional materials is in line with the manner in which the curriculum is designed (FME, 2013). In another contribution, Oladele and Lasisi (2006) have shown that a critical examination of the Nigerian Basic Science Core Curriculum reveals that science is an activity-oriented subject. It is in view of this that Danmole (2011) observed that there is need to explore and exploit all the available resources for improving science instruction. This shows that materials should be involved in teaching and learning process.

The teaching of Basic Science especially upper basic levels involves three issues which are the learner, the learning environment and the subject matter to be handled by a teacher using a strategy

in the art of teaching. Teaching and learning are not the same, for a lesson is not taught until it has been learned. Teaching can be thought of as a process that facilitates learning. A teacher helps to make the society what it is. The influence of the teacher is a long lasting one. Good teaching can make a society better while bad teaching can harm it seriously. Therefore, a teacher must at-least have a good process and should be acquainted with the major variables that influence the success of the teaching learning process.

Although there is considerable variation between countries in terms of curriculum emphasis on content, local and national aims, traditions and priorities, yet in all these countries teachers are the key to realizing curriculum aims and the quality of the science education which the students receive rest ultimately on them; Asoko (2004). Teaching involves helping the student to learn. In teaching, the teacher does not only teach the subject but is dealing with a mind and a personality. Therefore, the teacher should aim at developing qualities of personality and character that will provide a lasting inspiring example to his student. According to Asoko (2004), Teachers' lack of subject knowledge in science has been documented and frequently identified as barriers to the implementation of curriculum reform and to pupils' progress. Osborne (2003), has some pragmatic solution to the problem of lack of expertise within the existing teaching force. However, sustained improvements in Basic Science will depend on improved teacher capability. This could be viewed from both the initial and in – service education of teachers. So, there is the need for the teacher to be knowledgeable and know how best knowledge could be developed and transformed.

The Basic Science curriculum is a general outcome of the topic to be covered by the teacher in the course of the school years. It enables science to be taught sequentially from year 1 – 6 and for each year a main topic is accompanied by performance objectives, content, activities, materials and evaluation (Aina, 2007). It is further observed that the curriculum concepts are arranged in order

of difficulty from the lower class to upper class. If the curriculum is strictly followed, Aina (2007), maintained that pupils could develop interest in science education by observing and exploring the environment; develop acquisition of science process skills and develop a positive scientific attitude and objectivity among others. It is based on the content of the Basic Science Curriculum; if effective teaching and learning is to take place, the components of total planning for instruction has to be considered.

In teaching Basic Science Curriculum certain skills are needed, such as teaching skills, questioning skills, listening and attending skills. All is expected to be achieved at the end of the period. The goals and skills are derived from aims. One aim as stated in the National Policy on Education is. The acquisition of appropriate skills and the development of mental, physical and social abilities are for the development of the society. The National Policy on Education stated specifically the goals of secondary education in Nigeria is to provide trained manpower in the applied science, technology and commerce at sub professional grades (FRN 2013). The philosophy guiding the teaching of Basic Science could be said to have its origin in Rausean's and pragmatic philosophy of nature and experience of Dewey. Others like the empiricists and inductivities also influenced the integrated approach to the teaching of science. Making decisions on the type of method to use for the teaching of Basic Science is dependent on the following :The world of Scientific Knowledge that could be derived from nature environment ,the scientific skills that could be used in deriving such knowledge ,the intellectual capacity of the child in using the skills to generate or falsify scientific knowledge and the systematic study of the universe demands active participation of the learner if he is to acquire the necessary skills that will make him function in scientific and technologically – oriented world. It is for this reason that all Basic Science programs recommended the use of inquiry/discovery/activity method. Based on this, that for the junior secondary which is

now upper Basic Science curriculum, the child – centered approach instruction is emphasized. Specifically, the three strategies that are recommended: The inclusion of problem – solving activities; the use of discovery teaching modes and the involvement of students in open – ended activities, field trips/excursions. From the above, it is clear that the philosophy guiding the teaching of Basic Science is child – centered Activity.

All these objectives and goals are achieved by the teacher through giving the right types of instructions to the science students, no matter how well – developed and comprehensive a curriculum is, its success is dependent on the quality of the teachers implementing it. Moreover, the realization of these goals can be hindered by non – availability of science equipment that can ensure effective teaching and learning. Franzer and Jegede (Oladeji et.,al 2011) stress that; a professionally qualified science teacher no matter how well trained would be unable to put his ideas into practice if the school setting lacks the equipment and materials necessary for him/her to translate his competence into reality. This implied that materials should be involved in the teaching and learning. Therefore, in a situation where the materials are unavailable or inadequate improvisation should be an alternative way; the regular failure in Basic Science as a result of inadequate instructional materials to improve this by the used of improvised and standard materials.

Ezeliora (2005) showed that locally improvised materials showed superior effect on students' performance and interests. The more familiar the students are with the instructional environment of a science class, the more interest and better understanding they are likely to develop and hence more performance in the concept of the Basic Science programme. Inquiry/discovery and activity method of teaching science at the upper Basic schools is recommended from the above,

Eyetsinitan, (2002) stated that the teaching and learning of science at upper Basic school is process approach

### 2.1.2 Concept of Modeling

In its simplest sense, modeling is the ability to create spontaneously, from moment to moment. This is the base for all definitions of modeling. The ability to create is certainly esteemed, as it is related to resourcefulness. The attitudes towards modeling are knowledge, culture and environment dependent, and differ from person to person, in place and time. It is an underlying fact that modeling as an integral part of a teacher work.

