

**IMPACT OF COLLEGIAL TEACHING AND VERBAL-INTERACTION ON
ATTITUDE AND PERFORMANCE IN BASIC SCIENCE AMONG JUNIOR
SECONDARY SCHOOL STUDENTS IN KAFANCHAN, KADUNA STATE
NIGERIA**

By

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**DEPARTMENT OF SCIENCE EDUCATION,
FACULTY OF EDUCATION
AHMADU BELLO UNIVERSITY, ZARIA**

MARCH, 2018

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NIGERIA**

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EDUCATION**

**DEPARTMENT OF SCIENCE EDUCATION,
FACULTY OF EDUCATION
AHMADU BELLO UNIVERSITY, ZARIA**

MARCH, 2018

DECLARATION

I declare that the work in this thesis entitled Impact of Collegial Teaching and Verbal-Interaction on Attitude and Performance in Basic Science among Junior Secondary School Students in Kafanchan, Kaduna State, Nigeria, has been carried out by Luka Angulu WAKILI Reg. No Ph.D/EDU/22909/2012-2013 in the Department of Science Education. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this thesis was previously presented for another degree or diploma at this or any other institution.

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Date

CERTIFICATION

This thesis entitled “Impact of Collegial Teaching and Verbal-Interaction on Attitude and Performance in Basic Science among Junior Secondary School Students in Kafanchan, Kaduna State, Nigeria” by Luka Angulu WAKILI Reg. No. Ph.D/EDU/22909/2012-2013 meets the regulations governing the award of the Doctorate Degree in Science Education of the Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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ON

This thesis is dedicated to my wife Rahama L Wakili and children A'dam Stephen Luka, Kuyet Precious Luka, Ntyak Promise Luka, Katung Jewel Wakili and to the memory of my late father Wakili Angulu Kudi, late elder brother katukah Angulu, late mother Saratu Kali Angulu, Late step mother Sarkinfada Angulu and to the entire Wakili's family. I love you all.

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ABBREVIATIONS

BASPT	Basic Science Performance Test
ESTOS	Eggleston Science Teachers Observation Schedule
MDG	Millennium Development Goals
NCE	National Council on Education
NECO	National Examination Council
NEEDS	National Economic Empowerment and Development Strategies
NISP	Nigerian Integrated Science Project
NISTEP	Nigerian Integrated Science Teacher Education Project
NERDC	Nigerian Educational Research and Development Council
NTI	National Teachers Institute
STAN	Science Teachers Association of Nigeria
ASTBASI	Attitude of Students toward Basic Science Inventory
UNESCO	United Nation Educational Scientific and Cultural Organization

OPERATIONAL DEFINITION OF TERMS

Academic Performance: Academic performance is an outcome of education –the extent to which a student, teacher or institution has achieved their educational goals that were the focus of activities. In this case students’ academic performance in Basic Science

Attitude: is the way students think belief and feel about Basic Science

Basic Science: is an approach to learning science in which concepts and principles of nature are presented so as to express the fundamental unity of science. This is done to avoid premature distinction between the various science disciplines.

Collegiality: Adherence to the ethos, standards and conduct that govern behavior among colleagues within a given Junior Secondary School. The conduct refers to supportive and stimulating relationship among teachers

Collegial Learning: This learning encompasses a wide range of strategies for promoting academic learning through peer cooperation and communication; teachers supporting teachers, teachers teaching students learn and students sharing ideas and resources with each other.

Collegial Teaching: One in which two or more teachers work cooperatively through joint planning, shared teaching and joint reflection of their work. It is about getting teachers to work effectively together as a team

Verbal Interaction: Verbal interaction is an act of conveying messages, ideas, or feelings through the use of mouth. Verbal communication is the main way of communicating face-to-face among teachers-teachers, teachers and students

ABSTRACT

This study investigated the Impact of Collegial teaching strategy and Verbal-Interaction on Attitude and Performance in Basic Science among Junior Secondary students in Kafanchan Education Zone, Kaduna State, Nigeria. Five objective questions, five research questions and five null hypotheses were formulated for this study and tested respectively. 182 students out of a population of 7,264 from four secondary schools were randomly selected to form the study sample. The students were then randomized into four groups in four schools. Three groups from the four were taught Basic Science concepts employing collegial teaching methods by teachers using high, medium and low levels of verbal-interaction. The fourth group was taught the same Basic Science concepts employing lecture method. Topics taught were drawn from the Basic Science curriculum for JSS II. The treatment lasted for a period of six weeks. Three instruments; Basic Science Performance Test (BASPT) with a reliability coefficient of 0.89; Attitude of Students towards Basic Science Inventory (ATBASI) with reliability coefficient of 0.87 and Eggleston Science Teaching Observation Schedules (ESTOS) with a reliability coefficient of 0.67 were used to collect data for pretest, posttest and to test the five hypotheses. The data collected were analyzed using t-test, descriptive statistics and Analysis of Covariance (ANCOVA) at a significant level of $p \leq 0.05$. One of the findings of the study is that students taught using collegial teaching method performed better than those taught using lecture method, when the same concepts are taught by teachers using high, medium and low level of verbal-interaction. The conclusion from this study is that if teachers collegiate among themselves and allow active participation with students dominating discussion during lessons then we should expect improved performance in Basic Science. It was therefore recommended among others that Basic Science teachers should employ collegial teaching method and encourage high teacher-students interaction.

CHAPTER ONE

THE PROBLEM

1.1 Introduction

Science is a household name in the world today. It has made rapid progress and completely transformed outwardly the manner of human existence. Science has revolutionized man's thinking and behaviour so much that its meaning and the roles it plays in human development has to be made clear. Gottlieb, (2004) defined science as intellectual activities carried out by scientists designed to discover information about the natural world in which we live and to discover ways in which this information can be organized to benefit human race. Michael, (2007) identified science as a body of knowledge which is acquired through observation and systematic experimentation. On their part, Mogbo, Gana, & Alabi (2012) defined science as a way of knowing, a systematic method of learning about nature, based on observation and testing leading to the formulation of hypothesis, facts, laws, and theories.

From the foregoing, science is said to provide a way of exploring the world to offer humanity a meaningful and realistic life. It is a method by which man develops an understanding of why things happen the way they do. Science thus is seen as a product of knowledge as well as a process of generating knowledge. The content is the knowledge that we accumulate about our environment while the process skills deal with ways in which scientists go about gathering knowledge about the environment. Such process skills include: observation, measurement, classification, communication, inference, and formulation of hypotheses to mention a few. Science functions to make man knowledgeable and be able to use the knowledge acquired. It is important to note that all scientific knowledge must be testable. It must be consistent with what we know about the world, therefore scientific knowledge has to be systematic and verifiable.

Science in the Junior Secondary School (J.S.S) or Upper Basic is taught as Basic Science. The idea of the Nigeria Integrated Science Project (NISP) now Basic Science was borne by Science Teachers Association of Nigeria in the 1970s which is an attempt to teach science as a unified whole to achieve science knowledge. Basic Science is the study of the easy and uncomplicated most important part of life and physical sciences (Spohn, 2012). Basic Science underlies all other science. According to Bernard, (2000) Basic Science is established to aid understanding of the world. Also UNESCO in Mogbo, et al (2012) sees Basic Science as the approach in which concepts and principles of nature are presented so as to express the fundamental unity of science, to avoid premature or undue stress on the distinction between the various disciplines. Basic science which is an innovation of Integrated Science came about as a result of Federal Government's mandate to Nigerian Educational Research and Development Council (NERDC, 2007) to develop a curricula for use at all levels of education in Nigeria in line with the declaration for a 9-Year Basic Education Programme. The National Council on Education also approved a new curriculum structure namely: Lower Basic Education Curriculum (primary 1-3); Middle Basic Education Curriculum (primary 4-6); and Upper Basic Education Curriculum (JSS 1-3) listing relevant subjects for each level. The 9- Year Basic Education Curriculum (FGN, 2007) has the overall objectives to enable the learners to develop interest in science and technology by acquiring basic knowledge and skills which can be applied for societal needs.

In line with the philosophical thoughts on Basic Science various teaching methods such as inquiry, discovery, and discussion, demonstration, and laboratory activities have been advocated by Science Teachers' Association of Nigeria for the teaching of Basic Science to achieve these objectives. However results from previous studies (Osborne, 1999; Kaduna Education Resource Centre, 2008; Olorundare 2011) on teaching of Basic

tgScience revealed that teachers lectured and gave notes in Basic Science lessons instead of using the prescribed methods. This is coming from the background of the nature of teachers employed to teach the subject. The teachers are still too much in the grip of their single subject disciplines. Bearing in mind that graduates in Integrated Science who are the natural crop of teachers to handle these students are in short demand (Wakili 2007). Basic Science is one of the core subjects that is taught at the junior secondary school. It is at this level that young scientists are groomed and streamed into the fundamental science subjects of Biology, Chemistry, and Physics. Teachers that handle these levels of students must have acquired the necessary skills for such a big task. Given the high value placed on science at the junior school curriculum the need to teach it effectively through an effective method is indisputable. It is on record that Basic Science curriculum has a hierarchical structure and in themes which are taught progressive. One of the basic problems militating against teaching Basic Science effectively is that teachers who handle both the content and method are bias in the approach to teaching. Some concepts are skipped because teachers major in particular subjects, therefore they settle for traditional method of teaching.

Bichi (2004) and Usman (2007) have separately observed that lecture method encourages rote-learning without enhancing understanding. Furthermore, survey studies in various states of the Federation as reported by Akinmade in Wakili (2007) showed that Basic Science teaching was handled by incompetent teachers who are faced with pedagogical difficulties as a result of their professional background which often leads to poor performance in terms of students' outcome. Ajaji (2013) argued that teaching in Nigerian secondary schools has suffered some setbacks because there are no effective training and retraining programmes for teachers who are even in short supply. Reflecting on the problems of teaching Basic Science Mohammed, (2006) suggested that there is need to

pursue rigorously the issue of professionalism by involving high standard of initial training and a continuous updating through refresher courses, workshop, subscription to journals and through networking with others of the same specialization. Moreover each profession needs professional development and for teachers, various models have emerged. Mohammed (2006), research has indicated two most commonly used models in Nigeria: the workshop model and the school-based teacher professional support model. The workshop model entails drawing participants out of their school to a venue where they are exposed by experts to a core of information and skills. This is the most common form of continuing professional development model in Nigeria.

The school-based teacher professional support known as collegial/collaboration model is an alternative strategy for in-service training of teachers (Harries & Anthony 2001, Mohammed 2006). In this model, teachers, supervisors and facilitators are involved collaboratively in school-based activities that will help the teacher to improve. The teacher gets professional support from facilitators and experienced or co-teachers in managing their classes. Activities may include direct classroom support by fellow teachers and supervisors, staff meeting within the school involving principals and the participating teachers and demonstration lessons by teacher-educators. DuFour (2004) concluded that the success of a school depends on effective administration, teachers' professional, personal and social development as well as close relationship between and among teachers. One way of attaining close working relationship is through fostering collegiality among teachers. High level collegiality among staff members is associated with effective school management and improves students' academic performance.

Collegiality is the act of learning from one another, sharing and building expertise together. (Tolisano, 2009). To be collegial means to be colleagues and being a good

colleague means nothing less than fulfilling the contractual obligation to perform adequately in the classroom (Crazy, 2012). Collegiality is the quality of relationships that exist within and between the levels of the education system, a climate of trust running from top to bottom, respect for the views of staff and opportunities for them to engage in decision making, a reflective co-operative approach to the processes of commitment to share values with regards to relationship (Humes, 2007). Shah (2012) is of the view that strong and healthy collegial relationship among school staff is regarded as an essential component of school effectiveness and teacher enhancement. Shah suggested that teacher collegiality plays a vital role in augmenting teacher professional growth and development, job satisfaction, organization and professional commitment as well as school quality and students performance. Collegial support provides an opportunity for reflection on practice and sharing expertise for problem solving through group processes ultimately deepening the knowledge of teaching and learning. These processes are practiced through effective verbal interaction.

Verbal interaction according to Berko (2013) is an act of conveying messages, ideas, or feelings through the use of mouth. Verbal communication is the main way of communicating face-to-face. Among the key components of verbal communication are words, sound, speaking and language. Communication involves both transferring a message and ensuring that the message is received and fully understood by the receiver. In classroom interaction between a teacher and students, communication is an important component in collegial teaching. Student-teacher relationships are well established if communication is well understood and practiced in the class. In the course of teaching, the teacher engages students in the class meaningfully to bring out the best from them. This engagement can be in the form of verbal interaction, gestures, research work, assignment questioning, soliciting responses, and many other forms of interactions. In all

of these forms of verbal interaction between teachers and students, verbal communication skills stand out as very vital in this concept. The beauty of these interactions often gives birth to good academic performance.

Steinmayr, Meibner, Weidinger and Wirhwein, (2015) defined academic performance as an outcome of education, the extent to which a student, teacher or institution have achieved their educational goals that were the focus of activities. According to Steinmayr et al, (2015) academic performance is commonly measured by examination or continuous assessment. In line with this study, academic performance refers to the extent to which a student has achieved in Basic Science haven been taught by teachers who worked collaboratively. Academic performance is a measure of what students do in the school over a period of time. Causes of fluctuating performance among students have also been attributed to teacher-teacher, teacher –students’ relationships, methods employ for teaching and attitudes toward the subject.

Attitude is defined as a person’s feeling, thought and predicts position to behave or responds in some particular manner (Lakpini 2006). Attitude according to Gadzama (2010) is an expression of like and dislikes or person’s disposition towards a particular area, a discipline or an object. Such disposition is generally based on one’s feelings, mood, opinion and beliefs about the idea, discipline and object. Attitude is indispensable in personality formation and manifestation and it is a core aspect in the study of human behavior. It has components which are related to beliefs, feelings and the tendencies to behave in a particular way. Attitude has been discovered to be an integral part in learning, it promotes or hinders teaching and learning of science. Otuka (2004), Shata in Gadzama (2010) asserted that attitude is a vial aspect that cannot be overlooked in teaching and

learning. In this regard the development of positive attitude is part of the teachers' responsibilities.

The training of students in science to get their right attitudes toward the subject is done irrespective of gender. Research has shown that gender does not affect science students' attitude and performance adversely. Oludipe (2012) asserted that gender difference on Junior Secondary Students' Academic performance in Basic Science using team teaching strategy revealed that there was no significant difference in academic achievements (performance) of male and female students. This study investigated the impact of collegial teaching and verbal interaction, on academic performance and students' attitudes toward Basic Science at the Junior Secondary School.

1.1.1 Theoretical Framework of the Study

Collegial teaching strategy is usually an ongoing programme in schools. It is seen as a professional development of teachers to deepen their classroom practices or teaching skills. One of the theories underpinning collegial teaching is called organizational theory. According to Taylor (1917), organizational theory represents the merger of scientific management, bureaucratic theory and administrative theory. The theory deals with the study of organizations for the benefits of identifying common themes for the purpose of solving problem, maximizing efficiency and productivity, and meeting the needs of stakeholders. Barzilai, (2010) explained further that organizational theory can be classified into three broad concepts which includes: individual processes like motivation theory, group processes including working in groups/ communication and power to influence by what we say and do, and organizational processes, as it relates to organizational structure. Organizations like schools can play a role in developing their staff for success by organizing workshops, and seminars that focus on developing

organizational success. Allowing for a diverse set of experiences with appropriate support can maximize and expand the capabilities of each teacher.

Working in groups or pairs among teachers are building blocks for meeting organizational goals when intervention is undertaken to address particular needs. Principals should consider ways to develop leadership in team members like the teachers. There should be training among teachers to enable them support each other. When teachers are able to relate freely well the element of team spirit develops which will lead to identifying and cultivating talents like quality teaching skills. It should be mindful in school organization that a democratic process would require a delay of time to plan, teach and reflect on what transpire in the class. In a process of this nature Senge (1990) believes that where people continually expand their capacity to create the result they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspirations are set free, then people will continually learn to see the whole together. In such a set up team members become flexible, adaptive and production will excel. But for this to happen, it is argued that organizations need to discover how to tap people's commitment and capacity to learn at all levels.

Senge (1990), encourages team learning in organizations where he viewed such learning as the process of aligning and developing the capacities of a team to create the results its members truly desire. It builds on personal mastery and shared vision, but these are not enough. People need to be able to act together. When teams learn together, Senge, (1990) suggests that not only can there be good results for the organization; members will grow more rapidly than could have occurred otherwise. Collegial learning starts with dialogue, which is the capacity of members of a team to suspend assumptions and enter into a genuine thinking together as colleagues; this is the spirit of collegiality. In such a climate, there is

a free flowing of ideas an insight not attainable individually. It equally helps team members recognize the pattern of interaction that brings about improve learning outcome in terms of performance. So this study is built around organizational theory of teachers relating well by joint planning, share teaching and joint reflection/feedback of what happens in class.

1.2 Statement of the Problem

Basic Science as designed by the curriculum planners is to be taught by a single expert in the subject. But experience had shown that every Basic Science teacher in the junior secondary school do take side (Ajayi 2016). This is because the teachers are trained in particular science discipline like Biology, Chemistry, or Physics, therefore are bias. Being bias in specific aspects of the subject does mar the attainment of designer's objectives in the subject. There is the likelihood that some aspects of the subject will be left partially taught or not taught at all. The challenge has further been aggravated by teachers' interest and attitudes towards the subject. As a result of all the effects mentioned and even more, the performance of students in Basic Science has been a growing concern in schools in recent times (Olatoye, 2009). To this effect scholars have further carried out studies to investigate the factors that may be responsible for the unfortunate situation.

The factors according to Osborne, (1999) Olorukooba, Lawal and Jiya, (2012) can be attributed to the absence of supportive environment for meaningful interaction to inappropriate and uninspiring teaching methods employ by science teachers. In addition studies such as those conducted by Tambaya (2008),Alumba (2008),Dawaki (2010),Olorundare (2011)and Education Resource Center Kaduna(2017) reported poor performance in Junior Secondary Certificate Examination and attributed it to factors such as; poor language of communication, poor professional training of teachers, poor

academic background of students, poor learning environment, anxiety of teachers, fear of teachers planning and lack of confidence to teach lessons alone, poor reading habits and attitudes of students towards Basic Science. Moreover attitudes have both the potential to facilitate or inhibit learning of Basic Science. When students experience some difficulties in learning Basic Science, they manifest unfavorable attitudes towards the subject whereas the situation will reverse if there is favorable disposition towards the subject.

Table 1.1: JSCE Basic Science Performance in Kaduna State

Year	Pass	% Pass	Fail	% Fail
2013	36689	45.84	44507	54.14
2014	72897	91.44	6826	8.60
2015	45477	91.37	6850	8.64
2016	55135	55.02	45057	44.87
2017	93993	96.95	2931	3.02

Source: Education Resource Centre Kaduna (2017)

The JSCE results displayed shows the performance of students in the Basic Science from 2013-2017. The result can broadly be classified into two categories that is the pass indicating those who earned a credit and above (60 marks and above), while fail indicating those who earned 0-59 marks. In 2013 and 2016 there were mass failures as shown in the table.

Shuaibu and Usman (2002) and Alausa (2007) attributed poor performance to the attitude and the type of method usually adopted in teaching Basic Science. The lecture or expository method of teaching does not give students the desired opportunity to express themselves well and it equally limits interaction between students-students, and teacher-students' interaction(Usman, 2007). During the course of such interactions, students' fears and anxieties are not addressed in the class. For effective teaching and learning of Basic Science, it is expected that students participate actively in the process by asking questions, hold discussions, carry out class activities and make generous intellectual

contributions. The biasness of teachers does not encourage interactions couple with high population of students in classrooms.

Situations where teachers work as colleagues to share and develop professional practices together (collegial learning) have been found to check the effects of subject biases which often leads to teachers skipping some concept and may enhance academic performance of students (Aronson, 2014). It is against this background that collegial teaching and verbal interaction were experimented on their impact on, students' performance and attitudes towards Basic Science.

1.3 Objectives of the Study

The objectives for this study are to;

- i. investigate the impact of Collegial Teaching on students' academic performance when taught Basic Science concepts by teachers using high, medium, and low levels of verbal- interaction and their counterparts taught the same concepts employing Lecture Method.
- ii. determine the impact of Collegial Teaching on academic performance of male and female students taught Basic Science when taught by teachers using high, medium and low levels of verbal- interaction
- iii. investigate the impact of Collegial Teaching on academic performance of students taught Basic Science concepts when taught by teachers using high level verbal- interaction and those taught the same concepts employing low level verbal - interaction
- iv. examine the impact of Collegial Teaching on students' attitude towards learning Basic Science when taught by teachers using high, medium and low levels of verbal- interaction and those taught the same concepts employing lecture method.

- v investigate the impact of collegial teaching on male and female students' attitudes towards Basic Science when taught by teachers using high, medium and low levels of verbal- interaction.

1.4 Research Questions

The following research questions are formulated for this study:

- i. what is the difference in mean scores of students taught Basic Science by teachers using high, medium and low levels of verbal- interaction employing collegial teaching strategy and their counterparts taught employing Lecture Method?
- ii. What is the difference in mean academic scores of male and female students taught Basic Science by teachers using high, medium and low levels of verbal- interaction employing Collegial Teaching?
- iii. Find out the difference in mean scores of students taught Basic Science concepts by teachers who taught using high level verbal-interaction employing Collegial Teaching and those the same concepts using low level verbal- interaction.
- iv. Is there any difference in the mean rank of students' attitudes towards Basic Science when taught by teachers using high, medium and low levels of verbal- interaction employing Collegial Teaching and their counterparts taught the same concepts using Lecture Method?
- v. What is the difference in the mean rank of male and female students' attitudes towards Basic Science when taught by teachers using high, medium and low level of verbal - interaction employing Collegial Method?

1.5 Null Hypotheses

On the basis of the research questions, the following null hypotheses were formulated for testing at $p \leq 0.05$ level of significance.

HO₁: There is no significant difference in the mean academic scores of students taught Basic Science by teachers using high, medium and low levels of verbal-interaction employing Collegial Teaching and their counterparts taught the same concepts using Lecture Method.

HO₂: There is no significant difference in the mean academic scores of male and female students taught Basic Science by teachers using high, medium and low level of verbal- interaction employing Collegial Method.

HO₃: There is no significant difference in the mean academic scores of students taught Basic Science concepts by teachers using high level verbal-interaction employing Collegial Teaching and those taught the same concepts using low level verbal-interaction.

HO₄: There is no significant difference in mean rank in attitude of students taught Basic Science concepts by teachers using high, medium, and low level verbal-interaction employing Collegial Teaching and those taught the same concepts using lecture Method.

HO₅: There is no significant difference in the mean rank in attitude of male and female students' towards Basic Science when taught by teachers using high, medium and low level of verbal interaction employing Collegial Method?

1.6 Basic Assumptions

The following assumptions were made for this study:

1. Basic Science teachers are familiar with collegial teaching and learning of Basic Science at Junior Secondary School.

2. Teachers and students alike relate freely using verbal interaction during Basic Science teaching/learning and there are positive attitudes toward the subject.
3. All concepts in Basic Science can be taught using collegial teaching.
4. There will be adequate time to teach the Basic Science concepts.

1.7 Significance of the Study

The findings of the study will hopefully benefit the following groups of people in the following ways.

Science Teachers: collegiality will lead to developing an effective educator force that is responsive to the diverse academic needs and cultural backgrounds of all students. In addition ongoing training will provide practical tools for new teachers and administrators, such as guidance, troubleshooting, observation and quality feedback, with the goal of supporting teachers in their profession. Also it will lead to higher quality instructions and in turn increase students' academic performance.

Curriculum Planners: Collegial teaching provides professional development and program innovation to build capacity for school and to guide education reform by curriculum developers as it affects schools.

Professional Bodies and Associations: bodies such as Science Teachers Association of Nigeria (STAN), National Education Research Development Council (NERDC), and National Teachers Institute (NTI) will benefit from this study by way of production of Basic Science course materials in schools to reflect the culture, and tradition of Nigerians. Through courses, seminars, conferences and workshops that shall be organized from time to time, teachers will improve in their pedagogical approach to teaching Basic Science. Fear, and anxiety commonly observe among teachers will be reduced if not removed totally. Teachers will receive necessary training to overcome trouble shooting areas in teacher classrooms practices and so become more confident in what they do.

Basic Science Students; it is hoped that students' academic performance will improved greatly since teaching methods are enhanced through professional development of teachers. When teachers work together in harmony there are greater chances of success than doing it alone. Students' academic needs will be attended to promptly.

Textbook Publishers; new teachers' guide books will be produced in line with the new approach to teaching and learning science. Also text books to support and provide adequate information will be produced.

Researchers: Will benefit from the findings of this study by getting new information that will be added to the existing literature. The findings of this study will also be a foundation for further studies on Collegial Teaching.

1.8 Scope of the Study

This study investigated the impact of Collegial Teaching and verbal-interaction on attitudes and academic performance of Basic Science students among junior secondary school students in Kafanchan Education Zone of kaduna State Nigeria.

There are thirty five (35) co-educational junior secondary schools in the zone with a population of seven thousand two hundred and sixty four students (7264).

The samples for the study were drawn from the public secondary schools of the Zone. The need to carry out the study with students who were stable in school was considered to avoid likely barriers to successful work. In this regard, the Junior Secondary II class was selected because Junior Secondary I students were newly introduced to Basic Science at this level, while J.S. III students were busy preparing for their final examination and did not concentration well.

The topics taught were drawn from the Basic Science syllabus for JSS II. Under Theme I: You and Environment which have the following units:

- i. Family health diseases
- ii. Environmental pollution of water, air and soil
- iii. Drug abuse II
- iv. Changes in matter.

These units are part of the junior secondary school II syllabus. Some teachers from the sample schools have complained of the difficult nature of the topics and the report of Junior Secondary School Certificate Examination (JSSCE 2015) also revealed that Basic Science teachers consider these concepts to be difficult. In addition these topics were treated using the three levels of verbal-interaction namely; high, medium and low level interaction.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This study aimed at determining the impact of collegial teaching and levels of verbal interaction, on academic performance and students' attitudes towards Basic Science at the J.S in Kafanchan, education zone Kaduna state. In this chapter, the review of related literature is organized and presented under the following sub- headings:

2.2 Historical Background of Basic Science

2.3 Teaching of Basic Science at the Upper Basic

2.4 Concept of Collegiality

2.4.1 Professional development and Collegial Teaching Strategy

2.4.2 Collegial Teaching in Basic Science and its benefits

2.5 Concept of Interaction

2.5.1 Interaction and Learning of Science

2.5.2 Verbal Interaction and Student's Performance in Science

2.6 Students' attitudes and Academic Performance in Science

2.7 Gender and Academic Performance in Science

2.8 Overview of Similar Studies

2.9 Implication of the Literature Reviewed for the Present Study

2.2 Historical Background of Basic Science

The teaching of science in Nigeria dated back to 1897. It was introduced as Nature study and Hygiene. Later it metamorphosed into Biology, Chemistry and Physics. (Martinslibrary.com 2013). As a step towards presenting science to the child, reflecting the culture and tradition of Nigerians the idea of the Nigeria Integrated Science Project (NISIP) was borne. This was an attempt to teach science as a unified whole. According to the Science Teachers' Association of Nigeria (1970), the teaching of science should enable students to:

1. observe carefully and thoroughly;
2. report completely and accurately;
3. organize information acquired;
4. generalize on the basis of acquired information;
5. predict as a result of the generalizations;
6. design experiments (including controls where necessary to check the predictions);
7. use models to explain phenomena where appropriate and
8. continue the process of inquiry.

The study of science has been of great importance to man as he seeks to uncover the hidden beauty of nature. According to National Open University of Nigeria NOUN (2015) there was the need for new and innovative way of teaching an improved science concepts which led to the invitation of STAN by West African Examination Council (WAEC) to help revise and improve the science syllabuses for West African School Certificate (WASC). Consequently a committee of Science Teachers Association of Nigeria (STAN) reviewed the syllabus in Biology, Chemistry, Physics, and Mathematics and went ahead to modify and adopt them for Junior Secondary School. The Committee published the curriculum newsletter No. 1 specifying the philosophy, methodology,

content and evaluation of integrated science. In addition, STAN and Heinemann Educational Books International, produced, Pupils' Textbooks, Teachers' Guide and Pupils' Workbooks in 1972.

The desire for this change was motivated by the launching of Sputnik into space by Russia in 1957 that resulted in innovations which began in the United States of America.

Some of the curricula that resulted included;

- I Biological Science Curriculum Study (BSCS)
- II Physical Science Study Committee Course (PSSC)
- III Chemical Bond Approach (CBA) and
- IV Chemical Study

The United Kingdom bearing in mind that they were our colonial masters equally sought for new ways to teach science like the Nullified Curriculum Project. Basic Science was one of such innovation ideas and Nigeria was not left out of this quest (Atadoga & Onaolapo, 2008). The new projects came with strategies that allowed for deeper understanding of scientific concepts and principles. This brought about new orientation to learn science which Nigeria benefitted immensely. Innovations in Basic science brought along infusion of new concepts in the curriculum of the course to conform to the changing times. This has made Basic Science very rich in terms of content. The innovation has also brought about new methods of teaching the subject so as to meet up with the challenges. It is in this direction that this study wants to establish the richness of the content and the impact of collegial teaching and verbal interaction on academic performance of Basic Science students.