Modeling is defined by the Free Online Dictionary means "to invent, compose, or create with little or no preparation", and also as "to create or make quickly from materials and sources available, without previous planning". modeling has also been defined by some academicians as intuition guiding action in a spontaneous way (Crossan & Sorrenti, 1997), and also been defined as "making the most of what you have and getting the most out of what you make" (Keefe, 2002). From the above definition we can deduce that modeling is the ability to take existing pieces and put them together in a new combination for a purpose. Teachers or students apply tools or methods to these pieces in a very flexible manner. In relation to education this means teachers try to supplement, substitute or device means in inadequate material and equipment to facilitate effective teaching and learning among the pupils. modeling can be explained as composing a careful selection and use of material as an alternative means of complementing the existing or otherwise instructional materials /equipment in schools.

Education in general can only be successful with reasonable availability and proper selection of equipment, facilities and supplies. However, the fact remains that it is virtually impossible to

purchase or make all the equipment, facilities and supplies required for sound and quality education available, especially in this part of the world. This makes it imperative for teachers to think of how best to make use of their manipulative skills to improvise so as to achieve their lesson objective at least to a reasonable extent. When models are used in teaching, students provide different responses throughout the class session, and the instructor does not evaluate any given response but instead facilitates the modeling process among the students, with the goal of guiding them toward discovery of their own knowledge (Sawyer, 2003).

Instructional materials ensure that the learners see, hear, feel, recognize and appreciate as they learn, utilizing the five senses modalities at the same time. When the real material and equipment are not available, modeling becomes the next option as it will take their place. This is to enhance the teaching- learning process as well as makeup for the expensive nature of scientific equipment, the difficulty experienced in procuring them as well as the excruciating and persistent problem of in adequate of funds. It is a fact that non-provision of real material and equipment have all combined to worsen the teaching of science and technology education in schools. But with well packaged and relevant modeling, the arbitrary and complete abstract of the subject matter in the face of the learner is significantly reduced to lend credence to the importance and essence of modeling where and when the real instructional materials are not on hand.

Generally, modeling in science teaching particularly Basic Science is an attempt to adapt and make use of local resources in the teaching/ learning process when the readymade materials are not available or are in short fall or not within the reach of the users. The modelled instructional materials could be produced by the teacher and the students. According to Fajola (2008), modeling in the context of basic Science can be defined as a process of using alternative resources for enhancing basic Science teaching in the absence or shortage of the real ones. The production of

the alternative resources is initiated by the teacher and done either by him or the local craftsmen (e.g. the Carpenter, blacksmiths, wielder, etc).

Modeling in the view of Aremu (2012) is a technique of originating a totally new tool, instrument, materials, device or modifying existing ones for serving a particular purpose. Ahmed (2010) sees modeling as the process of making equipment and materials by the teacher or by engaging the services of others in the absence of the real or manufactured ones. Adeyemi (2010), described modeling as the act of using alternative materials and resources to facilitate instruction whenever there is a lack of or shortage of some specific first-hand teaching aid.

Fabola (2013) looked at modeling from the level of creativity involved. These levels involve substitution and construction. Substitution in modeling simply implies the techniques whereby a local material is used in place of a piece of equipment that is not available whereas construction involves making of a new instrument in place of the unavailable original one where substitution is not possible. It is expected that both substitution and construction of a modelled instructional materials will meet the demand for the real or original material with as high precision as time, money and other facilities and factors will permit.

According to Ehikioya (2010), the major reason for modeling stems from the fact that educational funding is insufficient and in the recent years seriously dwindling. Educational authorities find it increasingly difficult to provide the schools with all they need for teaching and learning. Ahmed (2010), claimed that instructional resources ensure that the learners see, hear, feel, recognize and appreciate as they learn, utilizing almost all the five senses at the same time. Olagunjo (2000), however, asserted that modeling provides a cognitive ‘bridge’ between students abstract and real experience of teaching and learning. According to Olagunjo (2008), when a teacher improvises, it

enables him to re-think and research for cheaper, better, and faster methods of making the learning process easy and safe for both the students and the teachers.

### *2.1.3 Factors to be considered in planning modeling*

There are certain factors to be considered when planning modeling. They are:

Who will be making the materials teacher, students, or both?

The time, effort and skills required both by the teacher and by the students.

The knowledge of the basics; the material could require the use of a range of scientific principles, applications and techniques and the teacher should fairly well be acquainted with them.

The steps involved.

The objectives and goals: the teacher need to identify and focus on the ultimate objectives, which learning behavior he/she wants to inculcate in the students and if a model can achieve it.

Motivating and involvement level of the class especially if kids are to be involved in making it. The teacher needs to motivate the class, raise their curiosity and admire their creativity. There should be proper interacted and constant feedback.

The teacher innovativeness, creativity and resourcefulness: to be considered also, are the teacher's management and co-ordination skills.

Collection of materials and tools required sometimes, one might need to buy some tools and materials too, hence some monetary funding.

The durability of the materials used.

Working and storage space to make and store the materials. Also, to be considered are when the materials (standardized materials) are easily and cheaply available, you may be better off buying them than improvising.

It is worthy to note that these definitions above presuppose that a modelled instructional material must necessarily serve the purpose for which it is intended. It is not just providing a piece of material or resource as substitute of what is not available. According to Landu, (2011) some guiding principles for modeling includes: Should be simple, readily replicable and durable Cost of production should be relatively low.

Should foster development of desirable skills and interest in the learner Should seek to illustrate and provide answer to specific scientific problems or principles.

Should not differ significantly in quality and reliability from conventional types: the modelled materials are determined by what is to be taught and the importance attached to the learning of the lesson. In addition, the learners' previous knowledge must have been considered. For example, a mathematics teacher cannot effectively teach the principles of logarithms if the students have no knowledge of indices Mbajiorgu (2013).