2.3 Teaching of Basic Science at the Upper Basic

Teaching is a set of conscious and deliberate actions intended to induce learning by impacting desirable knowledge, skills and attitudes. It should be a morally and socially accepted activity whose end result or goal is learning. (Oyekan, 2006). Bunkure (2012) sees teaching as the meaningful interaction between the triads, the teacher, the learner and materials that ensures students gain in the learning process. This implies that teaching involves the transfer of knowledge from an expert to the learner.

The study of science is a deliberate attempt by humans to understand their environment. It is a search for meaning or explanations of events. Science at the Senior Secondary is an embodiment of Biology, Chemistry, and Physics whereas at the Junior Secondary it is called Basic Science. In recent times Basic science which is an innovation of Integrated Science came about as a result of Federal Government mandate to Nigerian Educational Research and Development Council (NERDC, 2007) to develop a curricula for use at all levels of the educational system in Nigeria in line with the declaration for a 9-Year Basic Education Programme. The NERDC then directed the National Council on Education (NCE) in December 2005 to re-structure and re-align the existing primary and junior secondary school curricula to meet the targets of the 9-Year Basic Education in the context of National Economic Empowerment and Development Strategies (NEEDS) and the Millennium Goals (MDGS) (FGN, 2007). The NCE also approved a new curriculum structure namely Lower Basic Education Curriculum (primary 1-3); Middle Basic Education Curriculum (primary 4-6); and Upper Basic Education Curriculum (JSS 1-3) listing relevant subjects for each level. The 9- Year Basic Education Curriculum (FGN, 2007) has the overall objectives to enable the learners to:

1. develop interest in science and technology

2. acquire basic knowledge and skills in science and technology
3. apply their scientific and technological knowledge and skills to meet Societal needs
4. take advantage of the numerous career opportunities offered by science and technology
5. become prepare for further studies in science and technology.

The Basic Science curriculum for JSS 1-3 is structured around four main themes,

- i. You and environment
- ii. Living and non -living things
- iii. Science and development
- iv. You and energy

These themes are sub-divided into topics and presented in a manner to emphasize the fundamental unity of science. The topics are taught drawing examples from the child's environment and with him being the central focus (child centered approach). The first theme, You and Environment include topics such as, family health, family traits, pollution, environmental hazards conservation and diseases. The second theme deals with living things and non- living things which draw reference from him and things revolve around him. Topics such as the human body, resources from living things, non- living components and resources from them are treated. The third theme has to do with science and development. The topics include gravitation and weightlessness, information and Communication Technology (ICT), satellite, space travel, crude oil and petrochemicals.

Theme four is concerned with the techniques of how man saves energy in doing work. Topics in this theme include tools for work, simple machines, work, energy, forces, renewable and non -renewable energy.

The curriculum treats each of the themes in each year. The themes are like the central pillars of a spiral in nature. By this nature of presentation the JSS Basic Science is referred to as spiral curriculum. The treatment of each theme is into a greater depth as the child moves from the lower to higher classes. This is likening to the Brunner's spiral curriculum. One fundamental characteristic of the Basic Science curriculum is that it is an activity based one meaning both teachers and students lay emphasize on them doing more than talking. Learners are active participants in the process of learning. This is purposely done to make learning interesting, interactive and a paradigm shift from the traditional rote learning where teachers dominate in the teaching learning process. This helps equip students with strategies and skills to approach the study of science with vigor and determination. The teaching of science is well structured to achieve the goal of learning more so that Basic Science covers so many sub-disciplines of science. Thus, teaching method is one crucial factor that affects academic performance of students. Daudu and Bikpo (2008) opined that to achieve the goals of teaching Basic Science several inputs are required which include the following;

I knowledge of the subject matter

II pedagogical skills and

III psychology of the learner

Psychological theories often considered include; Ausbel's theory of prior knowledge in learning, Gagne's hierarchical learning, Bruner's concept of discovery learning and spiral curriculum and Piaget's theory of cognitive development and its implications in science teaching. Methodology is very vital in any teaching/learning situation. The method adopted by the teacher may promote or hinder learning.

2.3.1 Science Teaching Methods

A teaching method comprises the principles and methods use for instruction to be implemented by teachers to achieve the desired learning by students (Ameh & Danladi, 2012). Some of the different common methods employ for teaching Basic Science include but not limited to the ones mentioned below:

- Lecture method
- Discovery method
- Demonstration method
- Field trip
- Discussion method
- Questioning method
- Laboratory and
- Collegial method

The selection of a teaching method must take into account not only the subject matter but also how students learn. This includes pedagogical skills and psychology of the learner. This is necessary because Basic Science covers so many sub-disciplines of science whose aim is to impart desirable knowledge, skills and attitudes. Whichever method a teacher chooses to use, attention should be given to the procedures that make student have effective learning by way of interaction with matter, relating well to understand basic concepts and principles of science.

The teaching and learning of Basic Science at J.S.S level is confronted with so many problems some of which include teachers' biases in teaching the subject, insufficient time allocation on the time table for science, poor teaching environment, problem of language of communication, attitudinal problems of students, as well as poor teaching methods leading to poor academic performance (Morika, 2009).

Teachers' Biases in Teaching Basic Science

Basic Science is one of the core subjects that is taught at the junior secondary school. It is at this level that young scientists are groomed and streamed into the fundamental science subjects of Biology, Chemistry, and Physics. Given the high value placed on science at the junior school curriculum they need to teach it effectively through an effective method is indisputable. It is on record that Basic Science curriculum has a hierarchical structure and in themes which are taught progressive. One of the basic problem militating against teaching Basic Science effectively is that teachers who handle both the content and method are bias in the approach to teaching. Some concepts are skipped because teachers major in particular subjects (Ajayi 2016).

There is the likelihood that some vital aspects of the subject will be left partially taught or not taught at all. Every science teacher does have his/her area of interest. This will affect learning of students immensely and may eventually lead to poor performance in the subject. One of the ways of overcoming this obstacle is by encouraging teachers to collaborate and to jointly teach the subject to enhance learners' performance, and attitudes. This is the idea behind collegial teaching. Collegial teaching is a teaching style where two or more teachers come together to share ideas in their areas of specialization and the all jointly prepare the lesson. The lesson is taught after thorough preparation and consultation. Another effect of teaching method on Basic Science is poor performance. According to Okoli (2000), the persistent poor performance leaves one in doubt of the effectiveness of the teaching methods employed by science teachers. Similarly Wudil (2013) explained that the poor performance among science students was because teachers of science employ the traditional lecture or expository methods with little or no attention to the procedures that make students have good learning and understanding of basic concepts and principles of science.

The methods outlined are being used to raise students' interest in science, as well as better teachers- students' interaction in classrooms to increase academic performance. All the methods have their advantages and disadvantages or inherent lapses so collegial teaching/learning and verbal interaction are being advocated as a way of enhancing teaching-learning in the classroom to add value to the study of science. Hollingworth (2002) posits that educationists pursue methods of professional development that can make a difference; these methods build on the assumptions that collegiality among professionals and active creation or redesign of educational materials and lesson scenario do not only lead to new ways of teaching but also to teachers' professional development. The conditions and results of these new approaches towards professional development are assessed using both qualitative and quantitative methods. Being a teacher means lifelong learning; both formally and informally. Our society is constantly changing, so also the educational content of schools and the student and teacher population. Professionals need to be equipped with the knowledge, skills and attitudes needed through collaborative/collegial teaching to enhance student learning in this constant changing environment. Therefore this study is a research into the impact of collegial teaching on students' attitudes and performance in Basic Science at the Junior Secondary School level.

2.4 Concept of Collegiality

Collegiality refers to the quality of the relationship among staff members in a school setting often the term carries with it a positive value, referring to good (supportive, stimulating, rewarding, equal/democratic) relationship among equals (Kelchtermans, 2006). Staff collegiality means cooperative effort among teachers in pursuit of a common goal. It has been defined as the sense of collaboration and shared purpose among teachers within the same school. Ingersoll, (2001) defined staff collegiality as limited to

relationship between teachers as peers and typically does not include the relationship between teacher and supervisors. While Shah and Abualrob (2012), see collegiality as a positive working relationship among teachers highlighted by a sense of collaboration among teachers to achieve a common goal.

Collaboration and collegiality are terms often used by educators interchangeably (Hargreaves, 1999), (South worth, 2000) (Ketchtermans, 2006). They terms are similar in meaning. According to Ketchitemans, (2006) collaboration is a descriptive term, referring to cooperative actions, while collegiality refers to the quality of the relationships among staff members in a school. Often the term carries with it a positive value, referring to “good” (Supportive stimulating, rewarding, and equal/democratic) relationships among equals. As such collegiality implies a normative dimension that goes beyond mere description and refers to an aspect of the school’s organizational culture. Accordingly collaboration and collegiality constitute and reflect one another. The actual actions of working together are determined by the quality of relationships among staff members. They reflect collegiality. At the same time, however, the actual actions contribute to the meaning and value of the professional relationships. Furthermore both collaboration and collegiality always appear in the particular context of a school, at a particular moment in time. Both terms constitute important working conditions for teachers and as such they influence the professional development of teachers and school.

2.4.1 Team and Collegial Teaching

Team teaching according to Unameiye and Ojikutu (2009) is teaching that is done through collaboration to carefully planned and integrate activities. Team teaching at its best is a rich and satisfying experience for teachers and students where more learning takes place than in a single teacher classroom. Teaching is done in quite different ways by

teachers. In doing so, teachers consider many factors so as to make it effective. Such factors like, content, process of delivering, ability level of students, age, academic level and students' comprehension. Many at times teaching is done by individuals or in groups. When more than one teacher is instructing students it is called team teaching. . It is the umbrella name for all forms of teaching in which two or more teachers work together for the common good of students. Team teaching can be observed in co-teaching, collegial teaching, collegial circle and collaborative teaching. Teachers sometimes find it difficult to go it alone beginning and going through the process without support. So team teaching is introduced as a possible remedy.

Team teaching allows teachers to co-plan, jointly instruct and reflect on what is carried out. In this kind of process quality instruction is observed. Fellow teachers gain strength from one another. Collegial teaching just like co-teaching and collaborative teaching is defined as two teachers working together with group of students; sharing the planning, organization, delivering and assessment of instruction, as well as the physical space (Washut & Bacharach, 2010). The cooperating teacher is one who is willing to mentor the teacher candidate using co-teaching approach. Usually co-teaching strategy is introduced during professional development. Collegial or co-teaching can be a wonderful experience when planning and communication are in place beginning day one. It helps special and regular education teachers' work together. According to National Education Association (NEA), (2015), there are six steps that can be found helpful when preparing for co-teaching experience.

- I Establish rapport
- II Identify your teaching styles and use them to create a cohesive classroom.
- III Discuss strengths and weaknesses.

IV Discuss individual education plans and regular education goals.

V Formulate a plan of active act as a unified team

VI Take risks and grow

Hence McLaughlin and Tolbert (2001) argued that school collegiality concerns the quality of the relationship between professionals in a school environment. It concerns colleagues helping each other with suggestions and ideas for better result oriented teaching, (Martinez, 2004). Therefore teachers need to interact with each other more than ever before since they face common and varied challenges in the school. The nature of the relationship among the adults within a school has a greater influence on the character and quality of that school and/or student accomplishment than anything else”. Reflecting on the issue of time to collegiate, Kenway et al (1999) argued that in particular such schools showed a strong community to providing more time for teacher learning and they have found creative approaches to maximizing existence time meeting for professional development and ensuring additional release time for teams.

It is warned that collegiality in any organization does not happen by chance it needs to be learned (Gramston, and Wellman 2003). It is therefore pointed out that the ground work for a collaborative and collegial culture is essential for schools teachers, who realize that a collection of superstar teachers working in isolation cannot produce the same results as interdependent colleagues who share and develop professional practices together. Shah, (2012) and Fullan (2013) noted that “collegiality among teachers, as measured by the frequency of communication, mutual support; and help are strong indicators of implementation success. Fullan concluded that the benefits of teacher collegiality/ collaboration include “greater student performance, more positive interpersonal relationships and cohesion as a staff, increase social support within the staff and enhance self-esteem for teachers”. Lencioni in Barth (2006) who worked with various

organizations to improve their leadership organizational health, team work and culture offers the following reflections. “When it comes to helping people find fulfillment in their work, there is nothing more important than team work like in collegial circles”.

For a school to be successful, Martinez (2004) suggested that three factors should be incorporated; administrative effectiveness, classroom excellence and school collegiality. Collegial relationships constitute important working conditions for teachers and as such they influence the professional development of teachers and schools. Furthermore, collegiality as have been said is built on quality relationships. However only few resources directly help teachers build the human relationship skills necessary to build a collegial environment. Materials such as books, training sessions or college coursework in this area aim at the administrative audience. The majority of development and growth opportunity for teachers addresses curriculum and instructions and how teachers can create effective learning environments inside the classroom at the expense of collegiality.

Martinez (2004) argued that collegiality contributes to every successful change and effective administrators purposely draw on the expertise of teachers to discuss or implement new initiatives and programs and if a change were to be implemented without teacher input, concerns about that change can be most effectively expressed by teachers with strong interpersonal skills. It therefore remains a fact that collegial relationships among teachers are a prerequisite for school improvement in academics and make knowledge sharing and innovative practice possible (Fullan, 2001). Furthermore an organization cannot realize its full potential without clear and cooperative interaction among employees. This is also true for schools. The basic underlying truth is that students cannot effectively learn until adult effectively get along.

People in general whether in social or work situations are influenced by their relationships with others (Aronson, 2002). In one of the classic studies in organizational behavior, Roethlisberger in Martinez (2004) found that workers satisfaction and productivity are influenced by social interaction. Teachers make important career decision based on collegiality or whether there is positive social interaction in their schools. There should be effective communication among teachers and between teachers and administration. Positive social interaction and making important career decision cannot be realize unless teachers get along. Working with different teachers and administrators requires skills and these skills can be learned. (Martinez, 2004). The overall analysis of the research studies on a teacher collegiality determines that effective collegiality in school is vital source of enhancement in staff professional growth, student learning and organizational effectiveness. (Shah, 2012). This study is pursuing the impact of collegial teaching and verbal interaction on students' attitudes and performance in Basic science.

2.4.2 Types of Collegial Relationships

Little (1999) identifies four types of collegial relationships found in schools as follows:

- I storytelling and scanning for ideas
- II aid and assistance
- III sharing and
- IV joint work

Storytelling and Scanning for Ideas

In this type of collegial relationship teachers share incomplete anecdotes about practice, complain and gripe. Interchange of ideas is neither deep nor focused on problem solving.

Aid and Assistance

Teachers help only when asked, offer little evaluation, and do not interfere with the other teachers. Work deep relationships of exchange of ideas are seldom established.

Sharing

Teachers share much about themselves. Use an expanded pool of resources and knowledge; and frequently share ideas and suggestions that can lead to change of the other teachers' practices but teachers undertake little or actually work together.

Joint work

In contrast to the first three types of collegiality, joint work provides the opportunity for teachers to develop. Teachers and administrators spend time observing each other and they instruct each other in craft of teaching through formal and informal demonstrations. These interactions can build a powerful and shared technical language about teaching and learning that is precise and concrete. Collegial environments favor in-depth problem solving and planning. Deeper and richer ties do fellow staff and to build more productive working relationships Joint work is the highest and most extended form of collegiality. Teachers pursue a course of study action together involving such things as team teaching, collaborative planning, peer coaching, mentoring and at times action research. Fullan and Hargreaves (1992) noted that joint work implies and create stronger interdependence, shared responsibilities, collective commitment and improvement, and greater readiness to participate in the difficult business of review and critique of their colleagues.' Joint work identified by little (1999) includes the following;

- i. designing and preparation of materials
- ii. designing curriculum units
- iii. research materials and ideas for curriculum
- iv. writing curriculum

- v. Prepare lesson plan.
- vi. Reviewing and discussing plans
- vii. Creating new ideas and programs
- viii. Persuading others to try an idea
- ix. Inviting others to observing one's lesson
- x. Analyzing practices and effects
- xi. Peer coaching

On his part, Barth (2006) categorizes collegial relationship in four ways:

- i. Parallel play
- ii. Adversarial relationships
- iii. congenial relationships and
- iv. collegial relationships

Parallel Play

Every one doing his own thing without knowing or caring about what the other staff members is doing. There is little or no connection among adults and their efforts.

Adversarial Relationship

This kind of relationship can be described as intentional actions intended to make a peer or peers look inferior, incompetent or lacking in certain skills. Barth indicates that it is this type of relationship that will actually drive teachers into parallel play.

Congenial Relationship

Barth describes this relationship as personal and friendly. He states that congenial relationships are a 'pre-condition for the collegial relationships. A lot seem to center around food for example one teacher makes the tea and pours it for a colleague or a principal gives a ride home so that the teacher can take care of a sick child. They are

personal and friendly. This type of relationship is “highly prized by school reformers yet highly elusive”. Barth contends that schools are full of good players (teachers).

Collegial Relationship

Collegiality is about getting people to work effectively together as a team. “The challenge for every organization is to build a feeling of oneness of dependence upon one another because the question is usually not how well each person works but how well they work together. The concept of collegiality has been highlighted as the quality of relationship among staff members of a school working well together. (Kay& de-Gruiter,2015). That where teachers work as colleagues to share and develop professional practices together, there is bound to be fulfillment in their work, student learning and organizational effectiveness.

Collegial relationship is the kind being envisaged in this study for practice in schools. It is in this idea that collegial teaching is being experimented in this study to see whether it can create an impact on students’ performance and attitudes when taught using different levels of verbal interaction.

2.4.3 Benefits of Teacher Collegiality in Schools

Research has consistently underlined the contribution of strong collegial relationships to school success (Jarzab & Kowski, 2003), (Retallick & Butt 2004) (Barth, 2006), (Goddard, & Goddard 2007). They argued that high levels of collegiality among staff members is one of the characteristics found most often among successful schools in terms of effective teaching and students achievement. In this regard teachers are increasingly being admonished to move away from the traditional norms of isolation and autonomy and to move towards greater collegiality and collaboration. Shah (2012) argued that collegiality is the aspect of teacher professional development and a vehicle to increase

teacher knowledge. Schools in recent years are believed to be the best places for teachers to learn and grow professionally and schools are beginning to restructure in ways that provide more opportunities for teachers to learn together (Darling-hammond & Mclaughlin, 2002)

Collegial communities create such a cooperative climate that heightens the level of innovation and enthusiasm among teachers and provide a continuous support for staff professional enhancement (Shah 2012). Educators and researchers have advocated the methods of teachers' growth and enhancement that are based on continuous collegial interaction and support (Shachar & Shmuelevitz 1997, Owen, 2005). It is suggested that teacher collegiality could modify instruction (Martinez 2008); therefore teachers need to recognize the value of working together and to focus on what they have in common, again teachers who work in collegial settings become more open to new ideas, teaching methods and resources.

Collegiality helps teachers to cope with uncertainty and complexity; respond effectively to rapid change and create a climate that value risk taking and continuous improvement (Hargreaves 1997). It is stated that teachers who work together become more flexible in times of change and cope with new demands that would normally exhaust the energy and resources of teachers working on their own (Jarzabkowski, 2003). Teacher collegiality has also been link in a positive way to teachers' sense of self-efficacy by researchers. Also norms of individualism and non-interference have shown to weaken teachers' confidence about the efficacy of their own practice which eventually limits the possibility of improving student learning (Shah, 2012). Collegiality is considered as the most important energy giver and it is claimed that when teachers have emotional connections with colleagues their teaching energy is high (Graves 2001)

Benefits for Students

Schools with higher levels of teachers' collegiality had higher performance scores (Goddard, 2007 et al, Lema et al 2006). This perhaps is the most fundamental reason for pursuing collegiality among staff members. It is believed that higher collegial relations among teaching staff lead to higher quality instruction and in turn increased student academic performance (Schmoker ,1999).

Benefits for Educational Organizations

Collegiality among staff is one of the most important factors in determining the quality of a school. It is assumed that the task of developing collegiality may be integral to the task of improving schools (Dufour 2004; Barth, 2006), and that the most promising strategy for sustained substantive school improvement is developing the ability among school personal to function as professional collegial communities. If collegiality is seen as a factor that can enhance teaching and learning and the hallmark of the school system is geared towards improvement then this study is determined to discover the impact of collegial teaching on performance of Basic Science students at the Junior Secondary School level.

2.4.4 Professional Development: Collegial Teaching Strategy

Teachers frequently complain that they feel isolated in their classrooms due to the fact that they have little professional time together. Professional development PD /or training and development has generally been referred to as those activities which systematically over a sustained period of time enable educators to acquire and apply the knowledge, understanding, skills and abilities to achieve personal and organizational goals and to facilitate the learning of students as stated by Indiana State Teachers Association (2004). So there are ways of encouraging teachers develop professionally to build effective

practice in schools. One of such ways is to initiate and maintain dialogue among teachers which is a form of collegial practice. Two or more teachers can come together in order to build each other through meaningful activities, sometimes call collegial circle. (de-Gruiter, Thompson & Williamson, 2015)

According to Professional Learning Rochester City School District (RCSD) (2014), a collegial circle is a group of teachers (usually 4 to 8) who meet regularly to solve common problems; to share opinion, research and strategize, and to discuss common needs, questions, and interest. A collegial circle provides educators with structured time for collegial support and study as well as an opportunity for reflection on practices. It provides opportunity for sharing expertise, for problem solving through group processes ultimately deepening the knowledge of teaching and learning. In addition collegial circle is designed to encourage effective teachers planning and reflection about the process of student learning. The ultimate value of the collegial circle is to gain insight based upon structured group experiences and shared commitment to the group. Specifically collegial circle is to:

- i. Refine teacher practice and enhance instruction.
- ii. Ultimately increase student performance/achievement.

RCSD (2014) asserted that teachers have choice, take responsibility for their growth as professionals and set their own agenda for studying, learning and changing or improving practice. Collegial circles can be powerful as small groups collaborate in support of each other as learners. As part of a collegial circle a teacher:

- i. participates in ongoing professional learning on group selected topics.
- ii. explores new methods to advance classroom practice follow by discussion and implementation of techniques.

- iii. shares best practices in a collaborative environment
- iv. extends the learning from a workshop or conference.

Victorian Institute of Teaching (2017) opined that collegial teaching activities and other team teaching opportunities allow teachers to practice and work reflectively with others to develop their practice. Further supportive teaching activities provide opportunity for experienced and inexperienced teachers to share their knowledge and skills and provide a focus for professional dialogue and the development of practices for effective student learning.

According to VIT (2017); ESSPIN (2013) Supportive models, for collegial work include a three step sequence of:

- i. Joint planning (10-15 minutes)
- ii. Shared teaching (the classroom activity)
- iii. Joint reflection discussion (10-15 minutes).

This model will be used for the collegial teaching where by a group of teachers meet regular to discuss concepts or topics to be treated beforehand. Areas of challenges are well addressed, such as activities, teaching aids, and likely question and facilitation. During lesson two teachers will be available, while one leads the class in all activities, they other supports, through timely intervention with ideas, facilitation and management of the class. After the lesson the two teachers find an exclusive place to reflect on what transpired in class. The supporting teacher makes the comment “well done” and then asks, how did it go? The teacher may mention his/her lapses or successes from where the supporting teacher will mention strengths/stars of the delivery and then wishes for improvement. Wishes should be in form of suggestions or getting the thoughts of the presenter and proffer solutions.

2.4.5 Collegial Teaching Strategy in Basic Science

Meeting is the key to the development of professional practice. To start collegial teaching it is encouraged that participants establish norms that are a consistent part of the process. These may include being on time; remaining confidential and being prepared. It is also important to establish how collegial staff members are. To do this, assess staff level of involvement in four core collegial behavior. Siebold (2008) provided a continuum for this purpose.

3= strong; 2= moderate; 1= weak

- a) Do teachers regularly solve problems together?
- b) Do teachers regularly observe other teachers teaching?
- c) Do teachers regularly share expertise?
- d) Do Teachers regularly develop curriculum together?

If your total is under ten perhaps your staff would benefit by implementing collegial circle.

Attitude for Success

Siebold (2008) suggested that to be successful and ultimately have a positive impact on the entire learning environment, the following attitudes must be understood and nurtured;

1. Professionals must understand and believe that they can learn from one another.
2. Teachers must value the expertise of colleagues
3. Time must be allocated for collegial sharing.
4. Collegiality is an investment in school wide quality
5. Meaningful collaboration takes time, energy and commitment
6. Collegiality must be a vital part of school professional development plan
7. Collegial participation should be expected, value and recognized
8. Collegial circle can transform how professionals see themselves and their work.

RCSD (2014) outlined four offices of leaders which are:

Facilitators: to support the group's thinking and learning, he or she can listen and use strategic questions and comments to refocus the team's discussion. The role of facilitators may rotate among team members

Scribe: the scribe is responsible for keeping records regarding the meetings and charts thoughts and ideas contributed and documents minutes, ideas and actions.

Time keeping: the time keeper ensures that the team completes the focus within the allocated time.

Critical friends: all participants bring meaningful contributions to the discussion they are collaborative and supportive in their positive/critical feedback.

Characteristics of a critical friend especially during observation and feedback should include but not limited to the seven mentioned (deGruiter, et al 2015)

- i. Good listener
- ii. Knowledgeable
- iii. Skillful
- iv. Objective
- v. Tolerant
- vi. Firm
- vii. Supportive

Choosing Focus Areas

To employ collegial teaching in the class it is good to choose an area of professional practice to develop during classroom activity. The activity should focus on something novel chosen independently or collectively. Some of these areas should include

- i. questioning techniques/
- ii. giving clear instructions

- iii. managing time
- iv. assessing progress and giving feedback
- v. monitoring and managing challenging behavior
- vi. organizing group work or multiple activities
- vii. managing materials and resources
- viii. Managing group discussions.

Worthy to note are action plans and reflection in the collegial process. Colligating teachers should consider as a group how to move their conversation into action with specific outcomes. They should include research, observations, core curriculum, classroom strategies, tools, guidelines, coaching, learning, workshop, training and projects (RSCD 2014).

Reflection: as the collegial circle develops, they should reflect upon their discussion and actions, this is done to express ideas, feelings, thoughts and notices.

Guiding questions may include.

- i. How has the collegial learning circle impacted your insight into your profession?
- ii. How has it affected teacher practice?
- iii. How has it enhance instruction in your classroom?
- iv. How has it increased student performance?

While team of teachers work in a collegial circle, it is important that they keep meeting records. RCSD (2014) offered a sample record which looks like this:

- i. Facilitators
- ii. Date
- iii. Sign-in
- iv. Summary of session
- v. Next meeting (agenda items, action items):

vi. Resources needed for next meeting.

A practical approach to implementing Basic Science teaching using the collegial strategy is what is being advocated by United Kingdom Department for International Development (DFID) funded programme designed to support federal and state governments in Nigeria to strengthen their teacher education programmes. (Teacher Development Programme). The main aim of the programme is to improve the teaching skills of thousands of teachers and improve learning outcomes of students. (UKaid, 2016) Teachers support each other in the discharge of their responsibilities. In addition a range of materials that can be used in the classroom to aid activity based teaching and learning is made available. The TDP model of teacher support is rooted in a unique blended methodology that combines the use of technology with face –face support. This model ensures the availability of materials like Audio-Visual on phones, audio materials for classroom activities and print materials like posters. Teachers also enjoy the benefits of face-face training, support visits to witness how they implement what they learn. In addition they are provided constructive feedback for more effective performance. One special provision in the programme is teachers working in partnership. Here they raise possible questions that may be asked and addressed them. So confidence is built among teachers as they prepare to go into the class. The subjects being address in this programme include; literacy and numeracy for primary schools and Basic Science for Junior secondary.

Collegial teaching as has being discussed in this unit highlighted what it stands for in terms of a cordial relationship existing between colleagues to promote teaching and learning. It is generally accepted that teachers are at their best when they plan together and deliver. Quality work is usually achieved when teachers work as team members. There is a process that is adhered to in terms of practicing collegial teaching in a school.

Teachers meet regularly to plan, share opinion, research and strategize together. During joint reflection there is openness where members in the collegial circle exhibit characteristics of critical friends such as being tolerant, bold, supportive, reliable, good listener and being objective.

Education Sector Support Programme in Nigeria (2013) aims at strengthening the governance framework which will enable basic education reform. The programme is giving support in policy, planning, monitoring and evaluating, the gathering and use of national data and resource allocation and funding. At the school level the project aims to significantly improve the learning environment for children by providing assistance in curriculum management, effectively measuring teaching quality and pupil learning, performance, school management and leadership, staff development and pupil welfare. At the community level ESSPIN promotes demand for better education services by developing School Base Management Committees (SBMC) to encourage the wider community to proactively participate and campaign for quality education.

Teachers supported each other in planning, developing course work, and shared teaching and reflect afterwards to establish strengths and weaknesses during delivery. Hence in this study teachers supported each other in planning, developing course work, and shared teaching and reflect afterwards to establish strengths and weaknesses during delivery. This will help to ascertain the impact of collegial teaching on attitudes and performance of Basic Science students at the Junior Secondary School level. Also teachers bias in treating concepts is overcome as they work together to eliminate difficulties. A summary of the step by step approach to implementing the process is presented in the flow chart below.

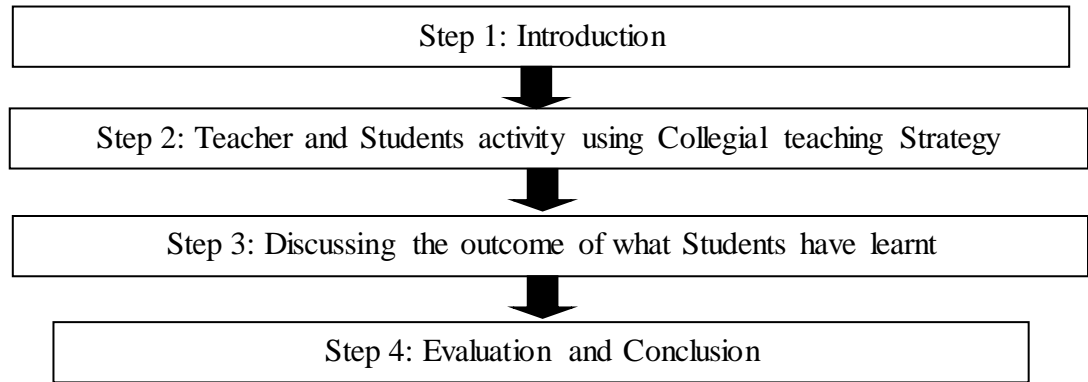


Figure 2.1: Flowchart of Collegial Teaching Strategy

Adapted from Education Sector Support Programme in Nigeria (ESSPIN, 2016)

2.5 Concept of Interaction

Interaction is a mutual reciprocal action of influence. It is a kind of action that occurs as two or more objects have an effect upon one another (Drees, Thorsson & Galitski, 2005). Classroom interaction by science teachers refers to the whole range of activities and experiences through which teachers; curriculum, materials, and learners interact. It has to do with the interactive processes through which teachers' implement the curriculum and impart learning to students using available materials (Goh and Frazer 1998).

Rhalmi (2016) discussed classroom interaction in three models. These are behavioural, cognitivism and social constructivism. Behavioural model is the use of techniques that bring students' behaviour under stimulus control. This model focuses mainly on the transmission of the right behavior to students by means of stimulus, response and reinforcement. The approach to teaching is mainly teacher centered. Students are mere recipients whose control over interaction is reduced to the minimum. Cognitivism is another model which classroom interaction is based on the learner processing of what is happening in the classroom to make sense of the world. The learner is actively involved in the learning by means of two processes namely assimilation and accommodation. Learners are actively engaged in the learning by questioning and making sense of the

world. Social constructivism interaction is at the heart of social constructivist theory of learning. Here learners make sense of the world not only by means of internal processes (happenings in the mind) but also through the social dimension of learning. This theory contends that human development is socially situated and knowledge is constructed through interaction with others.

Types of Classroom Interactions

- I Teacher- student
- II Students- teacher
- III Students- students

When the initiative comes from students in classroom interaction, the more learning is taking place. That is to say the students are freer to contribute by:

- I Asking and answering questions,
- II Taking decisions about the learning process
- III Participating in discussions,
- IV Initiating conversations

In a collegial teaching to improve good classroom interaction, the student-centered model is practiced where:

- I focus is on learning
- II focus is not on lectures but on tasks
- III students work in small collaborative small groups to answer tasks
- IV students talking time is high
- V students are provided with sufficient time and opportunity to listen and consider the ideas of others
- VI critical thinking is promoted

Teacher-student interaction in the classroom is about teaching and learning which is done through verbal communication. Communication from the Latin *Communicare* meaning “to share” is the activity of conveying information through the exchange of thoughts, messages, or information, as by speech, visuals, signals, writing, or behaviour. Communication is an inherently social interaction, and communicative competence is the ability to engage in inter subjective interactions. Verbal communication refers to the use of sounds and language to relay a message (Krauss, 2013). It serves as a vehicle for expressing desires, ideas and concepts and is vital to the processes of learning and teaching. In communication with non- verbal forms (gestures, body language, posture, facial expression, eye contact and sign language) of communication, verbal communication acts as the primary tool for expression between two or more people. According to Krauss (2013) signs and symbols are the major signals that make up verbal communication. Words act as symbols and signs are secondary products of the underlying message and include things like tone of voice, blushing and facial expressions.

Krauss (2013) explained that verbal communication has many purposes, but its main function is relaying a message to one or more recipients. It encompasses everything from simple one syllable sounds to complex discussions and relies on both language and emotion to produce the desired effect.

Verbal communication can be used to inform, inquire, argue and discuss topics of all kinds. It is vital to teaching and learning, as well as forming bonds and building relationships with other people. Communicating with others involves three primary steps: thought: First information exists in the mind of the sender; this can be a concept, idea, information, or feelings. Encoding: Next, a message is sent to a receiver in words or other

symbols. Decoding: Lastly, the receiver translates the words or symbols into a concept or information that he or she can understand (Berko, 2013).

Studies have shown that teacher classroom interactions is central to effective curriculum implementation as it has a strong influence on students' learning outcomes (Alausa, 2007). Henderson et al (2000) reported that students' perceptions of their teacher classroom interaction influenced attitudinal outcomes, adding that where students perceive teachers as initiating satisfactory classroom interactions their feelings and motivational attainment in the biology curriculum were positively affected. This is in line with Wubbels (1993) theory of teacher classroom behaviour model in science that include students responsibility and freedom, understanding, helping/friendly, leadership behaviours, uncertain, dissatisfied, admonishing and strict behaviours. In their findings (Onwuacha&Nwakonobi 2009) on students' evaluation of classroom interactions of their Biology students, in secondary schools perceived their biology teachers as leaders, understanding, admonishing and strict. They however disagree that the teachers allow student responsibility and freedom, uncertain or dissatisfied and admonishing. This finding is consistent with Scott (2003) who found that Australian students rated their teachers as being strong leaders and understanding. Onwuacha&Nwakonobi (2009) findings suggest that as much as the biology teachers were perceived as being leaders and understanding by the students, the teachers have not been able to establish a caring, learning environment by being helpful/friendly and allowing students' freedom. This may be because the biology teachers are accustomed to teacher centred teaching in a highly teacher dominated environment. It may also be due to inadequate facilities for teaching and learning in the schools. Hence, the teachers often find it difficult to devolve responsibilities to students.

Every day, teachers make countless real-time decisions and facilitate dozens of interactions between themselves and their students. Educators often talk about these decisions and interactions in different ways. According to Muntner (2008) the classroom Assessment Scoring System (CLASS) development at the University of Virginia's centre for Advanced Study of Teaching and Learning helps educators view classrooms through a common lens and discuss them using a common language, providing support for improving the quality of teacher-student interactions and, ultimately; student learning. The CLASS describes ten dimensions of teaching that are linked to student performance and social development. Each of the ten dimensions falls into one of the three broad categories; emotional support, classroom organization and instructional support.

Muntner (2008), further explained the three categories as follows:

- a. Emotional support refers to the ways teachers help children develop warm, supportive relationships, experience enjoyment and excitement about learning feel comfortable in the classroom, and experience appropriate levels of autonomy or independence. This includes:
 - i Positive climate – the enjoyment and emotional connection that teachers have with students as well as the nature of peer interactions.
 - ii Negative climate – the level of expressed negativity such as anger, hostility or aggression exhibited by teachers and/or students in the classroom
 - iii Teacher sensitivity – teachers' responsiveness to students' academic and emotional needs and
 - iv Regard for student perspectives – the degree to which teachers' interactions with students and classroom activities place an emphasis on students' interests, motivations and points of view.

- b. Classroom organization refers to the ways children develop skills to regulate their own behaviour, get the most learning out of each school day and maintain interest in all learning activities. This includes:
 - i Behaviour management – how well teacher monitor, prevent, and redirect misbehavior;
 - ii Productivity – how well the classroom runs with respect to routines, how well students understand the routine, and disagree to which teachers provide activities and directions so that maximum can be spent in learning activities and
 - iii Instructional learning formats – how teachers engage students in activities and facilitate activities so that learning opportunities are maximized.
- c. Instructional support refers to the ways in which teachers effectively support students’ cognitive development and language growth. This includes:
 - i Concept development – how teachers use instructional discussions and activities to promote students’ higher – order thinking skills and cognition in contrast to a focus on rote instruction;
 - ii Quality of feedback – how teachers expand participation and learning through feedback to students; and language modeling – the extent to which teachers stimulate, facilitate, and encourage students’ language use.

Verbal Communication Skills worth Mastering in Teaching and Learning Science

Smith (2010) explained 10 verbal communication tips teachers should all strive to master. Each of these just as important in our personal lives as in our professional lives. By improving your verbal communication skills you will quickly connect and build rapport, earn respect, gain influence, and become more likable and accepted.

- 1) Be friendly, people who communicate with a friendly tone and warm smile almost always have the edge.
- 2) Think before you speak. Better to remain silent and be thought a fool, than to open your mouth and remove all doubt. Some people say things that end up reflecting poorly on themselves.
- 3) Be clear. People who are indirect in their verbal communication and who tend to hint at things without saying that is really on their mind are seldom respected.
- 4) Don't talk too much, very few people like to be around someone who talks too much and dominates the conversation.
- 5) Be your authentic self. People were turned off by those people who feel the need to put a show to make their point. Instead people are attracted to someone who speaks from the heart and is genuine, transparent and real
- 6) Practice humility. People who speak with humility and genuine respect for others are almost always held in high regard
- 7) Speak with confidence. Speaking with confidence includes the words you choose; the tone of your voice, your eye contact and body language. Read a lot for if you have knowledge you can talk about anything and everything
- 8) Focus on your body language. When you are engaged in face-to-face verbal communication, your body language can play significant a role in the message you communicates as the words you speak. Your body language communicates respect and interest: Try to add humor.
- 9) Be concise. Constantly ask yourself, how can I say what needs to be said using the fewest number of words possible while still being courteous and respectful.
- 10) Learn the art of listening. Being an attentive listener is more important in verbal communication than any words that can come out of your mouth, show a sincerely

interest in what is being said, ask good questions, listen to the message and avoid interruption. Delay judgment until you have heard everything.

2.5.1 Interaction and Learning of Science

Ongoing interaction or communication between students and teachers is often difficult to achieve. (Adams, 2009). To improve your ability to communicate with students, Warren & Bok, (2009) and Strawbridge & Breakell (2010) offered that this can be done by giving students some ground rules for discussion, and engage them with comfortable, simple discussion topics and task early enough. Furthermore the following are some beginning suggestions for getting your students to interact more often and more effectively in your class.

- I Before class, write out questions that you are going to ask students so that the inquiries are not vague.
- II Be sure that your wait (silent) time exceeds ten seconds.
- III Call on those who do not participate
- IV Have students write out an answer to a problem or question
- V Be prepared to break your question down to more simple questions in the event that students do not answer the first time
- VI Become aware and watch facial and body gestures as you ask/answer questions do not alienate students when you disagree with or misunderstand them.

Teaching/learning is interactive in nature. Effective teaching/learning is a function of such interactions between teachers and their students, between and among students, between the class and its environment (Olu, 2004). To practice critical thinking, students need to participate in discourse of discipline, to think, speak and be listened to as they participate in the discipline's particular mode of inquiry. Students will get enough practice just by talking to instructors. Biyi (2001) noted that adequate distribution and

discussion of question in the class often helps eliminates boredom, dizziness, absent mindedness and other problems relating to idleness on the part of student during lesson. Teacher-students interaction in a classroom is a two way process. Each participant influences the behaviour of other students' and condition teachers' behaviour as much as teacher conditions students' behaviour. Verbal communication is the main form of interaction between teachers and students in schools. Effective teaching/learning is a function of such interactions between teachers and their students and among students. Students are better informed and active if given opportunity to express themselves freely. Healthy relationships are developed which give birth to students' involvement in the learning process. The situation in our classrooms seems to favour teachers talking more and doing more at the expense of students.

This study is therefore looking for ways of empowering students in the classroom the more in terms of being proactive so as to get the best out of them. Collegial teaching is being introduced in this study to help teachers (who are mentees at the initial stage, then mentors later) to organize learning by encouraging better verbal and other forms of interaction in the class. Three levels of teacher-students interactions have been identified, (Hough, 1966). These are high level interaction, medium interaction, and low level interaction. Each of them is classified base on who is dominating the interaction. Olajide (2002) affirmed that teacher-students interaction varies. Teacher aspect of interaction include such behaviors like accepting feelings, praises, use of students' ideas, asking questions, answering students, corrective feedback and the likes while students aspect of interaction consist of student talk response, students ask questions, silence and contemplation, confusion and irrelevant behavior. The three levels of teacher- students interaction identified earlier can be explained thus: Abdullahi (1998) describe low teacher-student interaction as the situation whereby the teacher ask narrow questions in

the form of drill requiring one worded answer as "yes" or "no". Thus low level of teacher-students' verbal interaction is when teacher talk within the range of 61-100% and students talk within a range of 0-40%. Medium teacher-student interaction can be regarded as an average amount of interaction between high teacher-student interaction and low teacher-student interaction. Medium level of teacher- student verbal-interaction is thus, when the teacher talk is 50% and student 50%. High level of teacher-student verbal-interaction refers to full participation of students in the classroom. In this instance the teacher initiates the talk by asking broad questions which are relatively open-ended, thought provoking or requiring expression of opinions or feelings which aim to elicit long response from students. High level of teacher- student interaction is thus a situation whereby teacher talk within a range of 0-40% and students talk within a range of 61-80%.

This study is therefore looking for ways of empowering students in the classroom the more in terms of being proactive so as to get the best out of them. Collegial teaching is being introduced in this study to help teachers (who are mentees at the initial stage, then mentors later) to organize learning by encouraging better verbal and other forms of interaction in the class. Students are given the opportunity to participate actively through discussions, ask questions, class activities and make suggestions. The pattern looks like this.

Table 2.1: Egglestones Interaction Analysis Category System Checklist

Observation	Time-Interval-in Min	Aspect of Interaction Teacher	Student	Table of Frequency for Twelve Contact Lessons.
1	0-3	Teacher ask question		12
2	3-6		Students talk response	24
3	6-9	Teacher lectures		12
4	9-12		Silence and contemplation	12
5	12-15	Direct practice or activity		12
6	15-18		Student talk response	36
7	18-21		Student talk response	12
8	21-24		Student talk responses	24
9	24-27		Confusion and irrelevant behavior	12
10	27-30	Corrective feedback		12
11	30-33		Student talk-emitted	24
12	33-35	Teacher Criticizes and Justifies Authority		12
Total		30%	70%	100%

Source: Adapted from Tambaya (2008)

In a study carried out by Tambaya (2008) on the Effects of Levels of Teacher -Student Verbal Interaction on Biology Academic Achievement of Senior Secondary School Students of Sabon Gari L.G.A of Kaduna State, he showed that there was significant difference in the academic achievement of biology students exposed to different levels of teacher-student verbal interaction. The significant difference indicates that high level of teacher student verbal interaction recorded the highest mean score followed by medium level and the least was low level of teacher- student verbal interaction. His findings tallied with those of Olajide (2002), Rekha and Fisher (2004). This study is therefore a further attempt to experiment the impact of collegial teaching on academic performance and

attitudes of students towards basic science when exposed to different levels of verbal interaction in classroom practices. Since the teacher plays crucial roles in educating students, it is naturally necessary to seek for ways of supporting and encouraging him to succeed in his profession. Dzama and Osborne (1999) observed that there is poor performance in science in developing countries and that teachers have to introduce methods, which will develop students' scientific understanding.

2.5.2 Verbal Interaction and Students' Performance in Science

Academic performance is a complex student behaviour and underlies several abilities like memory, previous knowledge or aptitude as well as psychological factors such as motivation, interest, temperament or emotions (Deary, whiteman, Starr, whalley& fox 2004). According to Adamu, (1998) it is the extent by which learners performed in the lesson taught or examination result. Similarly Adesoji (2008) sees academic achievement representing performance outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments, specifically in school, college and university. Academic performance should be considered to be a multifaceted construct that comprises different domains of learning. There are many criteria that indicate academic performance, such as procedural and declarative knowledge acquired in an educational system.

Academic performance is therefore a measure of what students do in the school over a period of time. Each school does aim to ensure that students achieve better results at all times. However over sometimes in Nigeria academic performance has not shown positive results. Adamu (1998) argued that causes of low academic performance are diverse and cannot be associated with a single major factor alone, for instance proponents of self-concept have found that self- concept and its variable may be a paramount factor in

academic failure. Causes of fluctuating performance among students have also been attributed to teacher-teacher, teacher –students’ relationships and methods employ for teaching. Olorukooba, Lawal and Jiya (2012) worked on teaching methods and academic performance in science education and agreed that there is a relationship between the type of method adopted in teaching and students’ academic performance. Furthermore Wong (1999) in his studies, “There is only one way to improve student achievement” opined that the only factor that can create student performance is a knowledgeable, skillful teacher; that is what the teacher knows and can do. In this direction therefore, education leaders should know that what matters is whether schools can offer their neediest students good teachers trained in effective strategies to teach strong academic knowledge and skills.

Okebukola (1992) and Adesoji (1992) have shown that method of instruction can influence the performance of low achieving students. Therefore how can teachers teach all students to high standards in mixed ability classrooms? Students come from different cultures racial and socio economic backgrounds. In this regard teachers need to seek for strategies that enable them to teach all students effectively. Differentiated instruction is a strategy by which teachers adapt instruction to meet students’ varied learning needs.

From the foregoing it is very clear that academic performance is related to teaching methods adopted by teacher in the classroom; by way of what the learner knows and can do. Aronso (2014) offered that as educators working in schools, we need to understand what research in education and psychology is discovering about the impact the teachers have on students’ performance. We want our practice to be grounded on strategies that are based on insightful, rigorous research. As educators we should shape our classrooms that are supportive; motivating and empowering for our students which will encourage

academic performance. Macalalag, Brockway, Mckay and Mcgrath (2007) conducted a research on partnership to improve academic performance in basic skills showed that intensive teacher professional development which encourages teachers' collegiality, improved content knowledge of teachers and students in life science and engineering as well as improve students' motivation to learn science. In this regard teachers team to address common challenges face in teaching science.

In another attempt to improve student academic achievement in mathematics and science, Mason, Gomar, and Ghenciu (2011) through a project worked in two basic areas to enhance the content knowledge and teaching skills of classroom teachers. This was necessitated by the need for high quality professional development programmes in mathematics and science. They discovered that there was high performance due to the quality of interaction between teachers. It also addressed effective pedagogical strategies in mathematics and science, including contextual teaching, problem-based learning, and inquiry-based learning. The project was grounded in the belief that "teacher professional development is not an event, it is a process" (Harwell 2003).

In a similar study of professional development of teachers, Gamoran (2002) found that "most teachers considered time spent planning and learning with other teachers as most valuable" and that teacher "noted that this activity was vital to their growth and development as they worked to change their teaching practice". Harwell, (2003) noted that the process of professional development was based on sound educational practice that presents information and learning activities in familiar and useful contexts. So professional development should also support interaction among master teachers, take place over an extended period and provide opportunities for teachers to try new behaviours in safe environments and receive feedbacks from peers. This professional

development project met these criteria. Mason et al (2011) concluded that integrated approach has proven to be an effective professional development model that results in growth in teacher content and pedagogical knowledge in both mathematics and science.

All that is done to change students thinking to get expected results is geared towards academic performance. If students cannot perform well in class activities, there are fewer chances that they would less on the long run. So many factors contribute to making a success story in terms of good results in schools. Among these factors is the teacher who is critical to changing things meaningfully. As much as a teacher may be zealous in the profession, it is equally true that he/she may lack the requisite skills to help students be at their best. Teachers do not sometimes be at their best when they teach alone but they feel encourage when they work in conjunction with others. Therefore collegial teaching is being introduced in this research work to professionally develop teachers in classroom practices like teacher-student interaction which is envisaged to bring about high academic performance and a positive attitude towards basic science.

2.6 Students' Attitudes and Academic Performance in Science

Ibraheem (2008) defined attitude as a learned disposition to respond in a consistently favourable or unfavourable manner with respect to a given subject. The term attitude according to Habor-Peters (2005) refers to a hypothetical construct, namely a predisposition to evaluate some objects in a favourable or unfavourable manner. This predisposition cannot be directly observed and is inferred from the individual's response to the attitude object, which can run from over behaviour or covert responses. They are manifested in conscious experience, verbal reports, overt behavior, and physiological indicators. The concept of attitude arises from attempts to account for observed regularities in the behavior of individual person. Hence attitude can be positive,

favourable, neutral negative or unfavourable. In relation to students learning science, therefore, if students experience some difficulties in learning Basic Science they will manifest unfavourable attitudes towards the subject. However if students have favourable or positive attitudes towards Basic Science, it will manifest in their likeness of the course.

Pudlo (2016) outline ten major scientific attitudes which are:

- I Belief: A scientist believes that everything that happens in this world has a cause or reason
- II Curiosity: A scientist shows interest and pays particular attentions to objects or events. He asks questions and seeks answers.
- III Objectivity: A scientist is objective if he does not allow his feelings and bias to influence his recording of observations, interpretation of data and formulation of conclusions.
- IV Critical mindedness: A scientist bases suggestions and conclusions on evidence when in doubt are questions the veracity of a statement in relation to the evidences presented
- V Open mindedness: A scientist listens to and respects the ideas of others. He accepts criticism and changes his mind if reliable evidence contradicts his believes.
- VI Inventiveness: A scientist can generate new and original ideas.
- VII Risk taking: A scientist expresses his opinions and tries new ideas even at the risk of failure criticism
- VII Intellectual honesty: A scientist gives a truthful report of observations. He does not withhold important information just to please himself or others.
- VIII Humility: A scientist is humble when he admits that he is not free from committing errors. He recognizes that there may be better ideas and realizes that there are

individuals whom he may have to consult to whom he may have to consult to arrive at correct observations and conclusions.

IX Responsibility: A scientist actively participates in a task and also dutifully perform tasks assigned to him.

The development of attitudes can be facilitated by good and suitable instructional approach hence it will lead to high level performance in science. Bature (2005) observed that major determining factors for attitude formation are the individual wants, information on group affiliation and personality. He further asserted that the importance of attitude arises from the fact that it has strong influence upon behavior and kinds of satisfaction and values the individual chooses. In addition attitude which is an expression of likeness or dislikeness plays a significant role in learning of science subjects (Situ 2008). Students attitude towards science subjects is influenced by the instructional strategies employed in the process of teaching. (Timothy 2005).

Krough (2000) identified factors that relate to students attitudes towards science. These include, parents, gender, age, cognitive styles of pupils, career interest societal view of science and scientists. Kola and Dube (2005) worked on the influence of conceptual instruction on students attitudes towards subjects. The result was that attitudes become more positive after instruction. Ibrahim (2000) supported this view through his work that groups that score significantly high in science achievement test also score significantly high in attitude test after instruction. Attitude was also reported by Schibeci in Olorukooba (2001) as having a direct effect on science achievement among American high schools students. Also students taught using cooperative learning strategy had positive attitude to the educational benefits from group work. Furthermore, attitude is a variable that does affect learning positively or negatively. Attitude regulates behavior that is directed towards or way from an object or situation. According to victor in

Lakpini (2006), the way and manner a subject matter is taught or handled affects the attitude of the learners either positively or negatively. For positive attitude to be developed, pleasant events must exist during the time of encountering the subject matter. In addition she reported that positive attitude to science enhanced academic achievement in science by 20-30%, while negative attitude on the contrary could lead to low expectation in students academic achievement.

Dana (2006) and Adesoji (2008) revealed that a person's attitude is learned as opposed to being inherited. Such attitude can be influenced by factors like the nature of subject and instructional strategy among others. Therefore attitude is a significant factor that can enhance students' performance when positively inculcated in the students. It is in line with this that this study intends to experiment the impact of collegial teaching and verbal interaction on academic performance and students attitude towards basic science.

2.7 Gender and Academic Performance in Science

Ogunsola-Bandele, (2000) carried out a research work on gender effects on academic achievement and reported that there is proportionate low achievement of female in science education programmes and careers. This gave the male a greater domination than their female counterparts. Other studies like the one carried out by Akanbi, 2004 found that girls under estimate their own academic ability and believe boys to be superior and intelligence than them and hence more capable of handling different subjects like sciences and mathematics. This is valid where co-educational schools exist. But Ermosho in Isa (2012) countered that the lack of female interest as well as low achievement was because they don't experience science through activities. He further argued that girls interest towards science increases when science is related to their concerns and with the effective use of instructional methodologies.

Also Okeke (2001), and Aluko (2005) opined that gender has no effect on students achievement in science while Mari in Mohammed 2012 explained that female subjects were significantly better than their male counterparts and that there was a significantly difference between the male and female in their ability to solve quantitative problems. However Mari and Tongding (2010) found out that male and female students with the same entry qualification do not differ significantly in performances. While some instructional strategies are gender bias others are gender friendly. However the degree of gender related differences in learning vary from one method of instruction to the other. Bichi (2006) reported that many studies in Singapore suggested that boys achieve better than girls in mathematics while Philips (2006) explained that girls excel consistently in arithmetic computation and are superior in reading and hand writing while boys are slightly better in arithmetic reasoning, history, geography and geometry.

Okwo and Otubah (2007) in their studies on gender and cognitive styles found that gender and cognitive styles are individually and jointly significant factors influencing achievement in physics essay test. It is often claimed that very few girls choose science in school and apart from biology very few of them are keen in science subjects. Bell (2001) confirmed such as a view by showing that girls are more interested and perform better in biology. The results obtained from researches in gender are not consistent, some favour males while some favour females and sometimes there is no gender difference in the performance of students. Therefore the impact of collegial teaching and verbal-interaction on academic performance and attitudes towards Basic Science will be determined in this study.

2.8 Overview of Similar Studies

This section reviewed similar studies carried out by other researchers related to the one in this study. The place where the study was carried out, population, experimental design, instrument for data collection, statistical tool for analysis and the outcome of each study is presented as follows:

Shah and Abualrob (2012) undertook a study on teacher collegiality and teacher professional commitment in public secondary schools in Islamabad Pakistan. The study was a quantitative, non-experimental design conducted in 17 public secondary schools consisting eight male and nine female schools. The survey questionnaire was distributed to all the teaching staff and a total of 364 completed questionnaires were collected from the selected schools after a period of two weeks for scoring and analysis. The survey instrument consisted of two measures, Teacher Collegiality Scale (TCS) and Occupational Commitment Scale (OCS). TCS was a self -developed scale consisting of 32 items. The scale addressed seven dimensions of collegiality among secondary school teachers; demonstrating mutual support, and trust, observing one another teaching, joint planning and assessment, sharing ideas and expertise, teaching each other, developing curriculum together, and sharing resources. OCS consisted of 18 items and measures three forms of commitment; affective commitment, continence commitment and normative commitment. A likert scale ranging from 1-7 (1= strong disagree; 7=strongly agree) was used for both the measures. The coefficient alpha for TCS ranged from 0.71 to 0.85. The Crombach alpha values for OCS ranged from 0.86 to 0.88. Data were analyzed using descriptive as well as inferential statistics Structural Equation Modeling (SEM). AMOS 160 was used to analyze the impact of teacher collegiality on teacher professional commitment.

The results revealed that teachers in Islamabad supported their colleagues. They trusted each other and felt comfortable in sharing their skills and expertise. Teachers did not hesitate in asking for suggestions about classroom management and discipline issues. However, they needed to be more open with their colleague about discussing instructional matters. Similarly, planning teaching strategies together and exercising joint assessment were less obvious among secondary school teachers. Most teachers however believed that they shared knowledge as well as other resources with their peers which enhanced collegiality and professional commitment positively.

This study under review is similar to this study in many areas; it was carried out on teachers' practices in schools as it relates to teachers' ongoing professional development with particular reference to teacher collegiality. The research work was carried out in male and female public secondary schools of Pakistan. In the same vein, the present study was centered on teacher's variable as it affects students' success at the Junior Secondary School level in Nigeria. Whereas the study under review did not look at the various levels of verbal- interaction in relation to attitudes and performance of students, the present study did. Again the study under review covered 17 public secondary schools consisting of eight male and nine female schools whereas the present study consisted of four co-educational schools in kafanchan Educational Zone of Kaduna State Nigeria. Data were analyzed using descriptive as well as inferential statistics structural equation modeling while the present study employed t-test and ANCOVA for the statistical test.

Goddard and Goddard (2007) conducted an empirical investigation of teacher collegial/collaboration for school improvement and student performance at the elementary school in one large urban school district located in the Midwestern USA. Survey data were drawn from a sample of 47 elementary 2,536 fourth-grade students. The

data collected was third-grade mathematics and reading scores. The researchers employed the Hierarchical Linear Modeling (HLM) as primary analytic method which has a reliability estimate for intercepts to be $r = 0.92$. At the student level, the study employed controls for children's social and academic backgrounds. The study revealed that when teachers collaborated/ collegiate the share experiences and knowledge which promoted learning. Such learning helped teachers solve educational problems which in turn had the potential to benefit students academically. Furthermore it must be said that of all the many resources required by schools, the most vital are the contributions of effort, commitment and involvement from teachers. From the study it was established that teacher collegial/collaboration was associated with increased levels of students' performance in both mathematics and reading.