Therefore, mastery of basic science concepts cannot be fully achieved without the use of learning materials. Researchers such as Okebukola, (2010); and Obioha, (2016) reported that there were inadequate resources for the teaching of science subjects in secondary schools in Nigeria. They further stated that where there were little resources at all, they are not usually in good conditions, while the few that were in good conditions were not enough to go around those who needed them.

It is based on this that the researcher decided to carry out research work on modeling, its significant and importance and how to find solution to its inadequacy.

Teachers' professional commitment, creativity, mechanical skills, initiative and resourcefulness were considered as the human factors. It is found that many of the science teachers were aware of possibility of modeling but many exhibited poor attitudes towards it. They also noted that very few teachers practice modeling while majority depends on imported equipment's and claim that improvisation of instructional materials is time consuming and fund depleting.

### 2.1.4 Academic Achievement in Basic Science and its Impediments

Academic achievement refers to a successful accomplishment or Performance in particular subject area. It is indicated by grades, marks and scores of descriptive commentaries. Academic performance also refers to how Students deal with their studies and how they cope with or accomplish different tasks given to them by their teachers in a fixed time or academic year. Fajola (2008), used the notion of academic self-concept in referring to Individuals' knowledge and perceptions about themselves in academic achievements, and convictions that they can successfully perform a given academic tasks at designated levels.

Fajola (2008) further stated that academic self-concept represents a more past-oriented, aggregated and relatively stable judgment about one's self-perceived ability in a particular academic domain while academic self-efficacy represents a context specific and relatively future oriented judgment about one's confidence for successfully performing an upcoming subjectspecific academic task. Rothstein (2000) argues that; learning is not only a product of formal schooling but also of communities, families and peers. Socio-economic and sociocultural forces can affect learning and

thus school achievement. A great deal of research on the determinants of school achievement has centered on the relative effects of home-related and school-related factors. Others argued that in various studies they indicated both home and school environments have a strong influence on performance of students. Musek (2001:89) stated that: …there are two broad groups of definitions of academic achievement. The first one could be considered more objective, because it refers to numerical scores of a pupil's knowledge, which measure the degree of a pupil's adaptation to schoolwork and to the educational system. The second group is a more subjective one, as its determination of academic success in reliant upon the student's attitudes towards his academic achievement and himself, as well as by the attitudes of significant others towards his/her success and him/herself. This study focuses on the effect of students produced improvised instructional materials on the academic achievement of students.

### 2.1.5 Factors Influencing Student Achievement

In contemporary Nigeria, great emphasis is being placed on science and technological development and also on achievement in examination in the sciences. As a result, students are being encouraged to take up science related subjects. One subject that is paramount is Basic Science. Today Basic Science as a subject, pervades literally every field of human endeavor in relation to medicine, pharmacy, agriculture, etc., and places a fundamental role in educational advancement. Unfortunately, achievement of students in Basic Science at the end of junior secondary school has not improved in the past decade (Umoingang, 1999). However, the interest of students in Basic Science have been related to the volume of work completed, students' task orientation and skill acquisition, students personality and self-concept, feeling of inadequacy, motivation, self-confidence, anxiety, shortage of qualified teachers (Aiken, 2006), poor facilities,

equipment and instructional materials for effective teaching (Odogwu, 2004), use of traditional chalkboard and talk methods (Edwards & Knight, 2004), large students to teacher ratio (Williams, 2004), over loaded curriculum (Okebukola, 2002), poor delivery of content, etc. Research results (Ajagu, 2006) have shown that Basic science teachers continue to teach using the lecture method despite the recommended guided discovery/ inquiry methods. The inability of Basic Science teachers to apply guided inquiry/ discovery approach and other modern methods of science teaching, might be hinged on some problems which include, lack of laboratories, equipped with facilities in schools, large class size, lack of qualified teachers, and incompetency arising from the training of science teachers.

## 2.2 Theoretical Framework

This study is based on Instructional Design Theory as its theoretical framework. Instructional design theory is a set of prescriptions for determining appropriate instructional strategies to enable learners to acquire instructional goals. Instructional Design theory is prescription – based and is founded in learning theory and related disciplines. The emphasis is on what works rather than on the steps to carry out the design and development process. Instructional Design Theory is sometimes nested within Instructional System Development.

The type of Instructional Design addressed in this paper is based on the Gagne (1965, 1985) assumption that there are different kinds of instructional goals and that different instructional strategies are required in order for the learner to most effectively and efficiently acquire a given kind of instructional goal. All Instructional Design Theory based on this assumption consists of three components; a descriptive theory of the knowledge and skill to be learned, a descriptive theory of instructional strategies required to promote this learning, and a prescriptive theory that

relates knowledge and strategies. Descriptive theory identifies the concepts used to describe either the knowledge to be learned or the strategies to be used to promote this learning. Prescriptive theory consists of if… then… prescriptions of the form: if (kind of knowledge outcome) then (specific instructional strategy). That is, if the learner is to acquire a particular kind of knowledge or skill then the instruction must employ the instructional strategy that is appropriate for promoting the acquisition of that kind of knowledge.

### 2.2.1 Gagne Conditions of Learning

Gagne (1985) proposed a descriptive theory of knowledge consisting of five outcome categories: intellectual skills, cognitive strategies, verbal information, motor skills, and attitudes. He elaborates some of these categories further. He also proposed a descriptive theory of strategy consisting of nine events of instruction: gaining attention, informing the learner of the objective and activating motivation, stimulating recall of prior knowledge, presenting the stimulus material, providing learning guidance, eliciting performance, providing feedback, assessing identifies the conditions necessary for learning to be efficient and effective. These conditions of learning comprise his prescriptive theory of instruction.