The research was an empirical investigation of teacher collegiality in school which increased students' performance. This was very similar to this study since this researcher concentrating on teachers (collegiality) which promoted learning, solved educational problems thereby increasing students' performance in secondary schools. Academic performance was one of the dependent variables of this study. The two studies are different in the sense that they are at different geographical locations while one was in USA, the other was in Nigeria. Furthermore the present study looked at the relationship between collegial teaching and verbal-interaction on attitudes and performance of junior secondary school students, the other centered on how collegiality affects students' performance at the elementary school. The research designs were different too, the previous study used Hierarchical Linear Modeling (HLM) method while the present study was a quasi- comparative experimental and control design.

Retallick and Butt (2004) undertook a research on professional well-being and learning: a study of teacher peer work place relationships in Canadian Primary and Secondary Schools. It was a quantitative, non- experimental research design. The major purpose of this research was to portray the essential structures and processes of teachers' experiences of work-life relationships with their fellow teachers (collegiality). Themes discerned from the interpretation of autobiographical data taken from teachers' professional life stories with regard to positive and negative relationships were used to identify what collegial initiatives and actions were perceived by teachers to lead to professional well-being and productive learning in the work place.

Teachers responded in writing to the invitation to express a variety of feelings with regard to their work lives, depict events which gave rise to those feelings and reflect on why they feel that way. These provided portrayal of what this group of teachers found satisfying and dissatisfying about their working realities. The autobiographical data were gathered from 29 teachers in Canadian schools during one year in the late 1990s and validated by a group of 20 teachers in the year 2000. 17 of the 29 were working in elementary schools and 12 were working in grades 7-12. Twelve teachers were female and 17 were male.

For analysis of the non- experimental design, data was categorized into three broad themes; Climate which was related to teachers experiences of the general context within which they work. The second theme centered on collegial communication related to a generic and generative set of processes of verbal interaction between peers. The third theme is on facilitating workplace learning and teacher development; related to experiences of particular events of a substantive nature that focused on individual and collective professional learning.

The positive climate is characterized by four themes of collegial support which include recognition, respect and trust, mutual caring, and social cohesiveness. From the reports teachers acknowledged the support from colleagues. For the second theme on collegial communication; teachers expressed their satisfaction of the joy of sharing challenges and the oneness of purpose in doing their work, enhanced communication which was free flowing. The finding on facilitating work place learning and teacher development showed that it lead to career development and a wider variety of-peer-oriented professional learning strategies, evident in the sub-themes of apprentice, collegial mentor observation of role models, work teams,, action research, critical friend and collegial problem solving in dealing with difficulty associated with students learning.

Collegial environments favoured in-depth understanding between teachers and enhanced joint planning problem solving, and communication between teachers and students. If verbal interaction was improved at the junior secondary level where teaching and learning was child-centered, (students talk more), effective learning took place viz-viz: greater academic performance. Also there was a great impact on teachers' attitudes towards students and the curriculum. This also agreed with this study which was centered on collegial teaching and verbal interaction and their impact on attitudes and performance of junior ssecondary school students. The second theme in the previous study centered on collegial communication related to a generic and generative set of processes of verbal interaction between peers. Whereas the present research centered on impact of verbal- interaction between students- students and students- teachers respectively. While the reviewed study was a quantitative design, this study was a two group pretest-posttest quasi comparative experimental design. Also the study was carried out in Canada in 2000, while this study was in Nigeria.

Usendia and Effiong (2015) conducted a research on verbal interaction patterns and Junior secondary students' performance in Basic science and technology in Uyo, Akwa Ibom Nigeria. The study investigated the effects of dominative and integrative classroom interaction (adopting Flanders' and Eggleston's interaction Analysis category system checklist to measure teacher-students verbal interaction in the classroom, high, medium and low interaction) patterns on the performance of basic science and technology students considering teacher's qualifications and teacher's years of experiences and teacher's gender. The study was a quasi-experimental research conducted in Uyo Local Government, Akwa Ibom Nigeria. 994 JSII students comprising 420 males and 574 female students and 20 JSII Basic Science technology teachers selected from 10 public co-educational schools. Criterion sampling technique formed the study sample. Two researches made instruments, Basic Science and Technology Performance Test (BSTPT) with reliability co-efficient 0.75 and Teachers Classroom Interaction Analysis Checklist (TCIAC) adapted from Flanders Interaction Analysis Category System Checklist (FIACSC) with intra item reliability co-efficient of 0.80 and 0.75 were used in collecting data. Data generated were analyzed using t-test and Analysis of Variance (ANOVA). The findings indicated a significant influence of teachers' classroom interaction patterns on students' performance with students in integrative classroom performing significantly better than those in the teacher dominated classes.

The link between this study reviewed and the present research was that both studies were Nigerian based and centered on verbal interaction patterns and performance in Basic Science among Junior Secondary II students. Both studies adapted Flanders and Eggleston's interaction Analysis category system checklist to measure teacher-students verbal interaction in the classroom. (High, medium and low interaction). Data generated were analyzed using T-Test, Analysis of variance and Analysis of covariance. The result

of reviewed literature showed that teachers' classroom interaction on patterns of students' performance in integrated classroom perform significantly better than those in the teacher dominated classes. The outcome corresponded with the present study where teachers in junior secondary schools collegiate and allowed high level of verbal-interaction. It showed that some types of classroom interactions can have a positive effect on various outcomes such as academic development, achievement and attitudes towards learning science. The main difference between the two studies was that the previous researched on the impact of verbal interaction patterns on students' performance in Basic Science while the present study centered on collegial teaching and verbal-interaction and their impact on students' attitudes and performance in Basic Science.

Tambaya (2008) investigated the effects of levels of teacher-student verbal interaction on biology academic achievement of senior secondary school students. Four null hypotheses were stipulated and tested at 0.05 level of significance. Senior secondary school II students of SabonGari Zaria formed the subjects of this study for the 2005/2006 session. The study used the pretest –posttest quasi experimental group design. The subjects were randomly classified into three experimental groups. Group A with low level teacher-student interaction, Group B with medium level of teacher-student verbal interaction and Group C with high level of teacher-student verbal interaction. Biology Achievement Test (BAT) with a reliability coefficient of 0.66 and Eggleston Science Teaching Observation Schedule (ESTOS) were the two instruments used in data collection. Achievement data collected were analyzed using analysis of variance (ANOVA) and t-test statistical techniques. The treatment lasted for a period of six weeks. The result of the analysis showed that there were significant differences in the achievements of the subjects exposed to different levels of verbal teacher-student interaction with high level having

better achievement than the medium level. There were also significant differences of gender when exposed to low and high level of teacher-student interaction.

From the result using high and medium levels of teacher-student interaction achieved better. Hence the two results agreed in many areas such as: both treatments lasted for a period of six weeks, the research design, the adaptation of Eggleston science Teachers' Observation Schedule, use of t-test and Analysis of Variance for results analysis. The outcome of the analysis also showed that both teacher-students exposed to various levels of verbal-interaction lead to better performance of students in Basic Science with high level verbal-interaction producing better performance than low level verbal interaction. The differences in the two studies lie in the study variables, whereas the previous study researched on effects of levels of teacher- students' verbal-interaction on Biology academic achievement of senior secondary school students, the present investigated impact of collegial teaching and verbal-interaction on attitudes and performance of Basic Science Students. On performance and gender, male students performed better in the present study unlike the previous. Whereas female attitudes are favourable towards Basic Science than males' students, the students' attitudes towards Biology was not considered in the study under review.

In study on gender Rekha and Fisher (2004) investigated teacher-student interpersonal behavior and its association with cultural and gender differences, attitudes and achievement among secondary science students in India. They used a descriptive survey design for the research. The sample was made up of 1,021 students from 31 year nine and ten science classes in seven schools who completed an already existing and widely used instrument, the Questionnaire on Teacher Interaction (QTI). It had a reliability coefficient of $r = 0.89$; an attitude scale with a reliability of $r = 0.63$ and questions relating to the

cultural background of students. The statistical analysis confirmed the reliability and validity of QTI for secondary science students in India. The dimensions of QTI were found to be significantly associated with students attitude score. As for cognitive achievement there were positive associations with cooperative behavior and negative associations with oppositional behaviours. Female students perceived their teachers more positively than did their male students. Students coming from Kashmiri cultural background perceived their teachers most positively.

Similarities in the two studies can be seen in the teacher-student interpersonal behavior in association with gender differences and students' attitudes and performance/achievement. On a general level both students and teachers relate through communication in the class and attitudes are some of the variables investigated in both studies. Again female students showed positive attitudes disposition toward science than the males in both studies. However the previous study was descriptive design and based in India while the present study is quasi-experimental survey carried out in Kaduna state Nigeria therefore t-test and analysis of variance were used for the analysis. While the reviewed literature investigated teacher-student interpersonal behavior and its association with cultural and gender differences, attitudes and achievement among secondary science students in India the present study looked at the impact of collegial teaching and verbal-interaction on attitudes and performance of Basic Science students in Kafanchan educational zone in Kaduna State Nigeria. The previous study did not investigate impact of verbal interaction on attitudes and performance while the present study did.

Ayodele and Olatunbosun (2015) investigated gender differences in performance and students attitudes towards Basic Science in JSS in Ekiti State Nigeria using a descriptive survey research method. 300 JS II students were selected from 12 public schools across

the state made up of 160 males and 140 females using multistage random sampling technique. Two instruments namely Scientific Attitude Inventory II (SAI II) and Basic Science Achievement Test (BSAT) was used for the analysis of data. SAI and BSAT had a reliability of 0.78 and 0.89 respectively. Data analyzed using inferential statistics such as t-test and pearson's product moment correlation analysis. The study revealed that there was no significant difference in students' gender and performance in Basic Science. The study also showed that there was a significant positive relationship between students' attitude and performance in Basic Science. Furthermore it was established that there is no significant difference between students' gender and attitudes towards Basic Science. The study also showed that there was a significant positive relationship between students' attitude and performance in Basic Science. Furthermore it was established that there is no significant difference between students' gender and attitudes towards Basic Science. Although boys tend to dominate classroom talk and there was evidence to suggest that teachers deliberately gear the content of lessons toward boys interest in order to retained attention and control. Teachers tend to interact more with male student than females.

Both studies were carried among JS II public schools in Nigeria and equally investigated gender differences in performance and students attitudes towards Basic Science. Again both studies used Scientific Attitude Inventory and Basic Science Achievement Test to collect data for analysis. Differences in the two studies are found in the variables under investigation, while the previous investigated gender differences in performance and students attitudes towards Basic Science in JSS the present researched on impact of collegial teaching and verbal-interaction on attitudes and performance of Basic Science Students. While the previous used descriptive survey and later used empirical research. On analysis of results the previous used t-test and pearson's product moment correlation analysis, the later used t-test and ANCOVA for analysis. The previous study revealed that

there was no significant difference in students' gender and performance in Basic Science. The study also showed that there was a significant positive relationship between students' attitude and performance in Basic Science whereas the outcome in the present study showed that male performance better than females and in terms of attitudes female students are inclined more to the study of science.

Oludipe (2012) investigated the influence of gender difference on Junior Secondary Students' Academic Achievement in Basic Science using cooperative learning teaching strategy. (Collegial learning/teaching is a form of cooperative learning/teaching strategy). A total number of one hundred and twenty (120) students obtained from the intact classes of the three selected junior secondary schools in the three selected local government areas of Ogun State, South West Nigeria; participated in the study. The study employed a quasi-experimental design. Lesson note based on the jig saw II cooperative learning strategy and Achievement Test for Basic Science Students (ATBSS) were the instruments used to collect relevant data. Spearman – Brown co-efficient statistical method was used to determine the reliability co-efficient of the instrument which was found to be 0.751. The analysis was computed using SPSS 15.00 Package. The data collected was analyzed using descriptive and independent samples t-test statistical method. Findings of the study revealed that there was no significant difference in academic achievement/performance of male and female students at the pretest, posttest, and delayed posttest levels respectively. The research suggested that in order to encourage more women into pure science-oriented courses, interventions need to be designed that focus not only on the academic achievement of girls but also on how to make science related occupations more interesting for young high achieving girls. The two studies are similar for the fact that both investigated the influence of cooperative /collegial teaching on male and female academic performance of junior secondary school students in Nigeria. Both studies

employed quasi- experimental design. The two studies differ in the number of variables investigated; while the former investigated the influence of gender difference on Junior Secondary Students' Academic Achievement in Basic Science using cooperative learning teaching strategy.

Collegial learning/teaching is a form of cooperative learning/teaching strategy, the later observed the impact of collegial teaching and verbal interaction on the attitudes and performance of Basic Science students. While the former used descriptive and independent samples t-test statistical method the later used t-test and analysis of variance and covariance. The results of the findings showed that there was no significant difference in academic performance of male and female students in the previous study but male students performed better than female students in the present study.

The review of similar studies has afforded the opportunity of understand effects of various teaching methods on such variables like performance, attitudes, verbal interaction, as they relate to students learning at the junior secondary school. In this study therefore the impact of collegial teaching and verbal interaction on students' attitudes and performance in Basic Science among junior secondary school students was investigated.

2.9 Implication of the Literature Reviewed for the Present Study

Abundant research activities concerning Collegial Teaching, verbal interaction, performance and attitudes of students towards Basic Science were reviewed in this chapter. The summaries of these studies and their implications on the present study are presented below.

The outcome of literature reviewed dwelt so much on strong and healthy collegial relationships in educational environment and professional development of practicing teachers. However, majority of previous studies on collegial teaching were undertaken in

foreign countries and mostly quantitative non-experimental in nature. Moreover they worked in supportive environment which has to do with school climate, quality and character of school life as it relates to norms and values and organizational processes and structures. It is in line with this that the present study undertook research in a different setting with the numerous challenges of the school climate in Nigeria aside lack of active participation of students during lessons. A lot of studies revealed that there was a significant influence of teachers' classroom interaction pattern on students' performance with students in integrative classroom performing better than those in teacher dominated classes which addressed levels verbal-interaction (Usendia & Effiong, 2015). In addition performance of students in school environment where they were exposed to high, medium and low level teacher-student interaction using problem solving method performed better. The levels of verbal interaction were also found to be gender friendly (Tambaya, 2008). To correlate this interesting relationship, the present study investigated verbal interaction at different levels by comparing experimental groups and control using Collegial Teaching for the treatment as a means of promoting interaction in class. Eggleston Science Teaching Observation Schedule was employed to measure teacher- student interaction.

Gender differences in performance and students' attitudes toward Basic Science were investigated in previous studies. The results showed that there is a high correlation between positive attitude and performance towards science. The results too are gender friendly (Rekha & Fisher, 2004; Oludipe, 2012; Ayodele & Olatunbosun, 2015). The differences in the previous and present studies lie in the approach to the investigation. Whereas the former used descriptive and cooperative learning to arrive at the results stated, the present study used Collegial Teaching and verbal- interaction to uncover the

relationship between the variables and this research was experimental in nature. The groups were made of three levels of verbal interaction and control group.

Of all the studies reviewed none of them investigated impact of collegial teaching and verbal interaction on performance and attitudes of students towards Basic Science at the junior secondary level. Teachers are found to be bias in teaching Basic Science due mainly to their training. Teachers often skip topics or concept they are not conversant with. This has adversely affected the coverage of the curriculum. The situation is even worsened by the fact that Basic Science themes are structured in such a way that concepts are expanded as students' progress through the years. The highlights in the literature reviewed have opened up gaps or areas of deficiencies in teaching and learning Basic Science in Nigeria. Such gaps as mentioned earlier include the issues of biases in handling topics, the lack of confidence to communicate fluently, the large number of students and inability to organize them for effective learning and teachers dominating discussions were addressed in the course of discussion in literature. Highlights worth mentioning are lesson plans that have been produced in appendix 8, suggesting alternative teaching strategy (collegial teaching) which is not common in Nigeria, promoting students attitudes towards learning Basic Science and addressing different levels of verbal interaction in the class and encouraging active participation through assigning group task and giving room for students to talk. Even though majority of studies were carried out in foreign countries, the present study was conducted in Nigeria at the junior secondary school level where meaningful interaction was encouraged to promote healthy relationship between teachers/students which lead to improved students' performance. It is against this background that the present study was undertaken.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

The study determined the impact of collegial teaching and verbal interaction on academic performance and attitudes of students towards Basic Science at upper basic level of education in Kafanchan educational zone, Kaduna state, Nigeria. In this chapter, the procedure of the research methodology was addressed under the following sub- headings:

3.2 Research Design

3.3 Population

3.4 Sample and Sampling Techniques

3.5 Instrumentation

3.5.1 Validity of the Instrument

3.6 Pilot Testing of the instruments

3.6.1 Reliability of the Instruments

3.6.2 Item Analysis (DI) (FI)

3.7 Administration of Treatment

3.8 Data Collection Procedure

3.9 Procedure for Data Analysis

3.2 Research Design

Quasi comparative experimental control group design was employed for this research. The design enable comparison between treatments verses control conditions (De Vaus, 2001;Gorard, 2013) This design was used to examine the impact of Collegial Teaching on students' performance and attitudes toward basic science when they are taught by teachers using different levels of teacher- student verbal interaction for both experimental and control groups. There were high level verbal interaction (HVI), medium level verbal interaction (MVI), and low level verbal interaction, (LVI). The four schools were exposed to the same content of the curriculum except the teaching method and the teachers engaged. Also the four schools were located far apart to avoid interference.

The experimental groups comprised three schools which were subjected to high, medium and low level verbal interaction respectively. Each class in each school was handled by two teachers who were trained by the researcher on Collegial Teaching for two weeks. One teacher supported the other in the class and the topics treated were shared by them where their roles interchanged. They were then monitored by the researcher and research assistants frequently and they equally took part in the teaching. To select teachers that were engaged in Collegial Teaching strategy from the three treatment schools, first the researcher demonstrated through teaching some lessons using the three levels of verbal interaction. A test was then conducted to ascertain teachers with equivalent skills on how to use Eggleston's Science Teaching Observation schedules before the commencement of the training. Thereafter a pretest was used to determine the students' comparable performance before commencement of the treatment and a posttest was administered after the treatment.

The instruments used were the Basic Science Academic Performance Test (BASPT) and Attitude of Students towards Basic Science Inventory (ASTBASI). Data collected were analyzed using analysis of covariance (ANCOVA) and Scheffé's test. There were four schools in all (3 experimental and 1 control) for the study. The research design is represented in Figure 3.1

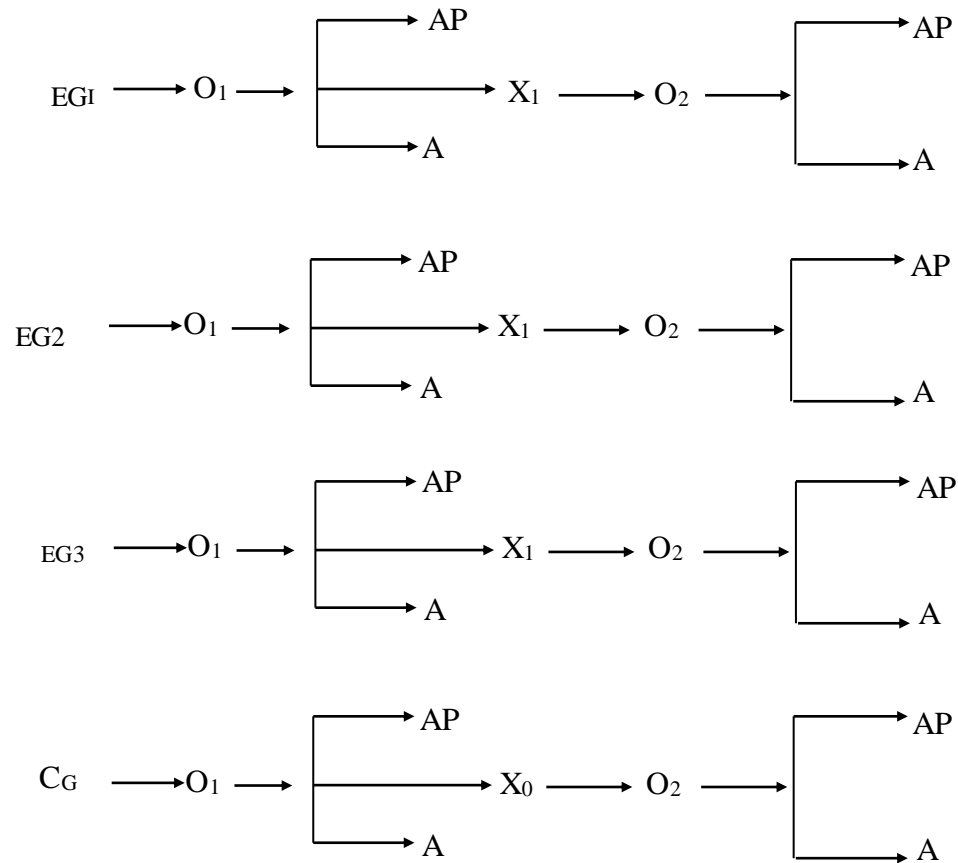


Figure 3.1: Research Design

Where:

- EG1 = High Level Interaction (HVI)
- EG2 = Medium Level Interaction (MVI)
- EG3 = Low Level Interaction (LVI)
- CG = Control Group (Control for HVI, MVI and LVI)
- O1 = Pretest
- O2 = Posttest.
- X1 = Collegial Teaching (Treatment)
- X0 = Lecture method (Control)
- AP = Academic Performance

A = Attitude

3.3 Population

The population of this study comprised of all Basic Science students in the 35 public junior secondary schools of Kafanchan Inspectorate zone of Kaduna state. The schools were located in four Local Governments Areas of the state namely Kaura, Jema'a, Jaba, and ZangoKataf. Kaura (1334 male and 1409 females), Jema'a (1016 males and 1438 females), Jaba (764 males 759 females). The total number of male students was 3383, while total number of female students for the four local governments was 3881. The total number of students in the population was 7264. The population is presented in Table 3.1.

Table 3.1: Population of the Study

S/No.	Name of School	L.G.A.	Male	Female	Total
1	GSS Kaf	Jema'a	219	195	414
2	GGSS Kaf	Jema'a	0	251	251
3	GJSS Jemaa	Jema'a	72	185	257
4	GSS Rafin Raga	Jema'a	50	53	103
5	GSS U/Fari	Jema'a	73	70	143
6	GSS B/Kogi	Jema'a	35	50	85
7	GJSS F/Kagoma	Jema'a	119	187	306
8	GSS Zikpak	Jema'a	177	170	347
9	GSS S/Kaninkon	Jema'a	85	81	166
10	GSS Fori	Jema'a	46	58	104
11	GJSS Kuryas	Jema'a	140	138	278
12	GJSS Kadarko	Kaura	210	191	401
13	GJSS Mallagum	Kaura	111	143	254
14	GSS T/Kagoro	Kaura	52	63	115
15	GJSS F/Daji	Kaura	48	41	89
16	GJSS Mahuta	Kaura	53	59	112
17	GJSS Manchok	Kaura	142	178	320
18	GJSS Bondon	Kaura	188	182	370
19	GSS Zankan	Kaura	150	124	274
20	GSS Zangang	Kaura	71	80	151
21	GSS F/Attakar	Kaura	159	179	338
22	GSS K/Daji	Kaura	150	169	319
23	GSS Afana	Z/Kataf	81	85	166
24	GJSS U/Rimi	Z/Kataf	112	128	240
25	GJSS Magata	Z/Kataf	76	62	138
26	GJSS Nok	Jaba	101	114	215
27	GSS B/Fushi	Jaba	77	79	156
28	GJSS N/Kwoi	Jaba	181	169	350
29	GSS Ramindop	Jaba	60	42	102
30	GJSS S/Zuro	Jaba	105	125	230
31	GJSS Angwal	Jaba	23	32	55
32	GSS U/Rana	Jaba	96	76	172
33	GSS Bitaro	Jaba	29	43	72
34	GJSS Gora 'A'	Jaba	30	25	55
35	GJSS Ankung	Jaba	62	54	116
Total			3383	3881	7264

Source: Kafanchan Inspectorate Division. (2016)

3.4 Sample and Sampling Technique

The Junior Secondary II Students of 2015/2016 session from Kafanchan Education Zone formed the subjects of this study. Two coeducational schools each were first selected through stratified random sampling method from the four local governments that made up the educational zone. This was done to allow wide and equal representation of each local

government. This was achieved by mixing 2 'yes' and 'nos' for the schools in each local government. As a result of this exercise, eight schools were listed. The eight schools were again subjected to another round of balloting by picking from a container where 4 'Yes' and 4 'No' squeezed pieces of paper were dropped. Representatives of the eight schools picked on their behalf. The four "yes" schools were then used for the research. At the schools level one arm was taken out of the many using previous terms' examination records. From the results obtained, four classes with similarity in performance (using previous term's result since all category of students sit for the same examination conducted by the same body)formed the sample for the study. Three schools out of the four formed the experimental groups while the last school formed the control. Each class in each school was handled by two teachers who are trained on Collegial Teaching using Eggleston Science Teaching Observation Schedule aspects of verbal interaction.

To select teachers that were engaged in Collegial teaching strategy for high, medium and low level verbal interaction from the three treatment schools, first the researcher demonstrated through teaching some lessons using the three levels of verbal interaction to the school teachers. A test was then conducted to ascertain teachers with equivalent skills on how to use Eggleston's Science Teaching Observation schedules before the commencement of the training. Base on their performance their schools were assigned to experimental groups 1, 2 and 3 respectively. The training of the teachers by the researcher on Collegial Teaching was for two weeks. One teacher supported the other in the class and the topics treated were shared by them where their roles interchanged. They were then monitored by the researcher and research assistants frequently and they equally took part in the teaching to ensure compliance. A pretest was conducted and ANCOVA and Scheffe's test were used to analyze the result. This test was conducted just at the onset of the exercise to ascertain the reliability of the instruments to be employed for the research.

For the purpose of this research, ‘intact classes’ of students were used as the sample size. The total number for the four schools sampled was one hundred and eighty two (182), made up of 83 males and 99 females. This number is justified by Tuckman (1975) and Sambo (2002) assertion who opined that a minimum of 30 subjects are required to carry out an empirical research.

Table 3.2: Sample for the Study

S/N	Name of School	Schools	No. Enrolled	Students Sampled Arm	Boys	Girls	Group
1	Experimental Group 1	A	115	31	13	18	EG1
2	Experimental Group 2	B	347	49	24	25	EG2
3	Experimental Group 3	C	254	51	25	26	EG3
4	Control Group	D	240	51	21	30	CG
		Total	956	182	83	99	

3.5 Instrumentation

The instruments used for testing teachers before commencement of teaching, students’ performance and attitudes toward science in experimental and control groups were:

- Eggleston's Science Teaching Observation Schedule (ESTOS)
- Basic Science Performance Test. (BASPT)
- Attitude of Students toward Basic Science Inventory (ASTBASI).

I. Eggleston's Science Teaching Observation Schedule (ESTOS)

Eggleston's Science Teaching Observation Schedule (ESTOS) adapted from Usman in Tambaya (2008) was used for this study. Since it has been long when the reliability of the instrument was established and the learning environment differs it became imperative to ascertain through a test-retest observation examination of teachers who took part in teaching. Science Teaching Observation Schedule deals with on-the-spot observation of science teachers during science lessons. The emphasis is on structured

observation: Observing individuals in careful defined situations. Just as with questionnaires and interviews there is a scientific as well as a socio-anthropological approach to observation. The interaction analysis categories consist of ten categories of communication, seven used when the teacher is talking and two when a student is talking (and one when there is silence or confusion). ESTOS requires the researcher to categorize what is happening at regular interval that is to record continually moving to a new column every 3 minutes of lesson time the activities being carried by students or teachers. (Tall, 1999).

II Basic Science Performance Test (BASPT)

The Basic Science Performance Test (BASPT) was developed by the researcher and validated by three experts in Science Education Department Faculty of Education A.B.U Zaria. The performance test consisted of 30 objective items covering the whole Basic Science syllabus especially topics treated in JS 1 and II. Some of other questions were picked from previous thesis on performance and attitudes of students and on the same topics in JS II curriculum for instance Gazama (2010) and Isa (2012) works were utilized. The topics taught were drawn from the Basic Science syllabus for JSS II. Under the Theme I You and Environment which has the following units:

- I Family health diseases
- II Environmental pollution of water, air and soil
- III Drug abuse II
- IV Changes in matter.

These topics were treated because they were topics in the curriculum for the term. Again the researcher through interaction with the teachers indicated that the concepts were difficult to teach and Examiners report from Kaduna Resource Centre (2008) showed performance in these areas to be poor.

The numbers of questions drawn from the various performance test items are represented in the table of specification below.