### 2.2.2 Merrill Component Display Theory

Merrill (1994) proposed a descriptive theory of knowledge consisting of a two-way classification based on performance level and content type. His performance dimension is; remember instance, remember generality, use generality with an unencountered instance, and find a new generality. His content dimension is: facts, concepts, procedures, and principles, Merrill proposed a descriptive theory of strategy consisting of primary presentation forms (PPFs), secondary presentation forms (SPFs), and inter display relationships (IDRs). Primary presentation forms

consist of: expository generality (rule), expository instance (example), inquisitor generality (recall), and inquisitor instance (practice). Secondary presentation forms consist of information added to facilitate learning such as attention focusing help, mnemonics, and feedback. Inter display relationships are sequences involving example-nonexample matching, example divergence and range of example difficulty. For each performance – content classification, component display theory prescribes the combination of PPFs, SPFs, and IDRs that comprise the most efficient and effective instructional strategy.

### 2.2.3 Instructional Transaction Theory

We have tagged both of these Instructional Design Theories as first-generation Instructional Design Theory. Neither Gagne's conditions of learning nor Merrills component display theory provide a sufficiently complete set of prescriptions to drive a computer program. Instructional transaction theory is an attempt to extend the conditions of learning and component display theory so that the rules are sufficiently well specified to be able to drive automated instructional design

and development. Instructional transaction theory describes knowledge in terms of three types of knowledge objects: entities, activities, and processes.

The descriptive theory of knowledge also identifies and associations between entities, activities, and processes.

## 2.4 Review of Empirical Studies

Similar studies related to the present research was conducted by some researchers. A study conducted by Usman (2008) on enhancing the Academic achievement of integrated science using improvised materials among JSS students. The study was carried out on 100 subjects from Zaria Local Government Area of Kaduna State. The design of the study was the matched experimental and control design. Integrated Science Achievement Test (ISAT) comprised of 20 multiple choice test items was used for the data collected. The data collected were analyzed using t-test. The results showed significant difference between subjects taught with improvised and control groups, but no significant different among gender in experimental group (those taught with improvised materials). The used materials were gender friendly. Therefore, the government and science teachers should make use of resource personnel in the construction and repairs of improvised materials (Usman, 2008). Ndioho (2005) investigated the related effectiveness of constructivismbased instructional model on senior secondary school student performance in Biology in Obio/Akpor Local Government Area of Rivers state. Ndioho used a sample of 240 SSII Biology students in four secondary schools; two mixed schools, one boys' school and one girls' school were randomly selected. From each school, 60 students were selected and divided into two groups of 30 students in each group. One group was assigned the experimental group and the other control group. The instrument used was Biology performance Test (BPT). The experimental groups were taught genetic concept using constructivist based instructional model while the control groups were taught the same genetic concept using conventional lecture method. The two groups were post tested and the test was analyzed using mean, percentage, standard deviation and t-test statistics. The result indicated that the experimental groups taught using constructivist based

instructional model performed significantly better than the control groups who are taught the same concepts using lecture method.

Makobi and Okoye (2010) on the effects of class size on academic achievement of senior secondary school students in chemistry, Delta state Nigeria. In the study, 681 SSII students were used. The researcher employed an ex-post-factor design and the data collection was carried out using Chemistry Achievement Test (CAT). The chi-square and F-test ANOVA were used. The result showed that chemistry students in small size classes performed better in relation to those in large size class. The results also show that there is no interaction effect of school location and class size on the achievement of the considered students.

Again, another study of Akusoba and Okeke (2006) on the effect of activity centered teaching approach using low cost learning kits in facilitating student's achievement and interest in Mathematics. The study was quasi-experimental study with the sample of 162 subjects. The instruments used included Mathematics Achievement Test (MAT) and Mathematics Interest Scale Questionnaire (MIS) for data collection. The data analysis used were mean score and standard deviations to answer the research questions, while Analysis of Covariance (ANCOVA) was used to test the null hypotheses at 0.05 level of significance. The result showed that significant difference exists between the experimental group and the control group. Akusoba and Okeke maintained that adaptation of activity centered approach using low cost learning kits as an alternative to conventional method that would improve higher achievement and interest in mathematics.

Onasanya and Omosewa (2011), on the effects of improvised and standard instructional materials on senior secondary school student's performance in physics in Ilorin have shown a greater impact

on performance. The researcher employed quasi-experimental study. The study comprised of 60 students and assigned to 3 groups (improvised standard and control groups). In this study, performance test in Physics (PTP) comprising of 50 multiple choice items were used for data collection. The mean scores, standard deviation and t –test statistics were used. The result revealed that no significant difference exists in the performance of subjects taught with improvised and those taught with standard materials. Also, there was no significant difference according to gender. This shows that improvised materials have almost the same effect as the standard materials as long as they are relevant to the lesson context. Folorunso and Nwosu (2016) in their study of students' and teachers' improvised materials on students' achievement in senior secondary school certificate biology. In the study, 107 students were involved (Experiment I, II and control groups). The design was experimental control group design. The instrument used was Ecological Achievement Test (EAT) for data collection. The data were analyzed using Analysis of Covariance (ANCOVA) and Schefft tests to test the hypotheses. The result showed that students taught with their own constructed improvised materials performed better than those taught with teacher improvised instructional materials. Therefore, Folorunso and Nwosu (2006) mentioned that science teachers should encourage students' participation in supplying and improving resource in science classroom. In another study, Jibrin (2006), on the use of teacher made educational materials in enhancing acquisition of mathematics concept and science experimentation, 60 subjects were randomly selected and grouped into experimental and control groups. Mathematics

Performance Test (MPT) was used to generate data for analysis. The scores of two (2) groups were analyzed using t-test statistics. The findings indicated that significant difference exists between the academic achievements of subjects taught with teacher made materials. Based on this, Jibrin

(2006) suggested that the state and local government should set up centers for production of instructional materials and scientific equipment's/apparatus to complement that of the federal government.