Table 3.3: Table of Specification for Basic Science Performance Test Items

	Items	Total
Knowledge	1,2,3,4,5,8,10,11, 12,13,18,21,24,27, 29	15
Comprehension	16,17	2
Application	6,7,9,14,15,25, 28, 20	8
Analyzing	19, 30	2
Synthesizing	12, 26	2
Evaluation	22	1
Total		40

III. Attitude of Students Towards Basic Science Inventory (ASTBASI)

The Attitude of Students Towards Basic Science Inventory (ASTBASI) adapted from Heckler (2015) for the purpose of this study. Heckler used science news articles in the secondary science classroom to determine the effect on students' summative assessment scores and attitude toward science. It was a master's research presented to the faculty of the Patton College of Education and Human services Ohio University. U.S.A The ASTBASQ is a 40-item survey utilizing a 5 point Likert scale: Strongly Agree (SA), Agree, (A), Neutral (N) Disagree (D), Strongly Disagree (SD). The original Attitudes toward Science Inventory (ATSI) had 48 –item survey utilizing a six-point likert scale (strongly agree, agree, weakly agree, weakly disagree, disagree, and strongly disagree.) The ATSI included six subscales: perceptions of the science teacher, anxiety toward science, value of science in society, self-concept in science, enjoyment of science, motivation in science. By each statement is a positive or negative sign to signal what side it is tilting toward. The ASTBASQ has included 7 items which are distributed according to 7 attitudinal variables

Students were expected to select from the Likert's scale by ticking against the statements one that best expresses their opinion towards the learning of Basic Science.

3.5.1 Validation of the Instruments (ESTOS, BASPT, ASTBASI)

Instruments used in the research were validated. This involved collecting and analyzing data to assess the accuracy of the instruments used. The test items were given to three experts of the rank of Professor, Principal lectures and Senior lecturers) who are well experienced in test construction in the department of science education and faculty of education Ahmadu Bello University Zaria to validate. The test items were also given to a panel of senior science teachers who teach in the Upper Basic level to seek for their face validation of the instrument. The experts made the following observations and contributions which helped in establishing the accuracy of the items:

A. Eggleston's Science Teaching Observation Schedule (ESTOS)

- determined the appropriateness of the wordings of the questionnaire items
- helped in determining the reliability of the test item
- determined the appropriateness of the length of the time required to take the test items
- helped determined the characteristics of ESTOS items through item analysis
- helped determined teachers compliance with the Eggleston schedule in teaching
- helped determined teachers abilities before the commencement and after the posttest

B. Basic Science Performance Test (BASPT)

To determine the accuracy of the Basic Science Performance Test instrument it was subjected to following observations and conditions:

- I the appropriateness of the wordings of the questionnaire items

- II. the number of questions included covered the topics undertaken
- III. the appropriateness of the length of time required to take the test items
- IV found out areas in the questionnaire that were not clear which students found difficult to understand and so made necessary changes
- V determined the inclusiveness of all aspects of Bloom's Taxonomy
- VI ensured that all Basic Science disciplines such as Biology, Chemistry, Geography, Mathematics, and Physics were included in the test items

Observations made by experts valuator's were that; Basic Science comprises many disciplines such as Biology Chemistry, Geography, Mathematics, and Physics so questions set reflected these areas; Bloom's Taxonomy of education was incorporated in establishing science learning objectives to reflect: knowledge, comprehension, application, analysis, synthesis, and evaluation in the instrument using action verbs.

- VII determined the reliability of the test item

C. Attitude of Students Towards Basic Science Inventory (ASTBASI)

To establish the accuracy of Attitude of Students towards Basic Science Inventory (ASTBASI), experts helped determined:

- I. the appropriateness of the wordings of the questionnaire items
- II. the number of questions included covering opinion towards the learning of Basic Science utilizing a 5 point Likert Scale
- III. the appropriateness of the length of time required to take the test items
- IV the questions that were not clear which students found difficult to understand
- V the reliability of the test item

3.5.2 Pilot Testing of Instruments

The instruments were pilot tested using a randomly selected school that was not to be involved for the main study to prevent the study subjects from having an idea of the instruments. Government Secondary School, Kafanchan was therefore used. Pilot testing was carried out to measure how well the items were to distinguish between examinees who are knowledgeable and those who are not. This helped to check the use of wrong keys to items, vagueness or extreme difficulty. Specifically the tests:

- I determined the appropriateness of the wordings of the questionnaire items
- II determined the reliability of the test item
- III determined the appropriateness of the length of the time required to take the test items
- IV found out the characteristics of ESTOS, BASPT and ASTBASI items through item analysis
- V found out teachers compliance with the Eggleston schedule in teaching
- VI found out areas in the questionnaires that were not vague which students may find difficult to understand
- VII determined students' abilities before the commencement of the research study

Before the administration of pre-test and posttest items, using ESTOS, BASPT, and ASTBASI, it was necessary to establish the reliability of the instruments.

3.5.3 Reliability of the Instruments

- a. The Reliability of Eggleston's Science Teaching Observation Schedule (ESTOS)

The Reliability of ESTOS was found to be 0.67. This was established after teachers were subjected to a pretest before teaching the science concepts in the study using Eggleston Science Teaching observation schedule and a posttest after the teaching was carried out at

an interval of two weeks to ascertain compliance with the observation Schedule. This was done after the pilot testing. Cronbach alpha was the statistical tool used for the analyses. The item analysis is in Appendix 2

b. The reliability of Basic Science Performance Test (BASPT)

The reliability of Basic Science Performance Test (BASPT) was determined by conducting the test with the designed instruments through a test-retest administration. The scores obtained were then subjected to test for reliability index and internal consistency coefficient of the items in the instrument. The observed reliability for BASPT was found to be 0.896. This was achieved by using the Statistical Package for Social Sciences (SPSS IBM version 20) with the t-test statistical technique.

C The reliability of Attitude of Students Towards Basic Science Inventory

The reliability of Attitude of Students Towards Basic Science Inventory (ASTBASI) was determined by conducting the test with the designed instruments in a pretest-posttest approach. The scores obtained were then tested for reliability index and internal consistency coefficient of the items within the instruments. It was established to be 0.866. This was obtained by using the Statistical Package for Social Sciences (SPSS IBM version 20) with the Kruskal Wallis statistical technique.

3.5.4 Item Analysis

Discriminating Index (DI)

The discriminating index of a test item is a measure of its ability to discriminate between high and low achievers in a test as a whole (Lakpini, 2006 & Usman 2007). It was calculated using the formula; $D = \frac{R_u - R_l}{N}$

Where; D =Discriminating Index

R_u =The number among upper 33%

R1 = The number among lower 33%

N = total number of respondents

The ranges for poor and good items adopted from Lakpini (2006) and Usman (2007) are;

0-30 Bad item

30-70 Moderately good items

70 and above = Bad item

The range picked for this study is 30-70 (moderately good items)

3.5.4.1 Facility Index (FI)

Facility index of an item indicates the percentage of candidates that got an item right, or a measure of how easy or difficult the question is for quiz takers (Butcher 2014). The facility index of the items in the BASPT was determined using the formula; $P = R/T$

Where P =Facility Index

R = number of candidates who got the item right

T = Total number of candidates that attempted the item.

Criteria for test items selection is those subjects who score below 40% and above 60% are rejected. (Field 2006 &Usman 2007). So in line with the argument only subjects who scored between 40%-60% were accepted.

From the above therefore, items in the draft BASPT, and ASTBASI were selected, modified or rejected.

The corrected versions of BASPT and ASTBASI based on the above criteria are at Appendix I. and II respectively.

3.5.5 Administration of the Treatment

The following strategies are the procedures that were followed to administer the treatment.

Step I: Training of Teachers/Research Assistance

The training of Basic Science teachers of upper basic who taught the selected classes was carried out by the researcher. Training was conducted for teachers on team teaching using collegial teaching strategy by the researcher. To start collegial teaching it was important to establish how collegial staff members are. To do this, staff level of involvement in four core collegial behavior was assessed. Siebold (2008) provided a continuum for this purpose.

3= strong; 2= moderate; 1= weak

- a) Do teachers regularly solve problems together?
- b) Do teachers regularly observe other teachers teaching?
- c) Do teachers regularly share expertise?
- d) Do Teachers regularly develop curriculum together?

If your total is under ten perhaps your staff would benefit by implementing collegial circle. For this case all teachers invited and tested scored below ten which showed that teachers will benefit from the training. Again to select the few eligible teachers to be employed to teach the concept of collegiality using teacher-student interaction patterns, they were asked to prepare and teach a topic of their choice after a demonstration by the researcher. Eggleston in Tambaya (2008) categorization of Teacher-Student interaction in which teacher talked for 80% during lesson and the student for 20%. This is seen as low interaction. When teacher talks for 50% and the students 50%, this is medium interaction. Whereas if the teacher talks for 20% and the student 80%, this is high interaction. So basically teachers were taught on how to employ Eggleston's Science Teaching Observation Schedule for conducting their lessons for meaningful interaction.

The training of six teachers two each for the three experimental groups.(HVI,MVI and LVI) took two weeks on collegial learning and using low-level, medium level, and high teacher,-student interaction for a total of 6 hours. The experiences acquired by the trained teachers were used to teach the different groups and topics so selected for the treatment. The collegial teaching involves the researcher and teachers working together to diminish the fear that comes from having to go it alone, especially if they co-teach a course or teach different sections of the same course. This provided the opportunity of working together to plan the course syllabus, assignments, share teaching, tests and examination. (Bullard & Felder, 2003). In this way the researcher (experienced person or mentor) provided support for developing course content. Mentor (researcher) provided teaching materials and lesson plans for a start to get the mentees (research assistants) stabilized, taught to serve as a model then monitor each lesson. The mentor according to Bullard and Felder (2003) provided timely and constructive feedback on the mentee's performance, provided demonstrations of good teaching practice and invited mentee's to observe as he taught or supported others.

Step II. Training of Observers (Research Assistants)

The researcher trained three observers one each for (HVI, MVI, LVI) for two weeks to assist him carry out the categorization of the lessons. And to ensure that the exercise follows due process of collegial teaching and to familiarize the observers with the use of Eggleston Science Teaching Observation Schedule instrument for teacher-student interaction.

During the two weeks training of the observers who were science education specialist with master, degree holders, they were exposed to the followings:

- i. A copy of aspects of interaction to be observed to study for a week.

ii. The observers met to discuss how to use the Eggleston's Observation Schedule After this training, and practice they observers went to their various designated schools to carry out the observations as schedule.

Step 1II. Teaching by the Trained Teachers

The trained teachers taught the three experimental groups using the methods acquired during training. This was basically on collegial teaching and on the three levels of teacher-student interaction (Eggleston in Tambaya 2008) which influenced students' performance and attitudes towards science. The teaching lasted for six weeks for each school giving 18 contact hours. ($3 \times 6=18$) Twelve lessons were taught in each school ($2 \times 6=12$). One double and single lessons each week.

The most effective and supportive models for collegial work include a three step sequence of (VIT 2017).

- I Joint planning (10-15 minutes)
- II Shared teaching (the classroom activity 35 or 70 minutes)
- III Joint reflection discussion (10-15 minutes).

Implementation of Collegial Practice

Meeting was the key to the development of professional practice. To start a collegial circle it was encouraged that participants establish norms that are a consistent part of the process. These included being on time; remaining confidential and being prepared. It was also important to establish how staff members implement collegiality in the school.

Teaching using the method was a 4 steps process namely:

Step 1; introduction (teacher sets the tone)

Step 2: teachers /students activity (teacher facilitates, organizes activities)

Step 3: discussion, (observations, and results discussed)

Step 4: evaluation (an ongoing step throughout the lesson)

The beauty of collegial teaching is that the co-teacher can intervene to support the teacher presenting due to mutual understanding. This marks out collegial teaching and others.

Step IV. Monitoring of Teachers

The researcher and research assistants carried out monitoring of teachers during teaching periods. This was done to ensure that the teachers teach according to the patterns and schedules expected. Among the practices observed were teachings by observing schedule as categorized by Eggleston. The Science Teaching Observation Schedule was adapted and used for the study in making on-the spot observation of teachers when teaching Experimental Groups HV1, MVI,LVI. Group 1 with high level student-teacher interaction, Group 2 with medium level interaction, Group 3 with low level interaction.

- a. **Teacher aspect of interaction:** These included, accept feelings, praises, encourage, accept and uses ideas of students, ask questions, answer students' questions, lectures, corrective feedback, give direction, criticize or justifies authority, directed practice or activity and demonstration.
- b. **Time allocation for teacher- student interaction:** There was a time-interval of 3 minutes for each aspect of interaction; therefore more aspects of interaction of who is contributing correspond to more time. In high level teacher-student interaction with the teacher dominating he/she consumes more time. If we have a 35 minutes lesson then 80% of the time means 28 minutes. i.e $80/100 \times 35$. The reverse can be the case depending on who dominates the interaction.
- c. **Student aspect of verbal interaction:** These consisted of student talk response, student talk emitted, students' questions, silence and contemplation, confusion and irrelevant behaviour.

Table 3.4.1: Summary of the Eggleston’s Science Teaching Observation Schedule for Low Verbal Interaction. (LVI)

Observation	Time-Interval Min	Aspect of Interaction		Table Frequency for Twelve Contact Lessons.
		Teacher	Student	
1	0-3	Lectures		24
2	3-6	Lectures		24
3	6-9	Demonstration		12
4	9-12	Lectures		24
5	12-15	Lectures		12
6	15-18	Demonstration		12
7	18-21	Gives direction		12
8	21-24	Criticize and justifies authority		12
9	24-27		Students ask questions	12
10	27-30	Answers student questions		12
11	30-33	Lectures		12
12	33-35		Silence and contemplation	24
Total		80%	20%	100%

The table captured the various aspects of interaction in which the teacher dominated

- The number of the aspects of interaction emphasized (i.e Teacher or Student aspect) was calculated by totaling the number of frequency in which each aspect was observed. The observation was made for six weeks totaling 10.5 hours of lesson period comprising single and double periods. (35 minutes per lesson).
- The teacher aspect was averagely 80% while the students aspect was 20%
- The observed frequency of teacher-student interaction was for the period of twelve contact lessons for example in observation 1 for the interval of 3 minutes

the aspect of lecture in form of interaction is of average of two frequencies per lesson. The total number of frequency of twelve contact lesson is thus: $2 \times 12 = 24$ frequencies. Details of lessons are seen in Appendix 'B'.

Table 3.4.2: Summary of the Eggleston Observation Schedule for Medium Verbal Interaction (MVI)

Observation	Time-Interval in (Min)	Aspect of Interaction		Table of Frequency for Twelve Contact Lessons.
		Teacher	Student	
1	0-3	Teachers lectures		12
2	3-6		Students ask	24
3	6-9	Teacher answers student question		24
4	9-12		Silence and contemplation	24
5	12-15	Teacher ask questions		24
6	15-18		Student talk response	24
7	18-21	Teacher lectures		12
8	21-24		Student ask question	12
9	24-27	Teacher answer questions		12
10	27-30		Confusion and irrelevant behaviour	12
11	30-33	Teacher gives direction		12
12	33-35		Student talk-emitted	12
Total		50%	50%	100%

Teachers and students interacted about equal as observed in the scheduled above.

Table 3.4.3: Summary of the Eggleston Observation Schedule For High Verbal Interaction (HVI)

Observation	Time-Interval Min	Aspect of Interaction		Table of Frequency for Twelve Contact Lessons.
		Teacher	Student	
1	0-3	Teacher question	ask	12
2	3-6		Students talk response	24
3	6-9	Teacher lectures		12
4	9-12		Silence and contemplation	12
5	12-15	Direct practice or activity		12
6	15-18		Student talk response	36
7	18-21		Student talk response	12
8	21-24		Student talk responses	24
9	24-27		Confusion and irrelevant behaviour	12
10	27-30	Corrective feedback		12
11	30-33		Student talk-emitted	24
12	33-35	Teacher Criticizes and Justifies Authority		12
Total		30%	70%	100%

Table pictured a child centered approach since they dominated in the interactions

- The number of the aspect of interaction emphasized (i.e teacher and student aspect) was calculated by totaling the number of frequency in which each aspect was observed. The observation was made for 6 weeks totaling 10.5 hours of lesson periods, comprising single and double periods.
- The teacher aspect of interaction was 30% while that of the students was 70%, details is seen in appendix 'B'.

v. **Discussion**

Base on observations made by the researcher and research assistants issues are discussed with teachers involved in the collegial teaching strategy.

Teachers are constantly evaluated to ensure compliance with the principles of collegial teaching.

The flow chart for training of research assistants on the use of Collegial Strategy

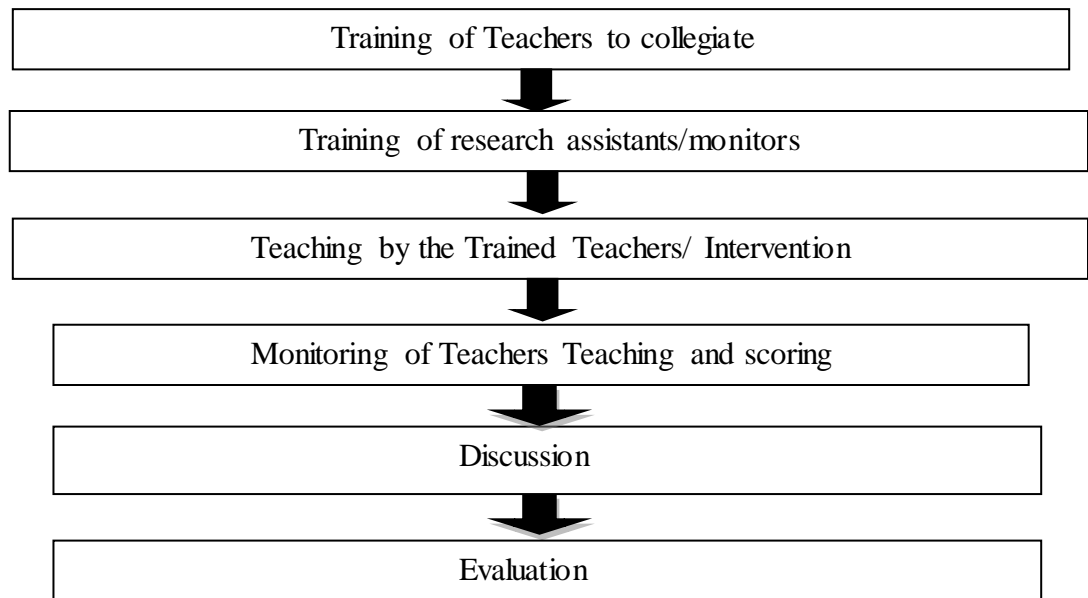


Figure 3.2: Flowchart for Training of Research Assistants on the use of Collegial Strategy

Adapted from Education Sector Support Programme in Nigeria (ESSPIN, 2016)

The third step in the collegial process (teaching by the trained teachers) is the actual intervention of the collegial teaching strategy in class. The lesson plans of collegial teaching strategy are drafted base on the chart below. This is represented by the flow chat in Figure 3.3

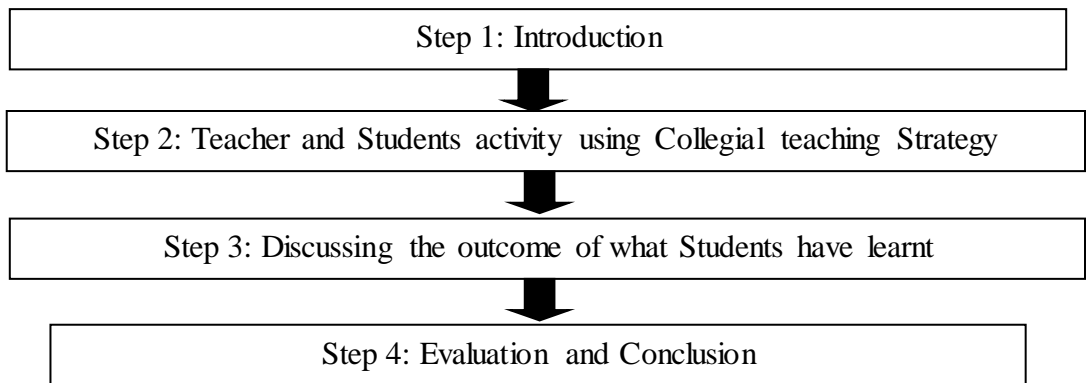


Figure 3.3: Flowchart for Collegial Teaching Strategy

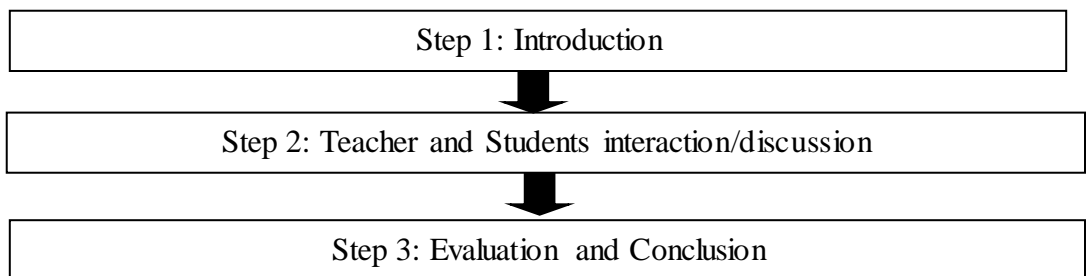


Figure 3.4: Flowchart for Lecture Method (control group)

3.6 Procedure for Data Collection

Data was collected from the pre-test and post-test respectively. The pre-test consist of Basic Science Performance Test and Attitudes of Students toward Basic Science Inventory items that were conducted at the beginning of the treatment to establish equivalence of the subjects. While the posttest data was collected at the end of the treatment using Basic Science Performance Test (BASPT) and Attitude of Students towards Basic Science Inventory (ASTBASI).

This was conducted by the researcher and researcher's assistants. All tests were administered and data collected on the spot to avoid missing results. The result was collected and recorded for analysis based on experiment and control, of verbal interaction, attitudes, academic performance between males and females students.

3.7 Procedure for Data Analysis

The data collected were analyzed based on the hypotheses formulated for testing at $p \leq 0.05$. This formed the basis for rejecting, retaining or accepting the null hypotheses

H0₁: There is no significant difference in the mean academic scores of students taught Basic Science by teachers with high, medium and low levels of verbal interaction using collegial teaching and their counterparts taught the same concepts using Lecture Method.

The 2-way Analysis of Covariance (ANCOVA) statistical technique was used to find the significant difference between the mean scores of the groups

H0₂: There is no significant difference in the mean academic scores of male and female students taught Basic Science by teachers with high, medium and low level of verbal interaction using collegial teaching.

The 2-way Analysis of Covariance (ANCOVA) statistical technique was used to find the significant difference between the mean scores of the groups

H0₃: There is no significant difference in the mean academic scores of students taught Basic Science concepts by teachers using high level verbal-interaction employing Collegial Teaching and those taught the same concepts using low level verbal-interaction.

t-test statistical technique was used to find significant difference in the mean scores between pretest and posttest

H0₄: There is no significant difference in mean rank in attitude of students towards Basic Science concepts when taught by teachers with high, medium, and low level verbal-interaction employing Collegial Teaching and those taught the same concepts using Lecture Method.

Descriptive statistics of Mean ranks and mean gain/loss. Kruskal Wallis, (mean ranked) technique was used to find the significant difference between the mean rank of the groups

H05: There is no significant difference in the mean ranks in attitude of male and female students' towards Basic Science when taught by teachers using high, medium and low level of verbal interaction employing Collegial Method.

Descriptive statistics of Mean ranks and mean gain/loss. Kruskal Wallis, statistical technique was used to find the significant difference between the mean ranks of the groups

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, AND DISCUSSION

4.1 Introduction

The study investigated the impact of collegial teaching and verbal- interaction on attitude and performance in basic science among junior secondary students in Kafanchan Kaduna, Nigeria

The chapter was discussed under the following subheadings:

4.2 Data Presentation and Analysis

4.3 Summary of Findings

4.4 Discussion of the Findings

4.2 Data Presentation and Analysis

Research Question One: What is the difference in the mean academic scores of students taught Basic Science by teachers with high, medium and low levels of verbal interaction using Collegial Teaching and their counterparts taught using Lecture Method?

The post test scores for students taught Basic science by teachers with high, medium and low levels of verbal interaction using collegial teaching and lecture method was analyzed descriptively using mean and the mean difference as presented in Table 4.1

Table 4.1: Comparison of Mean Scores of levels of verbal interaction in the experiment and control groups

Verbal Interaction	Methods	Mean	Std. Error	Mean Diff
High	Collegial	16.213 ^a	.68	3.99
	Lecture	12.218 ^a	.92	
Medium	Collegial	16.641 ^a	.55	3.81
	Lecture	12.827 ^a	.89	
Low	Collegial	16.021 ^a	.54	3.63
	Lecture	12.396 ^a	.95	

Table 4.1 shows the Comparison of Mean Scores of levels of verbal interaction when taught Basic Science using Collegial Teaching and those taught using Lecture Method. The table revealed that students performed better in collegial teaching method than those taught using lecture method in all the three levels of verbal interaction (high, medium and low) with mean differences of 3.995, 3.814 and 3.625 respectively. In order to determine how significant the difference in the groups was, the data were subjected to a 2-Way Analysis of Covariate (ANCOVA). The result is presented in Table 4.2.

Null Hypothesis One

There is no significant difference in the mean academic scores of students taught Basic Science by teachers with high, medium and low levels of verbal interaction using Collegial Teaching and their counterparts taught the same concepts using Lecture Method.

An Analysis of Covariance (ANCOVA) was conducted to test the null hypothesis at $p \leq 0.05$ level of significance. The result of the analysis is displayed in Table 4.2.

Table 4.2: Two-Way Analysis of Covariance (ANCOVA) of Students' Performance in Basic Science by Treatment (Collegial Method and Lecture Method) and Level of Verbal Interaction

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Remarks
Corrected Model	870.07 ^a	6	145.01	10.13	.00	S
Intercept	1539.55	1	1539.55	107.50	.00	S
Pretest	288.77	1	288.77	20.16	.00	S
Methods	524.26	1	524.26	36.61	.00	S
Grouping	9.01	2	4.51	.32	.73	NS
Methods * Grouping	.78	2	.39	.03	.97	NS
Error	2506.24	175	14.32			
Total	45596.00	182				
Corrected Total	3376.31	181				

$p \leq 0.05$ level of significance

Key : S=Significant, NS=Not Significant , *=and

Table 4.2 shows the Summary of 2-Way Analysis of Covariance (ANCOVA) of Students' Performance in Basic Science by Treatment (Collegial Method and Lecture Method) and Level of Verbal Interaction. The table revealed that after adjusting for the covariate (pre-test score), the effect of methods on students' performance in levels of verbal interaction is statistically significant, $F_{(1,175)} = 36.607$, $p = .00$ (less than .05 level of significant). Thus, the null hypothesis which states that there is no significant difference in the mean academic scores of students taught Basic Science by teachers with high, medium and low levels of verbal interaction using Collegial Teaching and their counterparts taught the same concepts using Lecture Method is therefore rejected. This can be explained by the fact that the p value of 0.00 is less than 0.05 level of significant.

Research Question Two

What is the difference in mean academic scores of male and female students taught Basic Science by teachers with high, medium and low levels of verbal interaction using Collegial Teaching?

Descriptive statistics of Means and Mean differences were used to answer the research questions. The results of the analysis is presented in Table 4.3.

Table 4.3: Mean academic scores between Male and Female Students Exposed to High, Medium and Low Levels of Verbal Interaction when taught Basic Science using Collegial Teaching

Methods	Grouping	Gender	Mean	Std. Error	Mean Difference
	High	Male	16.71	1.12	0.78
		Female	15.94	.78	
Collegial	Medium	Male	16.66	.75	0.06
		Female	16.72	.71	
	Low	Male	17.86	.78	3.52
		Female	14.34	.68	

Table 4.3 showed that there is a slight mean difference between male and female students in high and medium levels of verbal interaction ($\bar{X} = 0.78$ and $\bar{X} = 0.06$ respectively). The table also revealed that the difference in the mean score between male and female students in low level of verbal interaction is 3.52 in favour of male students. However, to find out how significant the difference in the mean scores between male and female was, the data were subjected to a 2-Way Analysis of Covariance (ANCOVA).

Null Hypothesis Two

There is no significant difference in the mean academic scores of male and female students taught Basic Science by teachers with high, medium and low level of verbal interaction.

An Analysis of Covariance (ANCOVA) was conducted to test the null hypothesis at $p \leq 0.05$ level of significance. The result of the analysis is displayed in Table 4.4.

Table 4.4: Two-Way Analysis of Covariance (ANCOVA) of Students' Performance in Basic Science by Gender and Level of Verbal Interaction using Collegial Method

Method	Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Remarks
Collegial	Corrected Model	307.68	6	51.28	4.05	.00	S
	Intercept	1535.72	1	1535.72	121.26	.00	S
	Pretest	128.55	1	128.55	10.15	.00	S
	Gender	57.40	1	57.40	4.53	.04	S
	Verbal Interaction	7.52	2	3.76	.30	.74	NS
	Gender * Verbal Interaction	83.14	2	41.57	3.28	.04	S
	Error	1570.43	12	12.67			
	Total	36576.00	13				
	Corrected Total	1878.10	13				

$p \leq 0.05$ level of significance

Table 4.4 shows the Summary of 2-Way Analysis of Covariance (ANCOVA) of Students' Performance in Basic Science by Gender and Level of Verbal Interaction using collegial method. The table shows that gender has a significant effect in the mean scores

of male and female students taught basic science using collegial teaching $F_{(1,124)} = 4.53$ $p = .04$ (less than .05 alpha level of significance). As a result of this, the null hypothesis which states that there is no significant difference in the mean academic scores of male and female students taught Basic Science by teachers with high, medium and low level of verbal interaction using Collegial Teaching is therefore rejected.