Another study was conducted by Salawu (1996) who studied the effect of class size on the students' achievement of different ability in Mathematics. The study wants to know and to establish the effect of class size on the achievement level of students with varying abilities in Mathematics. In a work sample of three hundred (300) senior secondary two (SS2) students was used and divided into different classes of 30, 60, 90 and 120 groups of students Based on the result of the pre-test the students within each group of class size produced higher, average and lower achievers. The results indicated that there was a general decrease in the level of students' performance of the different ability groups as there is increasing in the class sizes.

# CHAPTER THREE

## 3.0 RESEARCH METHODOLOGY

This chapter discusses the method and procedure that were used in the study. It is presented under the following sub-headings: research design of the study, area of study, population of the study, sample and sampling technique, instrument for data collection, validity of instrument, reliability of instrument, method of data collection and method of data analysis.

### 3.1 Design of the study

The design for this study is quasi-experimental design. Specifically, the study applied nonequivalent control group design. A quasi-experimental design is a type of experimental design that does not provide for full control of extraneous variables, primarily because of the lack of random assignment of subjects to groups (Ali, 2011).

Quasi-experimental design is considered appropriate for this study because intact classes were used to avoid disruption of normal class lessons. The pre-test was used to partial out initial differences in the two groups and to control selection bias, which is a trait to internal validity. The study design is illustrated in the figure 1.

**Fig. 1**

Group I O1 X1 O2

……..

Group II O1 X2 O2 Where

01=Pre - test

X1= treatment for Exp. Group

X2 = Control group

O2 = Post Test

### 3.2 Population of the study

The population of this study consist of all the 2078 JSS students of Basic Science from the 13 public schools in Bosso Metropolis of Niger State. JSSII was used because the topics to be taught fell under the JSS Basic Science curriculum. Co- educational schools were used because the researcher wants to find out if the modeled Human tooth would have any effect on the academic achievement of students in Basic Science based on their gender.

### 3.3 Sample and Sampling Technique

The sample size of this study is 179 students from two intact classes in public co-educational schools in Bosso Metropolis of State. To produce the sample, simple random sampling technique was used to select two schools from Bosso Metropolis. Two intact classes from the two co – educational schools where selected by to represent the experimental and control groups. Students into both the experimental and control groups was selected from co-existing classes, that is, classes which are crossed with gender, for uniformity in the subjects and also to allow representation across gender among the four groups. As a result, Bosso Secondary school Ahmadu Bahago secondary school. were sampled out for the experimental and control group.

The experimental group was taught using the modeled human tooth and the control group was taught without the modeled human tooth.

The sample for experimental group was made up of 96 students. This comprises of 41 males and 45 females while the control group was also made up of 44males and 39 female students.

Table 3.3 shows the sampled schools.

**Table 3.1 Sample Population Classification**

| S/N | Sample School | Male | Female | Total |
|---|---|---|---|---|
| 1 | Bosso Secondary School | 45 | 51 | 96 |
| 2 | Ahmadu Bahago Secondary School | 39 | 44 | 83 |
| **Total** | **2** | **84** | **95** | **179** |

## 3.4 Instrument for data collection

The instrument for data collection for this study is achievement Test on Human tooth (ATOHUT). Items for the ATOHUT were constructed by the researcher and it consist of twenty (20) multiple choice questions, based on the junior Secondary School Basic Science Syllabus in parts of the human body. The ATOHUT was develop from the above topic, the objective of the topic in Basic Science curriculum served as a guide for developing the questions. The Achievement Test on Human Tooth Achievement Test was used to assess the students' achievement in Basic Science.

## 3.5 Validity of Instrument

The twenty-item Achievement Test on Human tooth (ATOHUT), which consist of section A and B items, face content validation by two experts, all from Science Education Department in Faculty of Science and Technology Education, Federal University of Technology Minna. These experts

scrutinized the instrument in terms of: clarity of instruction to the subject, proper wording of the items, appropriateness and adequacy of the items for the study, structure and adequate timing. The comments and recommendations of these experts helped to modify the items in the instrument.

### 3.6 Reliability of the instrument

The reliability of Achievement Test on Human tooth (ATOHUT) was determined using KuderRichardson 21, by administering the instrument to 32 JSS II Basic Science students in two different schools in Bosso Metropolis of Niger State, to ascertain the reliability of the instrument.

### 3.7 Method of data collection

Experimental and control groups, were used for this experiment. At the end of the treatment session posttest was administered to the students. Data collected from both the treatment and control groups were used for analysis according to the research questions and hypotheses.

### 3.8 Method of Data Analysis

Mean () and standard deviation (SD) were used to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance using statistical package for social science (SPSS) version 2.0

## CHAPTER FOUR

## 4.0 RESULT AND DISCUSSION

This chapter presents the result of analysis of the research question and hypotheses advanced in the study.

### 4.1 Data Analysis and Result Presentation

The data obtained from the two groups in respect of different teaching strategies were used in answering the research questions employing descriptive statistics such as mean and standard deviations, while in testing the hypotheses, independent sampled t-test were used for all the analyses because the hypotheses were formulated on two variables parametric data and results are presented as follows.

#### 4.1.1 Pre-test performance of experimental and control groups

**Table 1:** Comparison of the Experimental and Control group Academic Achievement in Basic Science

| Group | N | Mean(X) | SD | *df* | t-cal | P-value | Remark |
|---|---|---|---|---|---|---|---|
| Experimental group | 96 | 11.50 | 3.10 | | | | |
| | | | | 178 | 1.67 | 0.93 | Not significant |
| Control Group | 83 | 10.84 | 2.84 | | | | |

***Not Significant>0.05**

Table 1 shows the mean scores of 11.50 and 10.84 for experimental and control groups, and the standard deviation scores of 2.84 and 3.10 respectively for pretest. The pre-test was carried out to determine the academic equivalence of the experimental and control groups in Basic science before the teaching commenced. From the table, the result indicated that, the P value of 0.93 was obtain(P>0.05) thus, there is no significance difference in the mean scores of the experimental and the control groups. This result shows that the students in the experimental and control groups

were equivalent in terms of their previous knowledge of the subject before the treatment commenced.

**Research Question1**

What is the effect of modeled Human tooth on upper Basic Secondary school Students academic achievement in Bosso metropolis of Niger State?

**Table 2: Mean and standard deviation scores of the academic achievement of JSSII students in Basic Science for experimental and control groups (Posttest)**

| Group | N | MEAN(X) | SD |
|---|---|---|---|
| Experimental Group | 96 | 23.80 | 4.21 |
| Control Group | 83 | 14.42 | 3.62 |

Table 2 shows the mean scores of 23.80 and 14.42 for experimental and control groups for posttest. The result indicated a higher mean score for experimental group than control group. The standard deviation scores of 3.62 for experimental group are lesser than 4.21 for control group.
This indicates a better rate of dispersion of the experimental group than the control group.

**Research Question2**

Will there be any difference in the academic achievement of Boys and Girls taught with modeled Human tooth in Bosso metropolis of Niger State?

**Table 3: Academic achievement of JSSII Boys and Girls students in Basic Science for experimental group.**

| Gender | N | Pre-test Mean(X) | Post-test Mean(X) | Gain in scores Mean(X) |
|---|---|---|---|---|
| Boys | 45 | 12.32 | 24.00 | 11.68 |
| Girls | 51 | 11.78 | 23.67 | 11.89 |

Table 3 shows the mean scores of 12.32 and 11.78 for Boys and Girls in the experimental group for pre-test, then 24.00 and 23.67 for post-test. The mean scores show 11.68 and 11.89 for Boys and Girls respectively indicating that both Boys and Girls performed better in Basic Science when exposed to modeled Human tooth. Thus, gender has no significant effect on the achievement of Boys and Girls who were taught with modelled Human tooth.

**Null Hypotheses**

$HO_1$**:** There is no significant difference in the academic achievement of upper Basic secondary school students taught with a modeled Human tooth and those taught without it in Bosso metropolis of Niger state.

**Table 4: t-test comparison of the academic achievement of upper Basic students taught Basic Science with modeled human tooth.**

| Group | N | Mean(X) | SD | *df* | t-cal | P-value | Remark |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Experimental group | 96 | 23.80 | 4.21 | | | | |
| | | | | 178 | 9.87 | 0.0001 | Rejected |
| Control Group | 83 | 14.42 | 3.62 | | | | |

***Significant<0.05**

Table 4 shows the mean score of 23.80and standard deviation of 4.21 for experimental group and 14.42 with standard deviation of 3.65 for the control group for the Post-test. from the result Pvalue is 0.0001(<0.05) was obtain thus, hypothesis 1 was rejected because there is significant difference in the academic achievement of students who were taught Basic Science with modeled Human tooth.

$HO_2$: There is no significant difference in academic achievement of Boys and Girls of upper Basic Secondary School taught with modeled Human tooth in Bosso metropolis of Niger state.

**Table 5: t-test comparison of academic achievement of Boys and Girls taught Basic Science**

| **Source of Variation** | **N** | **Mean(X)** | **SD** | ***df*** | **t-cal** | **Pvalue** | **Remark** |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Boys | 45 | 24.00 | 3.27 | | | | |
| | | | | 95 | 0.24 | 0.811 | Accepted |
| Girls | 51 | 23.67 | 4.19 | | | | |

***Not-Significant>0.05**

From table 5 shows the mean scores of 24.00 and 3.27 standard deviation for boys and mean score of 23.67 with standard deviation of 4.19 for Girls in the Experimental group the result indicated that both Boys and girls in the experimental group performed better. The result also shows that a P-value of 0.83 was obtained (P>0.05) thus, hypothesis 2 was Accepted because there is no significant difference in the academic achievement of Boys and Girls taught with modeled human tooth.

### 4.2 Discussion of Result

From the results, the findings of research question one showed that students who were taught Basic Science with modeled Human tooth performed better than those taught without it. The ttest analysis showed better Academic achievement in Basic Science by the experimental group because of the use of Modeled Human tooth. From the result, it is clear that the use of modeled Human tooth as an instructional material has enhanced the teaching and learning of Basic Science among upper Basic secondary school students resulting in higher achievement gains by the learners. This finding is in agreement with the findings of Miciano (2005) who found out that the use of instructional materials improved academic performance of students in Basic Science. The result also agrees with the work of Frouts, Brown and Thieman (2007) when they found out that the use of instructional materials improved the fifth-grade students in solving

computer assisted problems. The result of research question two revealed that Boys and Girls students who were taught with Modeled Human tooth achieved better academic performance in Basic Science. Also, the t-test analysis of hypothesis two showed a better academic Achievement in Basic Science of Boys and Girls when taught with Modeled Human tooth. This indicated that there is no significant difference in the academic achievement of Boys and Girls who were taught Basic science with Modeled Human Tooth. It further showed that gender has no effect on the performance of students in Basic science when they are taught with Modeled Human tooth. This result is in agreement with the work of Inyang and Eke (2007) on their study of the influence, ability and gender grouping in students' achievement, when they found out that there was higher level of performance of the mixed grouping than male and female groups. Hence, they emphasized more on mixed grouping than single groups.