Research Question Three

Find out the difference in mean scores of students taught Basic Science concepts by teachers who taught using high level verbal-interaction employing Collegial Teaching and those who taught the same concepts using low level verbal- interaction.

Descriptive statistics of Means and standard deviations were used to answer the research questions. The results of the analysis are presented in Table 4.5

Table 4.5: Mean Academic Scores of Students taught using High and Low Verbal Interaction employing Collegial Teaching Method

Grouping	N	Mean	Std. Deviation	Mean Difference
High Level Verbal-interaction	31	16.19	4.04	3.64
Low Level Verbal-interaction	51	12.55	4.45	

Table 4.5 shows the difference in the mean academic performance scores for high and low level verbal-interaction was (3.64) in favour of high level verbal-interaction. That is, the mean academic performance scores for students in Basic Science concepts by teachers who taught using high level verbal-interaction employing Collegial Teaching and those taught the same concepts using low level verbal- interaction were different. That is, group differences exist between the high and low level-interaction.

Null Hypothesis Three

There is no significant difference in the mean academic scores of students taught Basic Science concepts by teachers using high level verbal-interaction employing Collegial Teaching and those taught the same concepts using low level verbal-interaction.

t-test was used to test the null hypothesis at $p \leq 0.05$ level of significance. The result of the analysis is displayed in Table 4.6.

Table 4.6: Summary of t-test on Difference in the mean Academic Scores of Students taught using High and Low Verbal Interaction employing Collegial Teaching Method

Verbal Interaction	N	Mean	Std. Deviation	Df	t-cal	t-crit	p-value	Remark
High Level	31	16.19	4.04	80	3.72	1.99	0.00	Sig.
Low Level	51	12.55	4.45					

Significant $p \leq 0.05$

Table 4.6 shows the summary of t-test on the mean academic scores of students taught basic science concepts using high and low level verbal-interaction employing collegial teaching method. The Table revealed that there is a significant difference in the mean academic scores of students taught using high and low level verbal interaction employing collegial teaching method ($t\text{-cal } 3.72 > 1.99 \text{ } t\text{-crit}$;). Hence, the null hypothesis which states that there is no significant difference in the mean academic scores of students taught Basic Science concepts by teachers using high level verbal-interaction employing Collegial Teaching and those taught the same concepts using low level verbal-interaction is therefore, rejected. The reason for this rejection lies in the fact that t-cal. is greater than t-crit.

Research Question Four

Is there any difference in the mean scores of students' attitudes towards Basic Science when taught by teachers using high, medium and low levels of verbal- interaction employing Collegial Teaching and their counterparts taught the same concepts using Lecture Method?

Descriptive statistics of Mean ranks and mean gain were used to answer the research question. The results of the analysis are presented in Table 4.7.

Table 4.7: Summary of Mean Rank Differences of Students' attitude towards Basic Science using Collegial and Lecture Methods

Group	N	Pretest \bar{X}	Posttest \bar{X}	Sum of Ranks	Mean Gain
Collegial Teaching Method	131	86.15	95.89	11923.25	9.74
Lecture Method	51	105.25	80.23	4729.75	25.02

Results in Table 4.7 revealed that the mean attitude scores for students towards Basic Science when taught by teachers using high, medium and low levels of verbal- interaction using Collegial Teaching Method (Pre-Mean=86.15, Post- mean=95.89 and Mean gain of 9.74) and lecture teaching method (Pre-Mean=105.25, Post-Mean=80.23, Mean loss=25.02) were different.

Results in Table 4.7 revealed that the difference in the post test mean attitude scores for collegial teaching method and lecture method was (15.66) in favour of Collegial Teaching Method. That is, the mean attitude score of students towards Basic Science was high than the attitude scores for those taught with lecture method among Junior Secondary Students in Kafanchan Kaduna state, Nigeria. That is, group differences exist in attitude towards Basic Science between the two teaching methods. To determine whether the group means difference is significant or not, Hypothesis four was formulated and tested.

Null Hypothesis Four

There is no significant difference in mean attitude scores of students taught Basic Science concepts using high, medium and low level of verbal-interaction employing Collegial Teaching and those taught the same concepts using lecture method.

A Kruskal-Wallis test was conducted to test the null hypothesis at $p \leq 0.05$ level of significance. The result of the analysis is displayed in Table 4.8.

Table 4.8: Results for Kruskal-Wallis Test on Students' Attitude towards Basic Science using Collegial and Lecture Method

Variable	Group	N	Pretest \bar{X} rank	PostTest \bar{X} rank	Df	H-cal	P	Remark
Attitude	Collegial	131	86.15	95.89	1	4.041	0.05	Sig
	Lecture	51	105.25	80.23				

Significant at $P \leq 0.05$ Df= 1

In the result presented in Table 4.8 the Kruskal-Wallis test revealed that there is a statistically significant difference in the mean attitude scores of students towards basic science taught using different teaching methods. The result is supported by $\chi^2(1, n=182)=4.041$, $p=0.05$, which showed a statistical significant difference in the mean attitude scores for students taught basic science using Collegial and lecture method among Junior Secondary School in Kafanchan, Nigeria. Therefore, the null hypothesis which stated that there is no significant difference in mean attitude scores of students taught Basic Science concepts using high level verbal-interaction employing Collegial Teaching and those taught the same concepts using low level of verbal- interaction is rejected since the p value is equal to 0.05

Research Question Five

What is the difference in the mean scores of male and female students' attitudes towards Basic Science when taught by teachers using high, medium and low level of verbal - interaction employing Collegial Method?

Table 4.9: Results of Mean Rank, and Mean Rank Differences for Male and Female Students' Attitude Scores before and after Treatment

Method	Gender	N	Pretest \bar{X} Rank	Posttest \bar{X} rank	Mean Rank Gain
Collegial	Male	62	58.39	61.52	3.13
	Female	69	72.84	70.03	2.81

Results in Tables 4.9 revealed the difference in attitude scores and differences in scores of male and female students before and after exposure to treatment. The table shows the mean attitude scores for males students (M=58.39, and 61.52) respectively for their pre-test and posttest with females students (M=72.84 and 70.03) respectively for pre and posttest scores. That is, the mean attitude scores for male and female students taught Basic Science concepts' using collegial teaching method was different between Junior Secondary School students in Kafanchan, Nigeria. For the difference between the male and the female the posttest mean rank differences was 8.51 in favour of the female students implying that the females had more attitude change as a result of the treatment. That is, gender differences exist in between attitude of male and female students. To determine whether the gender mean difference is significant or not, Hypothesis five was formulated and tested

Null Hypothesis Five

There is no significant difference in the attitude of male and female students towards Basic Science when taught by teachers using high, medium and low level of verbal interaction employing Collegial Method.

Kruskal-Wallis was conducted to test the null hypothesis at $p \leq 0.05$ level of significance.

The results of the analyses were displayed in Table 4.10.

Table 4.10: Results for Kruskal-Wallis Test on Male and Female Students' Attitude Scores when taught using Collegial Teaching Method

Variable	Group	N	Pre-test \bar{X} rank	Post-Test \bar{X} rank	Df	H-cal	P	Remark
Collegial	Male	62	58.39	61.52	1	3.19	0.11	Not Sig.
	Female	69	72.84	70.03				

Not Significant at $P > 0.05, Df = 1$

Results presented in Table 4.10 showed that there is no statistically significant difference in the mean attitude scores for male and female students taught using the collegial teaching methods. The result is supported by $p = 0.11$ which is greater than 0.05 level of significance, which showed no statistical significant difference in the mean attitude scores for male and female students taught using Collegial teaching among Junior Secondary students in Kafanchan, Nigeria. Therefore, the null hypothesis which stated that there is no significant difference in the attitude of male and female students towards Basic Science when taught by teachers using high, medium and low level of verbal interaction employing Collegial Method was retained. This implies that teaching Basic science concepts using Collegial teaching method among junior secondary schools in Kafanchan, Nigeria is gender friendly in terms of promoting attitude of students.

4.3 Summary of Findings

The following are major findings:

1. Students taught using Collegial Method performed better than those taught Basic Science using Lecture Method. The effect of methods on students' performance in levels of verbal interaction is statistically significant in favour of collegial teaching method.
2. Male students performed better than their female counterparts when taught using Collegial Method.
3. High level verbal interaction group performed slightly better than low level verbal interaction group although the difference is not significant.
4. Students taught using collegial teaching developed more positive attitudes towards Basic science than students taught using lecture method.
5. Effect of collegial teaching on male and female students' attitude towards basic science when exposed to levels of verbal interaction is favourable to both sexes.

4.4 Discussion of Result

The study revealed that students performed better in Collegial Teaching method than those in Lecture Method. The effect of methods on students' performance in levels of verbal interaction is also statistically significant in favour of the treatment group . This finding agreed with the findings of Lema et al (2006) Goddard, (2007). Shah, (2012), and Fullan (2013), who concluded that among the benefits of teacher collegiality in schools is higher quality instructions giving rise to greater students' academic performance, in terms of higher scores. In addition, there is an indication of significant, influence of teachers' classroom interaction with students in integrative classrooms performing significantly better than those in the teacher dominated classes as discovered by (Usendia and Effiong

2015). From this study it is clear that when teachers collaborate effectively in class, it is bound to enhance instructions. When teachers encourage interactions between themselves and students, giving room to students to talk by asking questions, by expressing themselves freely, it is bound to increase understanding consequently giving birth to high performance. Hence there are ways of encouraging teachers develop professionally to build effective practice in schools. One of such ways is to initiate and maintain dialogue among teachers which is a form of collegial practice. Two or more teachers can come together in order to build each other through meaningful activities, sometimes call collegial circle. (de-Gruiter, Thompson & Williamson 2015) This is the desire of all schools.

The study found out that the male students performed better than their female counterparts. Also gender and levels of verbal interaction showed a significant interaction on students' performance in Collegial Method. The findings agreed with the studies of Ogunsola-Bandele (2000), Akanbi (2004) and Bichi (2006) who reported that there is proportionate low performance of female in science education programmes and careers. Girls were discovered to under estimate their own academic ability and believe boys to be superior and more intelligent than them and hence more capable of handling different subjects like sciences and Mathematics. On the other hand studies by Isa (2012) showed that female interest as well as low performance in science was because science taught was not activity base. Aluko (2005) opined that gender has no effect on students' achievement in science and Mohammed (2012) reiterated that female subjects were significantly better than their male counterparts while Ayodele and Olatunbosun (2015) revealed that there was no significant difference in students' gender and performance in Basic Science. Furthermore Mari and Tongding (2010) found out that male and female students with the same entry qualification do not differ significantly in performance. While some

instructional strategies are gender bias others are gender friendly. From this study indications are that collegial teaching tends to favour boys over girls. This may be due to the interaction between teachers and students in the class. While boys may be bold, confident and active in class, girls may be shy, and feel class environment is not supportive enough to encourage active participation.

The study discovered that group differences exist between the high and low level- interaction in the mean academic performance scores (3.64) in favour of high level verbal-interaction by employing Collegial Teaching Method. This relates to findings by Tambaya (2008) who reported that there were significant differences in the achievements of the subjects exposed to different levels of verbal teacher-student interaction with high level having better achievement than the medium level and low level verbal interaction. The outcome can be attributed to the interaction levels employed, the nature of teachers and the subject content being taught. On a general note, Kalu (1997) discovered that interaction patterns bears a significantly positive relation with students post- instructional performance in Physics and Okebukola (1999) reported that classroom participation had the greatest independent contribution to the variance in performance scores. Biyi (2001) noted that adequate distribution and discussion of question in the class often helps eliminates boredom, dizziness, absent mindedness and other problems relating to idleness on the part of student during lesson. Teacher-students interaction in a classroom is a two way process. Each participant influences the behaviour of other students' and condition teachers' behaviour as much as teacher conditions students' behaviour. Verbal communication is the main form of interaction between teachers and students in schools. Effective teaching is a function of such interactions between teachers and their students and among students. Students are better informed and active if given opportunity to express themselves freely. Healthy relationships are developed which give birth to

students' involvement in the learning process. High verbal interaction gives more room for discussion leading to finding solutions to academic problems.

The study found out that students taught using collegial method have favourable attitude towards Basic Science than those taught using lecture. There is also a significant difference in attitude of students taught basic science concepts using both collegial teaching and those taught using lecture method. This implies that the changes in the attitude of students are due to the treatment administered. In this case the use of Collegial Teaching and verbal interaction has dramatic effect on the attitudes of Basic Science students. Studies by Krough (2000), Lakpini, (2006) confirmed that the way and manner a subject matter is taught or handled affects the attitude of the learners either positively or negatively. Furthermore Students that scored significantly high in science achievement test also scored significantly high in attitude test after instruction. (Lakpini, 2006). Teaching methods thus have impact on attitudes of students. A right application of a teaching method is necessary for increase students' performance.

Adesoji (2008) revealed that a person's attitude is learned as opposed to being inherited. Such attitude can be influenced by factors like the nature of the subject and instructional strategy among others. The instructional strategy in the study being collegial teaching was administered to the treatment group. The result showed positive outcome which was attributed to improved positive attitudes towards learning Basic Science. Collegial teaching encouraged team work in teachers where they addressed common professional challenges such as disregard to principles of adult of learning, sharing skills and expertise that may impede overall learning. Students' fears are allayed, their self- esteem was observed, with the cumulative effect leading to strong influence on behaviour and satisfaction and value of students' choices. In addition more room was created for

students participation during lessons and positive social behavior developed as a result of their interaction. They undertook join projects, share their fears and strengths. The study found out that the effect of treatment on male and female students' attitude in levels of verbal interaction is not statistically significant. Also gender and levels of verbal interaction are not statistically significant on the attitude of students towards Basic Science using collegial teaching method. In other words collegial teaching and levels of verbal interaction are friendly to gender factor in learning Basic Science. However the researcher is suggesting that in order to encourage more women into pure science-oriented courses, interventions need to be designed that focus not only on the academic achievement of girls but also on how to make science related occupations more interesting for young high achieving girls.

This discovery tallied with Ayodele and OlatunBosun (2015) who revealed that there is no significant difference between students' gender and attitude towards Basic Science. This can be explained by the fact that all students are given attention in the class. The feel accepted and so participate in class proceedings un disturb

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CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

In this chapter the objectives of the study, the methodology employed to collect data and the summary of findings are briefly outlined.

5.2 Summary of the study

The purpose of this study investigated the impact of collegial teaching and verbal-interaction on performance and attitudes towards Basic Science among junior secondary students in Kafanchan educational zone. Five hypotheses were stated from the research questions. The instruments used to collect data were Basic Science performance Test made up of 30 test items and attitudes of students towards Basic Science Inventory made up 40 Likert Scale items. Four schools from the zone were randomly selected for the study. Three schools made up the experimental groups; HVI, MVI and LVI, while the fourth school formed the control group. The teaching sessions lasted six weeks after which a pretest and posttest were administered to the four groups from where data was generated for the analyses.

The treatment for the study involved:

- (i) Collegial teaching for the three experimental groups was carried out by research assistants and the researcher. The number of students was one hundred and thirty one (131).
- (ii) Lecture method for the control group. The number of subjects was fifty one (51).

The data were analyzed at $p \leq 0.05$ level of significance using t-test, analyses of covariance and descriptive statistics technique in SPSS 20.

5.3 Summary of major Findings

At the end of the study the following findings were made:

- i. Students taught using collegial teaching method performed better than those taught using the lecture method, when exposed to different levels of verbal interaction.
- ii. Male students performed better than their female counterparts when taught using collegial teaching.
- iii. High level verbal interaction group performed slightly better than low level verbal interaction group although the difference is not significant.
- iv. Students taught using collegial teaching developed more positive attitudes towards Basic science than students taught using lecture method.
- v. Effect of collegial teaching on male and female students' attitude towards basic science when exposed to levels of verbal interaction is gender friendly.

5.4 Conclusions

The following conclusions were drawn.

Students taught using collegial teaching strategy performed better than those taught using lecture method when exposed to different levels of verbal interaction. The difference was as a result of treatment given to the groups. Strong and healthy collegial relationships among teachers enhanced professionalism giving rise to better interaction between teachers and students. This promoted effective learning and better learning outcomes.

Male and female students benefitted differently from collegial teaching strategy. The method favours male students more. The variance observed in students' performance in levels of verbal interaction can be accounted for by gender. Collegial method of teaching Basic Science is therefore gender bias.

High level verbal interaction group performed slightly better than low level verbal interaction group although the difference is not significant. This can be attributed to the participation of the group during interaction. There was more room for students' participation in higher level verbal interaction than in low level interaction.

Students taught using collegial teaching method had more positive attitude towards Basic Science than students taught using lecture method. Collegial Teaching Strategy was responsible for this outcome. The method helped break interdisciplinary barriers giving rise to quality instructions and took care of students' needs. They therefore developed self confidence

In general both male and female students held positive attitudes towards Basic Science when taught using collegial teaching. Gender had no effect on attitude. Collegial teaching strategy potentially enhanced students' performance. It was established by the researcher in this study for Basic Science at the junior secondary school.

5.5 Contributions to Knowledge

The research discovered that:

- i. Teachers' collegiality has helped to widen the scope of teaching that is result oriented. Teachers should now go into the class with confidence knowing that they are not alone but other teachers are always around to support and guide.
- ii. The concept of teacher professional development is better undertaken and seen as something not far from the teacher since teachers are no longer isolated in the classroom but should conduct activities together which will help acquire and apply knowledge, skills and abilities to reach organizational goals.
- iii. Teachers have learned to work together, became more flexible, more efficient and developed a sense of self efficacy. Collegiality has helped teachers become

committed to their job, assumed responsibilities beyond what was required of them, and increased motivation in teaching. Teachers got prepared well before going to the class to teach.

- iv. Students are better informed, freely engaged/involved knowing the roles to play to learn better. Effective interaction helped students develop positive attitude towards learning science, encouraged joint projects, developed social skills, leadership roles, self- esteem, confidence and good team spirit with the use of collegial teaching method.
- v. Manual/model lesson plans that have been provided are sure to developed teachers professional skills in teaching

5.6 Recommendations

On the basis of the findings and conclusions from this study; the following recommendations are made;

- i. Collegial teaching method should be employed by teachers to teach Basic Science by exposing students to different levels of verbal interaction in schools. Ministries of Education, Curriculum planners, National Education Research Development Council and National Teachers Institute should champion this course.
- ii. Junior Secondary Schools Teachers should shift from teacher dominated classroom interaction to students' integrative classroom interaction and lessons should be inclusive in nature to take care of gender issues.
- iii. Continuous teacher professional support through refresher courses, workshop training seminars and direct classroom support by fellow teachers and school administrators should be promoted and sustained to encourage effective verbal interaction

- iv. Teachers' attitudes towards Basic Science should be positive to encourage students' attitudes and for them to serve as role models.
- v. Teachers should encourage active participation of both male and female students during lessons, to ease boredom and increase motivation. Students' attitudes towards Basic Science and performance will improve remarkably when they are involved in learning.

5.7 Limitations of the Study

The following are notable limitations of the study

- i. Using only four schools in the study limits the scope on generalization.
- ii. Schedules for meeting with teachers for training posed a great challenge because times of meetings were over shadowed with other school's events
- iii. The schools used for this study were all public schools. The results may look different if private schools are involved. This factor may also affect generalization of the study.
- iv. Some principals were a bit skeptical about the study. They felt it was disrupting lessons and so did not give maximum cooperation as expected.
- v. The crises that engulfed the region during the period of the study hindered smooth flow of activities.

5.8 Suggestions for Further Studies

Based on the research carried out, the following suggestions were made for further studies:

- 1 Similar studies should be carried out at a larger scale like the whole state and even nationwide.

- 2 Studies on non-verbal teacher-student interaction need to be researched on Since this study was done using levels of verbal interaction.
- 3 Similar studies should be carried in other subjects like Biology, Chemistry, and Physics at the Senior Secondary School Level.
- 4 The same study should be replicated at the primary school level to compare results and come up with better approach to teaching science for better performance

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APPENDIX 1

An Introductory Letter to Access Research Data for Instruments Reliability from Department of Science Education A.B.U



DEPARTMENT OF SCIENCE EDUCATION
AHMADU BELLO UNIVERSITY ZARIA

Vice Chancellor: **Professor Ibrahim Garba** B.Sc, M.Sc(ABU) Ph.D DIC (London), FNMGS
Head of Department: **Dr. Mamman Musa** B.Ed, M.Ed. Ph.D (ABU, FMAN, FANE, DAC).

Your Ref:
Our Ref: DSE/R/1/Vol.1

Date: 12 October 2016

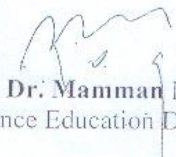
The zonal Director,
Kafanchan Inspectorate 2
Zone.
Kafanchan.


Dear Sir/Madam,

PG AN INTRODUCTORY LETTER TO ACCESS RESEARCH DATA

This is to introduce the bearer, Luka Angulu WAKILI,
with registration number Ph.D/Educ/22909/12-13, as one of our
Ph.D students who is conducting a research on the
topic:
IMPACT OF COLLEGIAL TEACHING AND VERBAL-
INTERACTION ON ATTITUDE AND PERFORMANCE IN
BASIC SCIENCE AMONG JUNIOR SECONDARY STUDENTS
IN KAFANCHAN, KADUNA, NIGERIA

Please accept our sincere thanks in advance for your kind action.

Yours faithfully,

Dr. Mamman Musa
Head, Science Education Department



Appendix 2

Letter of Introduction to Access Data from Kaduna Ministry of Education Science and Technology, Kafanchan Zonal Office



**KADUNA STATE
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY**
ZONAL OFFICE KAFANCHAN P. O. Box 170 Kafanchan Kaduna State

31st October, 2016.

THE PRINCIPAL,

GSS ZIKPAK

GSS KAGORO

GSS MALLAGUM

GSS U/RIMI ✓


LETTER OF INTRODUCTION TO ACCESS RESEARCH DATA

MR. LUKA ANGULA WAKILI

I am directed to write and introduce the above mention student to you to enable him access research data from your School, in the following areas (Topic).

1. Impact of collegial Teaching and Verbal interaction on attitude and performance in Basic Science Among Junior Secondary Students In Kafanchan Zone.

Please assist him.


JOSHUA ISHAYA,
FOR: ZONAL DIRECTOR.

APPENDIX 3

Basic Science Performance Test (BASPT) for JSS II

INSTRUCTIONS. This test questions contains 30 multiple choice items based on the Junior Secondary II Basic Science Course.

Each item on the test has four responses lettered **A-D** one of which is the correct answer.

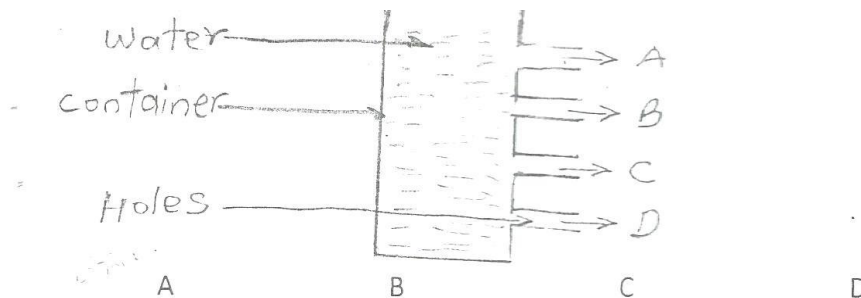
Choose the correct answer to each item by ticking the correct alphabet

TIME: ALLOWED 1 hour

1. Burning of firewood is an example of energy change from
A. Chemical to electrical
B. Chemical to heat and light energy
C. Heat to chemical
D. Electrical to chemical
2. Which of these systems of the body permits blood to circulate and transport nutrients, oxygen, carbon dioxide, hormones and blood to and from cells?
A. Circulatory system B. Digestive system C. Reproductive system
D. Respiratory system
3. Which of these is not a condition necessary for germination?
A. Water B. Temperature C. Sunlight D. Moon light
4. Which of these habitats will you likely find a life fish?
A. Water B. Land C. Air D. Sand
5. Which class of food does bean belongs?
A. Carbohydrate B. Fats & Oil C. protein D. Vitamins
6. How many meters do you have when you convert 2000cm to meters.
A. 2m B.20m C. 200m D. 0.2m
7. Adolescent girls are characterized by the following except.
A. Larger breasts and nipples B. Pubic hair C. larger Adam's apple d. Wider hips
8. Which of the following natural resources is the main material exploited for economic gain in Nigeria?
A. Petroleum/crude oil B. Water C. Uranium D. Coal
9. Which of these causes dough (flower, milk mixture for making bread) to rise?
A. Milk B. Yeast C. Sugar D. Water
10. A light electric bulb gives out light energy and another kind of energy which of these is the one?
A. heat energy B. chemical energy C. Kinetic energy
D. Potential energy

11. Which of these instruments would you use to measure temperature?
 A. Hygrometer B. Hydrometer C. Thermometer D. Barometer
12. One of these planetary bodies is the main source of energy on earth. Which one is it? A. Sun B. Moon C. Jupiter D. Comets
13. Lagos Nigeria is bordered by which of these oceans to the West? A. Indian B. Pacific C. Atlantic D. China sea
14. Which of these states of matter has fix shape and volume?
 A. Liquids B. Gas C. Solids D. Water
15. On a clear day, what is the colour of the sky?
 A. Blue B. Red C. Green D. Black
16. Pressure of water in a container (fig.1) with holes increases with depth. If it is true, in which of the holes should water pour out further?

Fig. 3



17. Which of these container shapes would contain more volume of liquid?

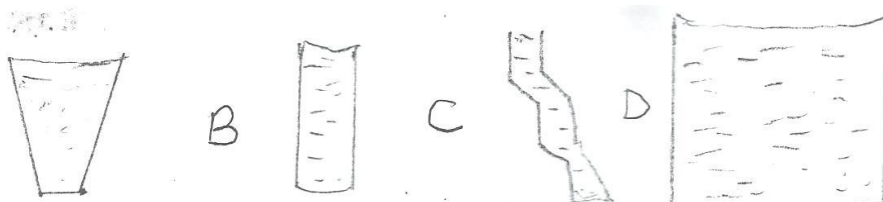


Fig:4

18. Which of these is not a weather condition in Nigeria ?
 A. temperature B. humidity C. Air pressure D. thermometer.
19. A bag of cement weighs 50kg how many bags will weigh 100kg?
 A. 2 B. 1 C. 3 D. 4

- 20 Evaporation of water in an open container is an example of chemical change A. Physical change B. colour change C. structural change D. structural change
- 21 Vacuum flask keeps hot water because it..... A. Radiates heat out B. stops light getting in C. stops heat escaping D. keep heating the water
- 22 Which of these simple machines is not an example of a first class lever? A. Scissors B. Plier C. Seesaw D. Sugar tong
- 23 In which of the following media does the transmission of sound waves travel faster: A. Air B. Wood C. Vacuum D. Water
- 24 Main electricity can cause a more severe shock than a touch battery why? A. A Battery voltage is very common B. A main socket is usually exposed C. A main socket is easier to touch d. Main voltage is high than the battery voltage.
- 25 Which electrical symbol is shown in fig 5. A. Fuse B. filament C. Switch D. Battery
- 26 A boy applied a force of 20N to move a desk through a distance of 3m taking 6 seconds. What power does the boy have? A. 10W B. 60W C. 600W D. 20W
- 27 The organ in the body responsible for pumping blood through the arteries into all body parts is called A. Heart B. lungs C. kidney D. brain
- 28 A rolling stone is said to possess what kind of energy----- A. Chemical energy B. heat energy C. kinetic energy D. stored energy
- 29 Taste detectors are found on the A. Teeth B. tongue C. gums D. lips
30. A body of mass 200kg is moving with a constant velocity of 5 m/s. Calculate the kinetic energy of the body A.1000j B. 2,500j C. 200j D. 100j

ANSWERS TO TEST ITEMS

1	B	11	C	21	C
2	A	12	A	22	D
3	D	13	C	23	A
4	A	14	C	24	D
5	C	15	A	25	D
6	B	16	D	26	A
7	C	17	D	27	A
8	A	18	D	28	C
9	B	19	A	29	B
10	A	20	B	30	B

Total = 1 mark × 30 = 30 marks

APPENDIX 4
Item analysis for the performance test instrument

Item no	Upper	Lower	Difficulty level (U+L/N)	Distribution Index (U-L/0.5N)
1	10	8	0.45	0.10
**2	4	2	0.15	0.10
3	10	9	0.48	0.05
**4	5	2	0.18	0.15
**5	3	3	0.15	0.00*
6	10	7	0.43	0.15
7	13	13	0.65	0.00
8	10	9	0.48	0.05
9	5	4	0.23	0.05
**10	3	3	0.15	0.00*
**11	6	2	0.20	0.20
12	8	7	0.38	0.05
**13	5	4	0.23	0.05
14	9	6	0.38	0.15
15	10	9	0.48	0.05
**16	4	3	0.18	0.05
**17	3	2	0.13	0.05
18	11	7	0.45	0.20
19	10	9	0.48	0.05
20	12	11	0.58	0.05
21	7	6	0.33	0.05
**22	6	4	0.25	0.10
23	8	8	0.40	0.00*
24	12	10	0.55	0.10
25	12	10	0.55	0.10
**26	6	6	0.30	0.00*
27	8	5	0.33	0.15
**28	3	2	0.13	0.05
29	8	7	0.38	0.05
**30	5	5	0.25	0.00*
31	10	9	0.48	0.05
32	9	8	0.43	0.05
33	7	6	0.33	0.05
**34	6	5	0.28	0.05
35	12	8	0.50	0.20
**36	6	4	0.25	0.10
37	10	8	0.45	0.10
**38	4	1	0.13	0.15
**39	3	3	0.15	0.00*
**40	3	3	0.15	0.00*
**41	6	4	0.25	0.10
**42	4	2	0.15	0.10
43	11	11	0.15	0.00*
**44	2	2	0.10	0.00*
**45	4	4	0.20	0.00*
**46	4	3	0.18	0.05
**47	3	1	0.10	0.10
48	10	9	0.48	0.05
**49	5	3	0.20	0.10
**50	7	4	0.28	0.15

APPENDIX 5

Attitudes of Students towards Basic Science Inventory (ASTBASI)

Name of school Serial No-----.