**4.3 Summary of Major Findings**

From the result of the analysis presented in this chapter, the major findings emerged from the study are as follows:

1. The difference in mean scores in answer to the research questions and the result of data analyzed using t-value showed that students who were taught with Modeled Human tooth performed better than those taught without or with conventional method.
2. The use of Modeled Human tooth on the experimental group showed a better academic performance in Basic Science result as seen from the t-test in table 3.
3. The use of Modeled Human tooth in the teaching and learning of Basic Science was found significant to the academic Achievement of the experimental group.
4. Gender has no significant influence on the Academic Achievement of as far as Modeled Human tooth is concerned.

# CHAPTER FIVE

# SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Summary

The aim of the study is to examine the effects of modeled Human tooth on the academic achievement among upper Basic Secondary school students Basic Science in Bosso metropolis of Niger state, Nigeria. This study was carried out with two research objectives, two research questions and two null-hypotheses were formulated. The study adopts the use of quasiexperimental research and out of the 2078 students of Basic science, the total of 96 students was sampled out for the experimental group. This comprises of 45 male and 51 females while the control group had a total number of 83 students. Data for the study was collected through the pretest, treatment and post-test using a researcher made instrument (Achievement Test on Human tooth), the ATOHUT consists of 20 objective test items. Data collected were analyzed statistically through the use of descriptive statistics. Major findings drawn from the study among others revealed a significant difference in the academic achievement of students taught Basic science with the use of modeled Human tooth when compared with those taught without. Also, finding shows there is no significant difference in the performance of boys and girls taught Basic science using modeled Human tooth.

## 5.2 Conclusion

The following conclusions can be made based on the findings of the study;

1. Since the students taught Basic science with modeled human tooth had a better mean score than those taught without, there is need for teachers to be trained on how to model instructional materials as this will enable them acquire the appropriate techniques and skills necessary for modeling.
2. Finding shows that Boys and Girls who were taught with modeled Human tooth had a better academic achievement in Basic science. . Thus, use of modeled instructional

materials help to improve the academic achievement students in Basic science. Moreover, the use of modeled Human tooth in teaching Basic science is gender friendly.

3. Finally, it can be concluded that the use of instructional materials in the teachinglearning process is very effective as result revealed a significant difference in the treatment effects for the students taught Basic Science using modeled Human tooth.

## 5.3 Recommendations

The following explicit recommendations can be made based on the findings of the study;

1. Teachers should be trained and re-trained through workshops, seminars and conferences for the purpose of skill acquisition necessary for the production and use of instructional materials by teachers.

2. The use of instructional materials which will motivate learners to pay more attention in the learning activities in schools should be encouraged.

3. In respect to the findings of the study, teachers should be enlightened on the use of appropriate instructional material as this will aid teaching and learning in schools.

4. It is also recommended that teachers should be adequately motivated to improvise and use instructional materials. This can be done by improving condition of service for teachers and better remuneration.

## 5.4 Implications for Teachers

1. The various findings of this study have implications for teachers in most secondary schools in terms of required skills development.

2. The study has shown that it is possible to develop skills in teachers in terms of materials production drawing opinions from professionals.

3. The study has its implication for teachers in secondary schools in the state as well as in Nigeria as a whole in terms of effectiveness, government support; funding, proper management and monitoring of equipment and materials should be given paramount consideration.

4. The study, if properly implemented is advantageous for mass awareness among teachers nationwide.

## 5.5 Suggestions for Further Study

The following suggestions for further studies are put forward:

1. Impact of teacher ‘s quality on the production of instructional materials.

2. Impact of locally produced instructional materials in curbing examination malpractice in secondary schools.

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# APPENDIX 1
# LESSON PLAN (EXPERIMENTAL GROUP)

Date: October2019

Class: JSS2

Sex: Male and Female

Subject: Basis Science

Topic: Human Tooth

Instructional material: Modeled Human Tooth, Textbook

Reference material: Nigeria Basic Science Book II

Behavioral objectives: At the end of the lesson, the student should be able to;

i. Explain the concept of human tooth
ii. State at least Three (3) types of human teeth. iii. List functions of the Major type of the human teeth.

Previous knowledge: The students are familiar with various parts of Human body.

Introduction: The researcher introduces the lesson by asking the students Questions based on their previous knowledge and link it up the topic of the day.

**PRESENTATION OF THE LESSON**

**STEP I:** The researcher explains the concept of teeth as;

The white portion of mouth that function mechanically to break down items of food by cutting and crushing them in preparation for swallowing and digestion. **STEP II:** The researcher goes further by explaining to the students the two set of teeth that develop in human (i.e Milk teeth and the Permanent teeth). The milk teeth are 20 in number and they appear between the age of 3 and start falling out at 6 or 7 years while the permanent teeth are 32 in number and develop between 12-21 years.

**STEP III**: The researcher lists out the various types and functions of the human teeth.

Types of teeth and their functions;

i. The incisors-use for cutting food
ii. The canine-use for tearing food. iii. The molar and Premolar- use for crushing food substance **STEP IV:** The researcher uses the modeled human tooth to further explain step I, II and III.

**EVALUATION:** The researcher evaluates the students by asking the following questions

i. State three (3) types of human teeth and their functions. ii. List (2) set of teeth in human.

**SUMMARY:** The teacher goes over the lesson and highlights the main point in the lesson.

**CONCLUSION:** The teacher concludes the class by giving the student assignment.

i. list and explain the two (2) set of teeth that develop in human being.

## APPENDIX 2
## LESSON PLAN (CONTROL GROUP)

Date: October 2019

Class: JSS II

Sex: Male and Female

Subject: Basic science

Topic: Human Tooth

Instructional material: Textbook

Instructional method: Discussion method

Reference material: Nigeria Basic Science Book II

Behavioral objectives: At the end of the lesson, the student should be able to;

a. Explain the concept of human tooth
b. State at least Three (3) types of human teeth.
c. List functions of the Major type of the human teeth.

Previous knowledge: The students are familiar with various parts of Human body.

Introduction: The researcher introduces the lesson by asking the students Questions based on their previous knowledge and link it up the topic of the day.

**PRESENTATION OF THE LESSON**

**STEP I:** The researcher explains the concept of teeth as;

The white portion of mouth that function mechanically to break down items of food by cutting and crushing them in preparation for swallowing and digestion. **STEP II:** The researcher goes further by explaining to the students the two set of teeth that develop in human (i.e Milk teeth and the Permanent teeth). The milk teeth are 20 in number and they appear between the age of 3 and start falling out at 6 or 7 years while the permanent teeth are 32 in number and develop between 12-21 year.

**STEP III**: The researcher lists out the various types and functions of the human teeth.

Types of teeth and their functions;

i. The incisors-use for cutting food ii. The canine-use for tearing food iii. The molar and Premolar- use for crushing food substance.

**EVALUATION:** The researcher evaluates the students by asking the following questions

i. State three (3) types of human teeth and their functions. ii. List (2) set of teeth in human.

**SUMMARY:** The researcher goes over the lesson and highlights the main point in the lesson.

**CONCLUSION:** The researcher concludes the class by giving the student assignment.

i. list and explain the two (2) set of teeth that develop in human being.

## APPENDIX 3

## Achievement Test on Human Tooth (ATOHUT)

Dear Student,

The purpose of this test is to collect data for research project and therefore not intended to test your performance.

You are kindly requested to answer the questions below by selecting one of the four options **(A, B, C and D.)**

Thank you.

**INSTRUCTION:** Please Circle or Tick () the correct option.

**SECTION A**: Bio -data information of students.

Gender: ☐ Male Female ☐

**SECTION B:** Objectives Items

1. The human adult has ----------teeth?
   (a). 20

   (b).32

   (c). 20

(d) 40

2. What kind of teeth do babies have?
   (a). primary
   (b). permanent
   (c). Bicuspid
   (d). Choppers.

3. Teeth not only help you eat, but they also help you?
   (a). Talk
   (b). Taste
   (c). Hear
   (d). Think.

4. Which is the part of the tooth you can see above the gum?
   (a). pulp
   (b). Cap

(c). Crown (d).
Cavity.

5. This type of tooth is pointy, sharp & made to help tear food?
   (a). Molar
   (b). Incisor
   (c). Premolar
   (d) Canine

6. These Teeth are big and strong to help you grind food so it can be swallow
   (a). Wisdom teeth
   (b). Canine teeth
   (c). Molar D.
   Premolar.

7. Which of the human part works like a chopper?
   (a). Ear
   (b). Nose (c).
   Hand (d).
   Teeth.

8. This type of teeth is used for cutting food?
   (a). Molar
   (b). Incisor (c).
   Canine (d).
   Wisdom teeth.

9. The primary teeth (milk teeth) in human are ---------- in number? (a). 26
   (b). 16
   (c). 20 (d).
   32.

10. Permanent teeth are of ----------types?
    (a). 4
    (b) 2
    (c).20
    (d). 32.

11. A tooth is divided into ------- & ---------- parts?
    (a). Pulp and enamel
    (b). Cementum and Pulp
    (c). Crown and root
    (d). Crown and pulp.

12. Which is the part of the tooth that you cannot see with your naked eyes which extend below the gum and help in anchoring the tooth into the bone?
(a). Root
(b). Pulp
(c). Crown (d).
Enamel.

13. Third molar are commonly known as ----------?
(a). Crown teeth
(b). Wisdom teeth (c).
Permanent teeth (d).
Milk teeth.

14. --------- function to mechanically breakdown items of food by cutting and crushing them in preparation for swallowing and digesting?
(a). Mouth
(b). Teeth
(c). Enzymes (d).
Tongue.

15. In the primary set of teeth, there are two types of molar which are?
(a). lower and upper
(b). central and lateral
(c). vertical and horizontal
(d). first and second.

16. In the primary set of teeth, there are two types of incisors which are ------&---------?

(a) central & lateral

(b) neutral & lateral

(c) middle & lower

(d) upper & lower

17. ---------- is a specialized bone-like substance that covers the root of a tooth?

(a) Cementum

(b) Pulp

(c) Dentis

(d) Enamel

18. ---------- is the visible substance that covers the tooth crown?

(a) Enamel

(b) Dentis

(c) Pulp

(d) Cementum

19. ----------contains the blood vessels, nerves and other soft tissue that deliver nutrient & signal to the tooth?

(a) Dentis

(b) Enamel

(c) Cementum

(d) Pulp

20. The premolar are also known as ----------?

(a) Second molar

(b) first molar

(c) Bicuspids

(d) cuspids

## APPENDIX 4

## Answers to Achievement Test on Human Tooth (ATOHUT)

1. B
2. A
3. A
4. C
5. D
6. C
7. D
8. B
9. C
10. A
11. C
12. A
13. B
14. B
15. D
16. A
17. C
18. A
19. D
20. C