Age..... Group.....Male..... Female.....

Instructions: You are expected to answer as correctly and honestly as you can.

The ASTBASQ is a 40-item survey utilizing a 5 point Likert scale.

Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), Strongly Disagree (SD).

The ASTBASQ has included 7 items which are distributed according to 7 attitudinal variables as follows:

- **E**= Enjoyment of Basic Science
- **M**= Motivation in Basic Science
- **P** =Perception of the Basic Science teacher
- **V** =Value of Basic Science in society
- **A** =Anxiety toward Basic Science
- **C** =Cooperative work in science
- **S** =Self- concept of Basic Science

Each student's response will be summarized for each subscale to give 7 attitudes scores per student.

You are to tick the most appropriate option that expresses your opinion regarding each of the statements provided.

S/No	Item	Positive (+) or Negative (-)	SA	A	N	D	SD
1	(E) I enjoy doing Basic Science	+					
2	(M) I like the easy Basic Science assignment best	+					
3	(E) Doing Basic Science activities is fun	+					
4	(A) I feel at ease in a Basic Science class	+					
5	(V) I do not do well in Basic Science.	-					
6	(P) Basic Science teachers show little interest in their students	-					

7	(S) I would like to spend less time in school studying Basic Science	-					
8	(E) I do not like anything about Basic Science	-					
9	(E) Most people should study some science	+					
10	(V) There is little need for Basic Science in most of today's jobs	-					
11	(S) Basic Science is easy for me	+					
12	(A) I feel tensed or upset when someone talks to me about Basic Science	-					
13	(V) Basic Science is of general importance to a country's development	+					
14	(V) It is important to know Basic Science in order to get a job	+					
15	(M) Sometimes for fun, I read ahead in my Basic Science book	+					
16	(P) Basic Science teachers present materials in a way that I understand	+					
17	(E) I would like a job that does not use Basic Science	-					
18	(A) It does not disturb or upset me to do Basic Science assignment	+					
19	(S) I am good at working Basic Science laboratory and hands-on activities.	+					
20	(S) I remember most of the things I learn in Basic Science class	+					
21	(M) I like the challenge of Basic Science assignment	+					
22	(M) I would rather be told scientific facts than find them out from experiment	-					
23	(A) I have a good feeling toward Basic Science	+					
24	(A) It scares me to have to take a Basic Science class	-					
25	(P) Basic Science teachers know when I am having trouble with my assignment	+					
26	(P) Basic Science teachers are willing to give me individual helps	+					
27	(P) Basic Science teachers do not like students to ask questions	-					
28	(V) Most of the ideas in science are not very useful	-					
29	(V) You can get along perfectly well in everyday life without Basic Science	-					
30	(s) I often think, "I cannot do this" when a science assignment seems hard	-					

31	(E) Basic Science is one of my favorite subjects	+						
32	(M) I have a real desire to learn science	+						
33	(M) The only reason I am taking Basic Science is because I have to.							
34	(P) Basic Science teachers know a lot about science	+						
35	(A) It makes me nervous to even think about Basic Science	-						
36	(C) I learn Basic Science better when I work in group or pairs.	+						
37	(C) Talking and discussing with other students is helpful in learning Basic Science and making me social	+						
38	(C) I get discouraged in learning science when I work with students who are not fast learners	-						
39	(C) I do not like working with others during Basic Science classes	-						
40	(A)Sourcing for materials at home to bring to school for Basic Science activities in class is a problem to me	-						

Appendix 6

Reliability of Attitudes of Students towards Basic Science Inventory (ASTBASI)

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	Cronbach's Alpha Based on Standardized Items	N of Items
.866	.878	40

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.764	2.325	4.700	2.375	2.022	.528	40
Item Variances	2.053	.708	3.413	2.705	4.822	.553	40

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Atti1	145.85	516.233	.272	.	.865
Atti2	146.40	515.374	.203	.	.866
Atti3	146.60	503.272	.354	.	.863
Atti4	146.80	508.472	.274	.	.865
Atti5	147.95	491.587	.439	.	.861
Atti6	146.60	495.169	.451	.	.861

Atti7	146.67	508.635	.287	.	.865
Atti8	148.23	494.230	.414	.	.862
Atti9	146.52	514.615	.178	.	.867
Atti10	146.23	506.846	.384	.	.863
Atti11	146.40	513.221	.228	.	.866
Atti12	148.00	492.769	.440	.	.861
Atti13	145.95	508.972	.502	.	.862
Atti14	146.30	493.754	.519	.	.860
Atti15	146.17	502.148	.553	.	.861
Atti16	146.02	500.794	.594	.	.860
Atti17	147.80	506.831	.304	.	.864
Atti18	146.15	507.310	.396	.	.863
Atti19	146.50	508.974	.319	.	.864
Atti20	146.08	498.584	.547	.	.860
Atti21	146.17	519.892	.151	.	.867
Atti22	147.05	493.895	.470	.	.861
Atti23	146.20	494.472	.634	.	.859
Atti24	146.73	493.743	.478	.	.860
Atti25	146.58	511.430	.237	.	.866
Atti26	146.25	502.859	.399	.	.862
Atti27	148.02	496.230	.410	.	.862
Atti28	148.17	520.404	.073	.	.870
Atti29	146.85	500.695	.320	.	.864
Atti30	147.33	501.097	.347	.	.863
Atti31	146.27	496.204	.515	.	.860
Atti32	146.35	513.977	.229	.	.866
Atti33	147.90	501.938	.282	.	.865
Atti34	146.25	517.013	.162	.	.867
Atti35	147.10	495.015	.427	.	.862
Atti36	145.92	508.943	.439	.	.863
Atti37	146.25	505.167	.393	.	.863
Atti38	147.33	496.892	.355	.	.863
Atti39	147.67	506.840	.230	.	.867
Atti40	147.83	508.815	.210	.	.867

Appendix 7

Reliability of the Eggleston Science Observation Schedule

PRE-OBSERVATION Reliability Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	36	100.0
	Excluded ^a	0	.0
	Total	36	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.631	2

POST-OBSERVATION Reliability

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	36	100.0
	Excluded ^a	0	.0
	Total	36	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.668	2

Appendix 8

Lesson Plans for Experimental Groups

Lesson 1 High Verbal Interaction (HVI)

Class: JS II

Theme 1: You and Environment

Topic: Environmental Pollution

Sub-topic: Water Pollution

Time 70 minutes

Teaching/learning Material: Filter papers, funnel, stove sieve, beakers, dirty water, pipe borne water. Charts on water filtration hand lens and Alum.

Performance objectives: By the end of the lesson, student should be able to;

- I. Define water pollution
- II. Identify water pollutants and their effects
- III. List causes of water pollution
- IV. Mention ways of reducing the risk of water pollution.

Previous Knowledge: students have encountered the theme and the topics being treated while in JS I only that the scope has been increased (spiral curriculum)

Presentation

Step I: Introduction

Teacher asks some students to name some of the physical properties of water (colourless, tasteless). Students are again asked by the teacher to mention some sources of water in their environment. Answers may likely be rivers, wells, pipe borne water and rain. (5 minutes)

Step II: Teacher/Students interaction

Teacher groups students for joint activities and assigns leaders and reporters for each group. The co-teacher helps coordinate the task.

Teacher presents various samples of water from different sources to the groups for them to observe carefully and record their findings (sources include; pond, well, streams, rivers, lakes and rainfall). Teacher goes round to ensure that students are working.

Teacher then ask the following questions:

- a. Are the various samples of the water looking the same in terms of cleanliness?

- b. What causes the differences in the various samples
- c. Can they drink water from the stream or dirty water? If yes why? if No why
- d. What do they observe in the water?
- e. How can the risk of water pollution be reduced?

Teacher instructs students on how to carry out simple filtration experiment in groups and the use of the chemical Alum. (30 minutes)

Step III: Discussion

The questions raised by the teacher are then tackled in plenary. Each group is given opportunity to respond to the various questions. Teacher explains further or justifies a point. Teacher praises student's efforts, probe and prompt.

Responses received are then summarize on the black board

These will include:

- Water pollution is contaminated water
- Water pollutants will include, dissolved particles, mud, rubbish, sand, human waste, spirogyra, algae, droppings, minerals
- Effects of water pollutants; disease of different kinds e.g. malaria, dysentery, cholera, typhoid.
- Differences between filtered and unfiltered water
- Human beings must have to control sewage, chemicals and other waste from reaching water ways. (30 minutes)

Step IV: Evaluation

Teacher assesses students understanding of the lesson through questions and observing their expressions closely. Like what substances can contaminate water?

What are the effects of water pollutants? (5 minutes)

Reflection/feedback: After the lesson teachers retire to an exclusive place where they reflect on what transpired during the lessons.

The observer/supporter says well done and ask teacher how it went to get his/her comments as he/she assesses self. Then the observer/supporter gives positive comments (strengths/stars) and wishes for improvement. Observations are recorded for reference as future lesson plans are made and delivered. (5-10 minutes)

LESSON 1: Medium Verbal Interaction (MVI)

Class: JS II

Topic: Environmental Pollution

Time 70 minutes

Teaching/learning Materials: Filter Paper, alum

Performance Objectives: By the end of the lesson, student should be able to;

- I. Determine water pollution
- II. Identify water pollutants and their effects
- III. List causes of water pollution
- IV. Mention ways of reducing the risk of water pollution.

Previous Knowledge: students have encountered the theme and the topics being treated while in JS I only that the scope has been increased (spiral curriculum)

Introduction: Various samples of water are displayed in class for examination. (5 minutes)

Step II : Teacher/students interaction

Teacher asks students to observe in their groups the various samples of water. They are to give feedback on colouration or clear property. They are to label them. Teacher gives corrective feedback.

Teacher asks students to name the likely causes of dirty water in the samples. Teacher accepts, praises, or expatiates.

Teacher asks students if they can drink dirty water. Furthermore, he/she enquires from students how they treat water in their homes before drinking. (20 minutes)

Step III: Teacher accepts, modify, and emphasize on students contributions

Alum is then distributed to the various groups for them to drop in the water sample for their group.

The teacher further distributes the materials for filtration to the various groups with the help of his colleague in the class. Students are then requested to compare the filtrate and the infiltrated water. Will there be any differences? Responses are accepted, praised, improved or justified. (30minutes)

Step IV: Evaluation It is an ongoing exercise in the course of the lesson. To cap it up, students are asked to name chemical and sources of water that can provide clean water like the filtrate collected from the experiment in Step II. (10minutes)

LESSON 1: Low Verbal Interaction (LVI)

Class: JS II

Topic: Environmental Pollution

Sub-topic: Water Pollution

Time 70 minutes

Teaching/learning Materials: Filter Paper, alum

Performance Objectives: By the end of the lesson, students should be able to;

- I. Determine water pollution
- II. Identify water pollutants and their effects
- III. List causes of water pollution
- IV. Mention ways of reducing the risk of water pollution.

Previous Knowledge: students have encountered the theme and the topics being treated while in JS I only that the scope has been increased (spiral curriculum)

Presentation

Step I: Introduction

Teacher asks students to mention one of the most abundant liquid in nature and its uses (water). (5 minutes)

Step II: Teacher/students interaction

Teacher defines water pollution and writes it on the black board

Teacher asks students to think and then identify water pollutants in their environments. These may include; refuse, mud sand, defecation, micro-organism, worms, insects etc. Causes of water pollutants are listed and discussed in class such as human activities, aquatic life, plants, and erosion. How these factors cause pollution will be treated.

Step III: Teacher demonstrates how water that is contaminated can be purified through the use of clean cloth, alum and filter paper. The diagram is equally drawn on the black board and students observe the demonstration. (55 minutes)

Step IV: Evaluation

Teacher asks the following questions;

- a. What is water pollution?
- b. Name three water pollutants?
- c. How can contaminated water be purified? (10 minutes)

LESSON 1: Control

Topic: Environmental Pollution

Sub-topic: Water Pollution

Time 70 minutes

Teaching/learning: Pictures of dirty water, tap water and charts on water filtration.

Performance Objectives: By the end of the lesson, student should be able to;

- I. Determine water pollution
- II. Identify water pollutants and their effects
- III. List causes of water pollution
- IV. Mention ways of reducing the risk of water pollution

Previous Knowledge: students have encountered the theme and the topics being treated while in JS I only that the scope has been increased (spiral curriculum)

Presentation

Step I: Introduction

Teacher tells students some of the properties of water and its importance to life. (Colourless, odourless, and a good solvent.) (5 minutes)

Step II Teachers and students Activities/discussion

Teacher displays charts of dirty water and filtration process of water

Teacher gives the definition of water pollution with the help of the charts or samples of dirty water,

Teacher requests students to identify water pollutants and their effects. The causes of water pollutants are listed on the board for discussion.

From the causes listed, teacher asks of ways to reduce the risk of water pollutants.

Teacher goes ahead to name them one by one based on human activities. (55 minutes)

Step III: Evaluation and conclusion

Teacher asks the following questions;

- a. What is water pollution?
- b. Mention three causes of water pollution
- c. How can water pollution be controlled? (10 minutes)

Lesson 2: HVI

Theme: You and Environment

Topic: Environmental Pollution of water

Sub-topic: Controlling water pollution

Duration: 35 minutes

Teaching/Learning Material: Posters and Charts

Performance Objectives: By the end of this lesson, student should be able to

- I. Describe how water pollution can be controlled

Previous knowledge: students have knowledge of water pollution and causes of water pollution.

Presentation

Step I: Introduction

Teacher should ask two or three students to define water pollution and list two causes of water pollution. (5 minutes)

Step II: Teacher/Student activities

Teacher groups student into six sets of eight students for meaningful interaction. They are to discuss ways of controlling water based on the causes earlier treated and to report back.

Such controls measures like;

- Stop the use of chemicals for fishing
- Stop the use of harmful and chemicals on farmlands
- Indiscriminate dumping of refuse in the rivers

Step III: Each group will be expected to explain how to effectively overcome the causes mentioned. Students and teachers listen, accept, suggest, explain further and praise the efforts made. (25 minutes)

Step IV: Evaluation

Students are asked to mention ways of overcoming pollution in the immediate environment and to find out other measures for controlling water pollution through self-study. (5 minutes)

Lesson 2: MVI

Topic: Environmental Pollution of water

Sub-topic: Controlling water pollution

Duration: 35 minutes

Teaching/learning Material: Chart

Performance Objectives: By the end of the lesson, students will be able to

- Describe how water pollution can be controlled

Previous knowledge: Students have knowledge of water pollution and causes of water pollution.

Presentation

Step I: Introduction

Teacher asks one student to mention one cause of water pollution while he/she explains to the students. (5 minutes)

Step II : Teacher/students' activities

Teacher asks students to explain how water pollution in rivers and wells can be controlled. Teacher follows closely by monitoring what is happening in the groups taking responses.

Step III: Teacher asks students what materials can be discarded or thrown in the bodies of water to contaminate them. Such materials include, plastics, polythene bags, clothes, decompose animals among others.

He/she praises, accepts, criticizes or justifies responses by way of discourse. (25 minutes)

Step IV: Evaluation

Teacher asks some students to explain how to treat contaminated water. (5 minutes)

Lesson 2: LVI

Topic: Environmental pollution of water

Sub-topic: Controlling water pollution

Duration: 35 minutes

Teaching/learning material: Charts

Performance Objectives: By the end of the lesson, students will be able to;

- I. Describe how water pollution can be controlled

Previous knowledge: Students have knowledge of water pollution and causes of water pollution.

Step I: Introduction

Teacher asks one student to mention one cause of water pollution while he/she explains to the students.(5 minutes)

Step II : Teachers/student's interaction through discussion

Whole class organization will be employed for teaching.

Teacher mentions some methods for control of water pollution to the class, like reducing discharge into rivers and well and goes further to explain how it can be effective.

Step III: Students ask questions for clarity which are addressed by the teacher. (25 minutes). Such questions include, who pollutes water? How can we measure the levels of pollution?

Step IV: Evaluation and Conclusion

Teacher briefly describes the lesson's outcomes to the whole class (5 minutes). Pollutants contaminate water which can cause diseases.

Lesson 2: Control

Topic: Environmental pollution of water

Sub-topic: Controlling water pollution

Duration: 35 minutes

Performance Objectives: By the end of the lesson, students will be able to;

- I. Describe how water pollution can be controlled

Previous knowledge: Students have knowledge of water pollution and causes of water pollution.

Presentation

Step I: Introduction

Teacher asks one student to mention one cause of water pollution while he/she explains to the students. (5 minutes)

Step II : Teacher/students' activities

The lesson is a whole class presentation. Teacher dominates the lesson by explaining ways of water pollution

He will ask questions but without hesitation answer the question and continue the lesson. He lectures, criticizes, reprimands and is in a haste to cover much ground

He dictates notes for student to copy. (25 minutes)

Step III: Evaluation

Teacher asks questions on pollution treatment and explains to students. (5 minutes)

LESSON 3: HVI

Class: JS II

Theme: Living and Non-Living Things

Topic: Changes in matter

Time: 70 minutes

Teaching/learning Materials: Ice block, common salt water, kerosene, stove, beakers, spatula paper, matches, and leaves (fresh and dry).

Performance objectives: By the end of the lesson students should be able to;

- a. Describe different ways matter changes
- b. Identify the changes as temporal or permanent
- c. Distinguish between temporal and permanent changes

Previous knowledge: Students have been taught the three states of matter and their properties

Presentation

Step I: Introduction

Teacher groups students for activities and asks a few students to list the three states of matter and some of their physical properties.

Teacher accepts, modifies and praises them. Students are equally asked to say if they have seen changes in states of matter. if yes why? (10 minutes)

Step II: Teacher's/students activities

Teacher puts the students into groups of five or eight each with mix abilities. For each of the group, the co-teacher helps by distributing the learning materials, these are; kerosene stove, ice block, fresh and dry leaves, matches and thermometer. Students are to observe the leaves and their colours in their groups

Secondly, students are to heat the ice block put inside the beaker, and observe. They are to measure the temperature of the ice block at the onset of the experiments and to measure when the water is boiling.

Activity 3: students are to burn the pieces of paper given to them and observe the changes occurring on them. (25 minutes)

Step III: Students' activities/discussion

Teacher receives responses from the groups based on activity 1, II and III. The teacher ensures that all students are participating in the activities and jotting down their observation which was shared at plenary.

They are supported accordingly

Teacher asks questions like;

- What are the colours of the fresh and dry leaves?
- What happened to them?
- What of the ice block, did it change its state? Why? Can the change be reversed?
- What happen when they burn the pieces of paper? Can the change be reversed?
- What brought about the changes in colour, shape and states of matter? Are their changes reversible?

Students talk respond, look confuse, remain silent or may contemplate.

Teachers reinforce ideas, correct, comply or explain.(30 minutes)

Step IV: Evaluation

What causes change in matter? Is chemical change reversible? Main ideas are summarized on the black board as students make inputs. (5 minutes)

LESSON 3: MVI

Class: JS II

Topic: Changes in matter

Duration: 70 minutes

Teaching/learning Materials: Ice block, common salt water, kerosene, stove, beakers, spatula paper, matches, and leaves (fresh and dry).

Performance objectives: By the end of the lesson students should be able to;

- a. Describe difference ways matter changes
- b. Identify the changes as temporal or permanent
- c. Distinguish between temporal and permanent changes

Previous knowledge: Students have been taught the three stages of matter and their properties

Presentation

Step I: Introduction

Teacher introduces the lesson by asking students the following question;

What changes do materials undergo that they have witnessed in their environments?

Students' responses will be moderated by the teacher. (5 minutes)

Step II: Teacher/students' activities

The teacher presents green and dry leaves of banana and inquires from the students if they are the same. They will discuss to find a reasonable compromise.

Teacher demonstrates the changes of state of solids ice, liquid and steam (gas) putting the ice inside a beaker, measuring its temperature and heating it on a lighted stove. Teacher carries out the experiment but involving the students and asking questions as the process continuous. The last activity is the burning of a piece of paper which is carried out in the full glare of students. The teacher asks if the change is reversible or not. The students are asked to compare the change from solid ice to liquid and gas and burning of a piece of paper which is a permanent change? Why is it so and what is responsible?

Step III: discussion

The ideas of students are moderated by the teacher in class through corrective feedback. (50 minutes). The effect of heat was mentioned. The product of burning paper were mentioned. It was agreed that the process was irreversible. When

compared with the melting of ice it was accepted that this process was reversible which is opposite to the burning of paper.

Step IV: Evaluation Evaluation is usually an ongoing process during the lesson delivering in an interactive manner. However teacher asks major difference between temporal and permanent change. (15 minutes)

LESSON 3: LVI

Class: JS II

Theme: Living and Non-Living Things

Topic: Changes in matter

Time: 70 minutes

Teaching/learning Materials: Ice block, common salt water, kerosene, stove, beakers, spatula paper, matches, and leaves (fresh and dry).

Behavioural objectives: By the end of the lesson students should be able to;

- a. Describe difference ways matter changes
- b. Identify the changes as temporal or permanent
- c. Distinguish between temporal and permanent changes

Previous knowledge: Students have been taught the three states of matter and their properties

Presentation

Step I: Introduction

Teacher asks students to look around and mention any material that can be seen that has changed its colour, shape or size. Their responses will help assess students' ideas on change. (10 minutes)

Step II: Teacher/Students' activities

The teacher carries the activities with limited involvement of students. She/he lectures, demonstrate, directs students on what to do and ask questions based on what is been done. The demonstration is centered on heating ice block and the burning of a piece of paper. Students are to observe and answer the question;

Step III: discussion

The discussions are addressed by answering the questions;

- a. What changes occurred in the two illustrations above
- b. What is a temporary and a permanent change? (50 minutes)

Teacher controls the discussion by telling the students the answers

Step IV: Evaluation and conclusion

Teacher engages the students through questions, observations, criticizes explains and justifies their views. He/she asks what causes change. What are some of the physical changes noticeable in the immediate environment?

Key points are captured on the board.(10 minutes)

LESSON 3: Control Class

Topic: Changes in matter

Teaching/learning Materials: Drawing on a flip chart

Behavioural objectives: By the end of the lesson students should be able to;

- a. Describe difference ways matter changes
- b. Identify the changes as temporal or permanent
- c. Distinguish between temporal and permanent changes

Previous knowledge: Students have studied the states of matter and their properties

Presentation

Step I: Introduction

Teacher asks one or two students to list the three states of matter and some of their physical properties. She/he explains further. (5 minutes)

Step II: Teachers and students activity/discussion

Teachers displays diagram of solution of salt which is heated on a stove and the burning of a piece of a paper into ashes

Teacher explains that table salt only changes its colour, and structures when dissolved in water but when heated reform the salt and its colour when water evaporates. This illustrates a physical/temporal change.

Teacher explains further the permanent change that occurs when a piece of paper is burnt. The change is irreversible; therefore heat is what causes matter to change colour, shape and size. The discussions are addressed by answering the questions;

What changes occurred in the two illustrations above

What is a temporary and a permanent change?

Teacher controls the discussion by telling the students the answers (55 minutes)

Step III: Evaluation/ conclusion

Teacher asks a few students to differentiate between temporary and permanent change.

What causes change in matter?

Summary of the key facts are written on the black board. (10 minutes)

Lesson 4: HVI

Topic: Changes in matter

Time: 35 minutes

Teaching/learning Material: Thermometer, ice block, water heating source (stove)

Performance Objectives: By the end of the lesson, student will able to;

- I. Explain causes of temporary and chemical changes

Previous Knowledge: Changes in matter have been discussed in class

Presentation

Step I: Introduction

Teacher calls on some students to mention and explain the types of changes matter do undergo. (5 minutes)

Step II: Teacher/students' activities

Teacher groups students and assigns leaders and reporters for each. Materials are then given to each group to carry out experience.

They are to measure temperature of ice block at the beginning and after when steam is formed. That is from solid state to gaseous state. Second teacher supports in distribution and helping students carry out task. (15 minutes)

Step III: Discussion of finding

Groups will be asked to present their observation in plenary. By now students must have observed the change in state from solid – liquid –gas and subsequent rise in temperature. Therefore, since a stove was used to make the water boil, then heat must have caused the change of state from solid ice to gaseous steam. (10 minutes)

Step IV: Evaluation and Summary

Teacher wraps up the lesson by asking students the causes of change in the state of matter. (5 minutes)

Lesson 4: MVI**Class:** JS II**Topic:** Changes in Matter**Time:** 35 Minutes**Teaching/learning Materials:** thermometer, ice block, water heating source (stove)**Performance Objectives:** By the end of the lesson, students will be able to;

- I. Explain causes of temporary and chemical changes

Previous Knowledge: Changes in matter have been discussed in class**Presentation****Step I: Introduction**

Teacher calls on some students to mention and explain the types of changes matter do undergo. (5 minutes)

Step II: Teachers/students' activities

Teacher tries to be balance in the presentation allowing for students participation. Teacher assign task to groups with the teaching aids distributed to them. Participation is solicited from the groups.

Step III: discussion

Having given proper instructions, it is expected that students should attribute causes and change in matter to heat. Teacher asks if students expect the temperature required for change of different substances from solid to gas to be the same when subjected to heat. Second teacher supports in distribution and helping students carry out task. (27 minutes)

Step IV: Evaluation

Teacher asks two students to explain what they have learnt in the lesson. (3 minutes)

Lesson 4: LVI**Class:** JS II**Topic:** Changes in matter**Time:** 35 Minutes**Teaching/learning Materials:** Thermometer, ice block, water heating source (stove)**Performance Objectives:** By the end of the lesson, student will be able to;

- I. Explain causes of temporary and chemical changes

Previous Knowledge: Changes in matter has been discussed in class**Presentation****Step I: Introduction**

Teacher introduces the lesson by reflecting on the previous lesson. What change is and types of change. (5 minutes)

Step II : Teacher/students' activities in class

Teacher asks students to attempt an explanation of causes of change in state of matter. Teacher demonstrates by measuring the temperature of ice (solid) which is heated and then at the point of boiling and changes from water to steam. The difference in temperature shows that heat cause the change in the state of matter. Second teacher supports the main teacher in the course of delivery. (25 minutes)

Step III : class discussion

Teacher explains the effect of heat on substances which cause temporal or permanent change. Very high temperatures lead to permanent change

Step IV: Conclusion

Teacher asks students to say what they gained in the lesson. Which he/she accepts, praises, corrects or amplifies by explaining further. (5 minutes)

Lesson 4: Control**Class:** JS II**Time:** 35 minutes**Topic:** Changes in matter**Performance Objectives:** By the end of the lesson, student will able to;

- I. Explain causes of temporary and chemical changes

Previous Knowledge: changes in matter have been discussed in class**Presentation****Step I: Introduction**

Teacher calls on some students to mention and explain the types of changes matter do undergo. (5 minutes)

Step II: Teacher and students' activity/discussion

Teacher recalls types of changes in matter and goes further to explain how heat can cause substances to change state, like from solid – liquid – gas and vice versa if the temperature is reduced. So heat is responsible for changes in matter. Quantity of heat determines how fast a change occurs.. The teacher dominates this discussion. (25 minutes)

Step IV: Evaluation

What causes change in matter? Does quantity of heat affects rate of change?.(5 minutes)

Lesson 5: HVI

Theme 1: You and Environment

Topic: Air Pollution

Time: 70 minutes

Teaching Materials: Films, charts, pictures on pollution

Performance Objectives: By the end of the lesson, students should be able to

- I. Define air pollution
- II. Name sources of air pollutions
- III. List some of the air pollutants
- IV. Discuss the effects of air pollution

Previous Knowledge: matter its states and properties have been discussed in previous lessons

Presentation

Step I: Introduction

Teacher draws attention of students to the states of matter. He/she asks them to name. Students are further asked to state which of the states has no fixed shape and volume. Likely answer will be gas. Other physical properties of gases will be expected from students and responses capture on the blackboard or flip chart. Teachers asks questions and students answer. (7 minutes)

Step II: Teacher-students' activities/discussions

Teacher organizes students into groups of 6 to encourage join activities and support for each other with the help of the peer teacher in the class.

Teacher asks students to discuss in pairs the definition of air pollution. Students are to jot down in their exercise books the definition.

Again teacher asks students in their groups to list some air pollutants and sources of the air pollutant. Teacher directs them to cast their minds back to their homes, market places, industries and factories to find their answer. They are to write down their finding.

Second teacher distributes charts, films and pictures on air pollution to guide students on air pollutions and their sources.

Other tasks to be undertaking by the students include consequences of the air pollution or dangers of air pollution on the environments. The teachers go round to facilitate the process by supporting the students' information generated in connection with the areas being investigated. (30 minutes)

Step III: Discussion of students' findings

Findings by students are presented in plenary for discussion. The various views of students are discussed and brief summaries are written on the black board. So

teacher ask questions, receives responses, lectures, explain, directs, corrects and justifies authority. On their part, students answer questions, contemplates, remain silent, ask relevant questions, draw, and express confusion and irrelevant behaviour by students. (25 minutes)

Step IV: Evaluation

Teacher asks a few questions to elucidate the key aspects of the lesson. These include causes and consequences of air pollution.

Students will be asked to state specific measures to reduce air pollution in their homes.

Summary Includes: Air pollution is any substances that people send into the atmosphere that has damaging effects on living things and the environments.

The life of most organisms depends on air which is composed of oxygen which comes from un-burnt fuel which includes kerosene, burning firewood, stove, cooking gas, burning of paper, and waste materials, gases emitted from compounds in fuel, exhaust from cars, hydrocarbons produced from incomplete combustion of petro and engine oil.

Season of the year help increase pollution e.g. dry season's increases the quantity of dust and sand in the air.

Nitrogen, carbon dioxides and inactive gases, this air is found mostly in the atmosphere. Activities of humans results in every many substances finding their way into the air. These substances could be solids, liquids and gases. These substances contaminate or pollute the air.

Measures to control to reduce air pollution include removing the causes of pollution. Check out the causes of pollution. (9 minutes)

Lesson5: MVI

Class: JS II

Theme: You and Environment

Topic: Air Pollution

Time: 70 minutes

Instructional Material: Films, charts, pictures on pollution

Performance Objectives: by the end of the lesson, students should be able to.

- I. Define air pollution
- II. List some air pollutants
- III. Name sources of air pollutions
- IV. Discuss the effects of air pollutions

Previous Knowledge: matter its states and properties have been discussed in previous lessons

Presentation

Step I: Introduction

Man will cease not to exist if he stops breathing. We take in air and through the nose to sustain our lives. The air we breathe in contains other gases and substances which may be harmful to our health. Where do we find a great accumulation of air around us? (7 minutes)

Step II: Teacher/students' interaction

Teacher encourages pair/group work. The co-teacher asks students what air pollution is?

Answer; air that is contaminated.

Teacher; where do we find air predominantly?

Students; in the atmosphere

Teacher; what is the nature of air?

Step III: discussion

Answer; air is a mixture of gases, solids and liquids substances

Teachers explain and present pictures, charts and films on air pollution, then he asks what causes pollution?

Responses; students contemplates, look confuse

Teacher throws more light by citing example of human activities that can increase quantity of gaseous particles in the atmosphere, e.g. burning of paper/waste and the release of smoke into the atmosphere.

Teacher asks students in their groups to discuss the effects in their groups and come up with ideas. Co-teacher helps in facilitating.

Students' responses should centre on the need to control or reduce all those activities which produce pollution of air. The co-teacher encourages active participation by going around to guide, and justifies issues in the groups. (55 minutes)

Step IV: Evaluation

Students will be evaluated in the course of the lesson. Also they should find out ways in which gaseous particles discharge into the atmosphere serve as pollutants. (8 minutes)

Lesson 5: LVI

Duration: 70 minutes

Theme I: You and Environment

Topic: Air Pollution

Instructional Material: Charts, and pictures on pollution

Performance Objectives: By the end of the lesson, students will be able to;

- I. Define air pollution
- II. List some of the pollutants
- III. Name sources of air pollutions
- IV. Discuss the effect of air pollution

Previous Knowledge: matter its states and properties have been discussed in previous lessons

Presentation

Step I: Introduction

Teacher asks students to name the sources of air which the breath. Teacher further ask if students sometimes find it uncomfortable to breathe when smoke is introduced into the air around them. (7 minutes)

Step II: Teacher/students interaction

Teacher asks students to take 1minute to think about what air pollution is

Teacher defines it as a mixture of natural and man-made substance in the air we breathe.

Sources of air pollution

Teacher draws attention of students to sources of air pollution in the environments which will include, burning of organic and inorganic substances. When burnt, gases in the form of smoke are released into the atmosphere. Soot from unburned fuel like kerosene, dust and sand when wind blows and some reactions in the air.

List of some pollutants

Step III: discussion

Teacher asks students to list some air pollutants to include; carbon dioxide, carbon monoxide, smoke, dust and pollen grains

Effects of air pollution

Teacher explains the harmful effects of air pollution, with little contributions from the students. Teacher dominates the class by asking questions, criticizes students

and justifies responses to emphasize. Among the effects are breathing problem. (55 minutes)

Step IV: Evaluation

During the course of teaching, students are evaluated by measure of their participation and understanding by the teacher through questions/answers. (8 minutes)

Lesson 5: Control**Class:** JS II**Theme:** You and Environment**Topic:** Air Pollution**Duration:** 70 minutes**Instructional Material:** Pictures on pollution/poster, charts**Performance Objectives:** By the end of the lesson, students will be able to;

- I. Define air pollution
- II. List some of the pollutants
- III. Name sources of air pollutions
- IV. Discuss the effect of air pollution

Previous Knowledge: matter its states and properties have been discussed in previous lessons**Presentation****Step I: Introduction**

Teacher asks students to explain how they feel when they stay in a room full of smoke. Teacher justifies the responses. That is, smoke which is a gas pollutes the fresh air which makes it difficult for animals to breathe. (7 minutes)

Step II: Teacher activity/ discussion

Teacher displays pictures and charts on pollution.

Teacher defines pollution and asks students to mention sources of air pollution in their environment. With the help of diagram and charts displayed.

Teacher collaborate students answer and explains what air pollutants are. In addition, the effects of air pollution on living and nonliving things are explained.

Teacher defines pollution and mentions sources of air pollution in their environment. With the help of diagrams and charts displayed.

Teacher collaborate students answer and explains what air pollutants are. In addition, the effects of air pollution on living and nonliving things are explained. (55 minutes)

Step III: Evaluation and Conclusion

Teacher asks the following questions

- a. What is pollution/
- b. What are some of the sources of air pollutions?

- c. What are the effects of air pollution on living and non-living things? (8 minutes)

Lesson 6: HVI

Theme 1: You and Environment

Topic: Air Pollution

Sub-topic: Methods of pollution control

Duration: 35 minutes

Instructional Material: Pictures, charts

Performance Objectives: By the end of the lesson, students should be able to;

- I. Discuss the different methods of pollution control.

Previous Knowledge: students have been taught sources of air pollution and their effects on the environment

Presentation

Step I: Introduction

Teacher asks students to reflect on the previous lesson and mention one thing they learnt. Responses are accepted, modify, justify or explain further. Teacher praises and reinforces responses. (5 minutes)

Step II: Teacher's activities

Teacher with the support of the other teacher put the students in groups, and distributes the pictures and charts on air pollution drawing their attention to the causes of pollution in their environments.

Students are to observe and discuss in their groups the remedy to air pollution.

Teachers will go round to help guide their discussion. (10 minutes)

Step III: Discussion

At plenary, each group is given room to read their observation which they have noted down. Each view is presented to the whole class for their reaction. Points or ideas are written on the black board by students

Teacher allows students to contribute more to the discussion. Points are accepted, rejected, justified, modified or explained. (15 minutes)

Step IV: Evaluation

Teacher asks a few questions to assess students understanding. For example explain three ways of arresting or curtailing air pollution like; reducing the amount of gases discharge into the atmosphere through combustion of fuel and indiscriminate exploitation of the environment. (5 minutes)

Lesson 6: MVI

Topic: Air Pollution

Sub-topic: Methods of pollution control

Duration: 35 minutes

Instructional Materials: Pictures of air pollution.

Performance Objectives: By the end of the lesson, students will be able to;

- I. Describe the different methods of pollution control

Previous Knowledge: Sources and effects of air pollution of air pollution have been treated in the class

Presentation

Step I: Introduction

Teacher asks questions based on the previous lesson, i.e. what is air pollution and what causes air pollution? (5 minutes)

Step II: Teacher's activities/interaction

Teacher asks students common pollutants found in the atmosphere and their possible causes.

Pictures and charts brought to the class are then distributed to the various groups for observation and discussion. Teacher ensures that there is active participation (10 minutes).

Step III: Discussion

Teacher takes feedback from students based on observation and records from groups, such as control of emissions, wind, burning of hydrocarbons and inorganic substances. Teacher ensures that neither he/she nor students dominates the lesson. It is expected that there are about equal aspects of interaction of questions, expectation, students looking confused, silence, and contemplation and so on. (15 minutes)

Step IV: Evaluation

What causes air pollution and how can it be addressed?.(5 minutes)

Lesson 6: LVI

Topic: Air Pollution

Sub-topic: Methods of pollution control

Duration: 35 minutes

Institutional Material: The Blackboard

Performance Objectives: By the end of the lesson, students will be able to;

- I. Describe the different methods of pollution control

Previous Knowledge: what air pollution constitutes has been treated in previous class

Presentation

Step I: Introduction

Teacher asks some students to explain their feeling when they are in a kitchen with so much smoke. They will be very uncomfortable because the air has been polluted. (5 minutes)

Step II: Teacher/students' activity

Teacher dominates the lesson by asking only a few questions but taking pleasure in explaining, demonstrating, giving direction and criticizing. E.g what causes air pollution? Can controlling number of vehicles flying the roads reduce pollution? (10 minutes)

Step III: Discussion

Teacher dominates the lesson by explaining, demonstrating, giving direction and criticizing. E.g what causes air pollution? (gases) Can controlling number of vehicles plying the roads reduce pollution? yes (15 minutes)

Step IV: Evaluation

Air pollution control measures are mentioned and explained such as uses of fossil fuel, electricity and flying fewer vehicles on the high way to reduce harmful gases being emitted. (5 minutes)

Lesson 6: Control

Topic: Air pollution

Sub-topic: Method of pollution control

Duration: 35 minutes

Performance Objectives: By the end of the lesson, students should be able to

- I. Discuss the different methods of pollution control

Previous Knowledge: Students are aware of causes and effects of air pollution

Presentation

Step I: Introduction

Teacher defines air pollution and its effects on health of people and plants.(5 minutes)

Step II: Teacher/Students' Activity

Teacher asks students common health challenges among people and causes of them especially air pollutants. How are these diseases treated? Teacher writes notes on the blackboard how to control air pollution. He makes sure all students are copying the notes. In the process he takes time to explain at the same time the causes of air pollution, the use of wood for cooking, burning of solid fuel and materials. Diagrams of chimney are also presented (25 minutes)

Step III: Conclusion

Teacher asks one students to describe one method to control air pollution. Students are asked to read ahead.(5 minutes)

Lesson 7: HVI:

Class: JS II

Theme: You and Environment

Topic: Soil Pollution

Duration: 70minutes

Teaching/learning Materials: Pictures of polluted land, polluted soil sample

Performance objectives: By the end of the lesson students will be able to:

- i. Define soil pollution
- ii. List soil pollutants
- iii. Discuss the effect of soil pollution.

Previous knowledge: students already know what soil is, its elementary constituents and uses

Presentation

Step 1: Introduction:

Teacher asks some students to name where they cultivate their crops while others are to name the common colour and nature of soils. (5 minutes)

Step II: Teacher/ students' activities

Teachers assign students into groups and appoint leaders and reporters. In pairs students are asked to define soil pollution. Each group is given pictures of polluted land and polluted soil samples. They are asked to observe and discuss the nature of the soil sample, identify colours and texture. Furthermore the groups are asked to list the soil pollutants base on their observation of the various forms of soils given to them and to write the ideas down. Having listed the soil pollutants or contaminants students in their groups will be encouraged to discuss the effect of soil pollution. They are to look around their environment to identify the remote effect of pollutants on the soil. Teachers go round to help, refine and facilitate students' discussion. (30 minutes)

Step III: Discussion

Teacher gets the attention of all students for plenary discussion.

Definition of soil pollution is received from two groups and to marry it with others. It should have such basic words like part of land degradation cause by the presence of human made chemicals from industrial activity.

Various groups are asked to name one soil pollutant which is written on the board. This should include industrial activities, agricultural chemicals, or improper disposal of waste. Nuclear waste, toxic from industries, fertilizers, herbicides, acids, detergents, oils, non-degradable compounds. Effects of soil pollutants should include poor yield, loss of soil texture, and destruction of soil organisms, soil erosion and human diseases. (30 minutes)

Step IV: Evaluation

Teacher in the course of delivery will ask questions to help direct students thinking, Such as give three examples of soil pollution. (5 minutes)

Lesson 7: MVI

Class: JS II

Theme: You and Environment

Duration: 70 minutes

Topic: Soil Pollution

Teaching Materials: Pictures of polluted land, and polluted soil sample.

Performance Objectives: By the end of the lesson students will be able to:

- i. Define soil pollution
- ii. List soil pollutants
- iii. Discuss the effect of soil pollution.

Previous knowledge: students already know what soil is, its elementary constituents and uses

Presentation:

Step 1: Introduction

Whole class teaching: Teacher gets the views of two students on what supports the growth of plants. On what material are crops grown? This is to direct their thinking on soils. (5 minutes)

Step II: Teachers'/ students' activities

Teacher puts students to work in pairs and assign them to define pollution, list soil pollutants and discuss the effect of soil pollution. The teachers lead, guide and ask them to observe, discuss and then explain the activities with the help of the pictures of polluted land/ soil samples given out. (30 minutes)

Step III: Discussion

Whole class teaching: teacher gets the views of various pairs regarding soil pollution, soil pollutants and its effect on soil.

Ideas should include, substances that contaminate the soil, types include, agricultural, chemical and non- bio degradable materials. These materials can kill soil organisms and reduce soil nutrients. (30 minutes)

Step IV: Evaluation

Teacher asks a few students to define soil pollution and give five examples of soil pollutants and their effects on soil. (5 minutes)

Lesson 7: LVI:

Class: JS II

Theme: You and Environment

Duration: 70 minutes

Topic: Soil Pollution

Teaching Materials: Pictures of polluted land, and polluted soil sample.

Performance Objectives: By the end of the lesson students will be able to:

- i. Define soil pollution
- ii. List soil pollutants
- iii. Discuss the effect of soil pollution.

Previous knowledge: students already know what soil is, its elementary constituents and uses

Presentation

Step 1: Introduction

Teacher introduces the lesson by stressing the importance of soil to plants as it supports their growth and stability. (5 minutes)

Step II: Teachers / students' interaction

Teacher dominates discussion in the course of the lesson by defining soil pollution, give examples of soil pollutants while some students are called upon to name the others.

Teacher leads in explaining effects of soil pollution. Teacher writes without delay key points on the topic. (30 minutes)

Step III: Discussion

There is less room for in-depth discussion between teacher and students since teacher does not delay in explaining if students look confuse or remain silent. (30 minutes)

Step IV: Evaluation

Two students are call upon to define soil pollution and the effect on soil pollution on crop yield. (5 minutes)

Lesson 7: Control:

Class: JS II

Theme: You and Environment

Duration: 70 minutes

Topic: Soil Pollution

Performance Objectives: By the end of the lesson students will be able to:

- i. Define soil pollution
- ii. List soil pollutants
- iii. Discuss the effect of soil pollution.

Previous knowledge: students already know what soil is, its elementary constituents and uses

Presentation

Step 1: Introduction

Teacher introduces the lesson by stressing the importance of soil to plants as it supports their growth and stability. (10 minutes)

Step II: Teachers and students' interaction/discussion

Teacher dominates discussion in the course of the lesson by defining soil pollution, give examples of soil pollutants while some students are called upon to name the others.

Teacher leads in explaining effects of soil pollution. Teacher writes without delay key points on the topic.. There is less room for in-depth discussion between teacher and students since teacher does not delay in explaining if students look confuse or remain silent. No probing. (55 minutes)

Step III: Evaluation

One student is call upon to define soil pollution and the effect on soil pollution on crop yield. (5 minutes)

Lesson 8: HVI

Time: 35 minutes

Topic: You and Environment

Sub-topic: soil pollution

Teaching Materials: films, pollutants, polluted soil sample.

Performance objectives: By the end of the lesson students should be able to:

- i. Suggest how soil pollution can be controlled

Previous Knowledge: students have learnt about what soil is. Causes of soil pollution and its damaging effects on the environment

Presentation

Step 1: Introduction

By way of linking the previous and current lesson, teacher will ask the following questions; what is soil pollution? What are some soil pollutants common in their environment? (5minutes).

Step II: Teacher / students activities

Each group is given a cause of soil pollutant to discuss and come up with a possible control. Teachers will guide, prompt and probe to lend support (10minutes).

Step III: Discussion

For each of the cause/effect of soil pollution, a group is called upon to give their findings which will be discussed in class with the teachers facilitating. Students are given much room to air their views. Ideas should include the use of chemical fertilizers, doping of industrial waste, deforestation and domestic waste. All these should be curtailed (15 minutes).

Step IV: Evaluation and conclusion

Teacher asks a few questions to recapitulate. Like what are the most prominent soil pollutants on their farm and how can they be controlled effectively? (5 minutes)

Lesson 8: MVI

Time: 35minutes

Topic: You and Environment

Sub-Topic: soil pollution and control

Teaching Materials: Soil samples, polluted soil samples, pollutants

Performance objectives: By the end of the lesson students should be able to:

- i. Suggest how soil pollution can be controlled

Previous Knowledge: students have learnt about what soil is. Causes of soil pollution and its damaging effects on the environment

Presentation

Step 1: Introduction

Teacher asks the following questions, what is soil pollution? What are some common soil pollutants prevalent in their communities? Teacher leads in this discussion in a whole class teaching. (5 minutes)

Step II: Teacher/ Students' interaction

The main activity will center on discussing how soil pollution can be controlled. With samples of polluted soil and pollutants presented in the class teacher leads the discussion by asking questions. For example looking at the common pollutants what can be done to stop their introduction into the soil. What human activities encourage soil pollution? Students will be encouraged to discuss in groups and asked to explain during whole class presentation. (10 minutes)

Step III: Discussion

Students are allowed to present their points which are critiqued by other students with the teachers justifying, or explaining further. They will praise or reject their views with superior argument. Issues banning the use of leather for packaging, plastic and non-biodegradable materials should be mentioned. (15 minutes)

Step IV: Evaluation/ Conclusion

Teacher asks students to visit sites of polluted soil and to bring back report by the next class what they observe. (5 minutes)

Lesson 8: LVI

Time: 35minutes

Topic: You and Environment

Sub-Topic: soil pollution and control

Teaching Materials: Soil samples, polluted soil samples, pollutants

Performance objectives: By the end of the lesson students should be able to:

- i. Suggest how soil pollution can be controlled

Previous Knowledge: students have learnt about what soil is. Causes of soil pollution and its damaging effects on the environment

Presentation

Step 1: Introduction

Teacher reviews the previous lesson by asking about the harmful effect of soil pollution especially to plant around their homes for example poor yield, fasten soil erosion. (5 minutes)

Step II: Teachers/ Students' interaction

Teacher explains one way to control chemical pollutants e.g chemical fertilizer which is by using organic manure. Students are asked to think and explain other ways of controlling soil pollution. The views are moderated by the teachers.(25 minutes)

Step III: Discussion

Students take time to explain ways of controlling soil pollution very familiar to them. Teacher dominates this discussion since it is low level interaction.

Step IV: Evaluation

Teacher asks one student to explain one way to control agricultural pollutants. (5 minutes)

Lesson 8: Control

Time: 35minutes

Topic: You and Environment

Sub-Topic: soil pollution and control

Performance objectives: By the end of the lesson students should be able to:

- i. Suggest how soil pollution can be controlled

Previous Knowledge: students have learnt about what soil is. Causes of soil pollution and its damaging effects on the environment

Presentation

Step 1: Introduction

Teacher reviews the previous lesson by asking about the harmful effect of soil pollution especially to plant around their homes for example poor yield, fasten soil erosion. (5 minutes)

Step III: Teachers and Students' interaction/interaction

Teacher explains one way to control chemical pollutants like chemical fertilizer which is by using organic manure. Students are asked to think and explain other ways of controlling soil pollution. The views are moderated by the teachers. (25 minutes)

Minimal contribution is expected from the students. The teacher therefore lists, defines, writes and dictates facts. (25 minutes)

Step III: Evaluation

Teacher asks students to explain other ways of controlling agricultural pollutants. (5 minutes)

Lesson 9: HVI:

Class: JS II

Theme: You and Environment

Topic: Drug Abuse II

Time: 70minutes

Teaching Materials: Charts, some drugs commonly use at home, video clips and costumes.

Performance Objectives; By the end of the lesson, majority of students will be able to:

- i. List method of drug abuse
- ii. Identify some common ways youth misuse drugs.
- iii. Discuss social risk factors in drug abuse.

Previous knowledge: students have been taught what drugs are and the one commonly used and abused.

Presentation

Step 1:Introduction

Teacher asks a few students to explain the common behaviours of young people and adults with unsound minds. What are the major causes of these behaviours. They are mentally ill and their behaviours can be traced back to excessive drinking of alcoholic beverages, smoking and or use of drugs such as marijuana. (10 minutes)

Step II: Teacher/Students' Interaction

Teacher puts students into groups and appoints leaders and reporters who will write down discussions and observations.

- ✓ The groups are to list methods of drug use (5minutes)
- ✓ Identify some common ways youth misuse drugs and (5minutes)
- ✓ Discuss social risk factors in drug abuse (5minutes)
- ✓ Assorted charts drugs and video clips on drugs and related efforts are then displayed students are asked to role play, or dramatized the influence of drugs.

- ✓ The two teachers are to facilitate student's discussion, support, and encourage active participation of all students through questions, prompting and probing. Each of the objectives is treated step by step. (25 minutes)

Step III: Discussion

Adopting a whole class approach, teacher takes up a general discussion, accepting, approving ideas, explaining and lecturing highlighting the following:

Methods of drug use: swallowing (ingesting), smoking, snorting, suppositories and injecting. Drug misuse means use of a drug for a purpose or condition for which it is not suited or improper dosage. Drug abuse means excessive or persistent use of a drug without regard to accepted medical practice.

Common ways youth misuse drugs include: alcohol consumption, Narcotics, tramor, opium (morphine) to kill pain, sedatives (to relax the central nervous system and induce sleep), cocaine, tranquilizers, valium, hallucinogens, marijuana. Cigarettes/ tobacco and club drugs mostly abused by adolescents and teenagers. Social risk factors in drug abuse include, early aggressive behaviour, lack of parental supervision (lack of bond) substance abuse, drug availability. Academic failure and social difficulties, peer influence, broken homes materialistic value. Risk factors can increase a person's chances for drug abuse. (30 minutes)

Step IV: evaluation and conclusion

Teacher asks leading questions that are mostly open ended to allow students room to express themselves. Suggest ways of preventing drug abuse, then wraps up the discussion. (5 minutes)

Lesson 9: MVI

Time: 70minutes

Theme: You and Environment

Sub-Topic: Drug abuse II

Teaching Materials: Charts, some drugs commonly use at home, video clips and costume

Performance Objectives; By the end of the lesson, majority of students will be able to:

- i. List methods of drug abuse
- ii. Identify some common ways youth misuse drugs.
- iii. Discuss social risk factors in drug abuse.

Previous knowledge: students have been taught what drugs are and the one common used and abused.

Presentation

Step 1: introduction

Teacher asks a few students to explain the common behaviours of young people and adults with unsound minds. What are the major causes of these behaviours. They are mentally ill and their behaviours can be traced back to excessive drinking of alcoholic beverages, smoking and or use of drugs such as marijuana. (10 minutes)

Step II: Teacher/ students' interaction.

Teacher leads discussion on methods of drug use, common ways youth misuse drugs and social risk factors in drug abuse. Teachers ask questions, explain concepts, appraise responses, praise and make suggests. The students are assigned into groups for meaningful interaction. (20 minutes)

Step III : Discussion

Teacher takes responses from students. They are asked to explain the task assigned to them. Students and teachers alike explain their views which are accepted or rejected. Methods of drug use, like swallowing (ingestion), smoking, snorting, and injection. Drug abuse like alcohol consumption, and cigarette smoking.

Social risk factors include, aggressive behaviour, and academic failure. (35 minutes)

Step IV: Evaluation

Teacher asks students to explain social risk factors associated with teenagers. (5 minutes)

Lesson 9: LVI

Time: 70 minutes

Theme: You and Environment

Sub-Topic: Drug abuse II

Teaching Materials: Charts, some drugs commonly use at home, video clips and costume

Performance Objectives; By the end of the lesson, majority of students will be able to:

- i. List methods of drug abuse
- ii. Identify some common ways youth misuse drugs.
- iii. Discuss social risk factors in drug abuse.

Previous knowledge: students have been taught what drugs are and the one common used and abused.

Presentation

Step 1:Introduction

Teacher enquires from student if some of them have come across mad people in their communities. If yes what are the common causes of their madness. Common among them are due to drug abuse. (10 minutes)

Step II:Teacher/ Students' interaction.

Teacher asks and goes ahead to explain methods of drug use, youth misuse of drugs and the risk in drug abuse. The teacher welcomes questions and addresses them without delay. He or she praises and reprimands. He dominates discussion.(10 minutes)

Step III :Discussion.

Teacher explains methods of drug use, youth misuse of drugs and the risk in drug abuse. The teacher welcomes questions and addresses them without delay. He or she praises and reprimands. He dominates discussion.(50 minutes)

Step IV: Evaluation / Conclusion

Lesson summary is by asking questions and explaining key ideas. (10 minutes)

Lesson 9: Control

Time: 70 minutes

Theme: You and Environment

Sub-Topic: Drug abuse II

Performance Objectives; By the end of the lesson, majority of students will be able to:

- i. List methods of drug abuse
- ii. Identify some common ways youth misuse drugs.
- iii. Discuss social risk factors in drug abuse.

Previous knowledge: students have been taught what drugs are and the one common used and abused.

Presentation

Step 1: Introduction

Teacher enquires from student if some of them have come across mad people in their communities. If yes what are the common causes of their madness. Common among them are due to drug abuse. (10 minutes)

Step II : Teacher/ Students' interaction and discussion.

Whole class teaching: Teacher asks and goes ahead to explain methods of drug use, youth misuse of drugs and the risk in drug abuse. The teacher welcomes questions and addresses them without delay. He or she praises and reprimands. He dominates discussion. (50 minutes)

Step III: Evaluation / Conclusion

What are the likely causes of madness?

Tuancy observe in students, cases of rape and other related vices in the society?

Lesson summary is explained by mentioning key ideas. (10 minutes)

Lesson 10: HVI

Class: JS II

Duration: 35 minutes

Topic: Infection Rate among Drug Users

Teaching Materials: Syringe and needle,

Performance Objective: By the end of the lesson students will be able to:

- i. Recognize that sharing injection needles make HIV/AIDS infection rate higher among drug users

Previous knowledge: Drug abuse and how drugs are taken by human beings have been discussed

Presentation

Step 1: Introduction

Teacher introduces the lesson by asking students to reflect on the previous lesson. Questions like asking students to state ways in which drugs are misused, and identifying social factors leading to drug abuse are mentioned. (5 minutes)

Step II: Teacher/ Students' activities

Teacher presents syringe and needles and charts/ video clips on the use of injection needles. Groups are asked to describe how syringe and needles are used for injection. What are the likely consequences/ effects of using piercing objects on the body? What is the likely danger? Students are to discuss and come up with their ideas. The video clips should help as a guide in this discussion. (10 minutes)

Step III: Discussion

Teacher takes views from different groups as a whole class presentation encouraging inclusive contribution. Injection drug use is one of the most high risk HIV/AIDS related activities that a person can be engaged in. When people share needles and drug equipment, the virus can easily be drawn up into the syringe and injected into the body along with the drugs. (15 minutes)

Step IV: Evaluation and conclusion

Teacher asks two students to explain the dangers in wrong use of injection needles

Teacher gives a summary of the whole lesson highlighting how drug users inject themselves with needles and how the process leads to a high risk of contracting diseases. (5 minutes)

Lesson 10: MVI

Class: JS II

Duration: 40 minutes

Topic: Infection Rate Among Drug Users

Teaching Materials: Syringe and needle,

Performance Objective: By the end of the lesson students will be able to:

- i. Recognize that sharing injection needles make HIV/AIDS infection rate higher among drug users

Previous knowledge: Drug abuse and how drugs are taken by human beings have been discussed

Presentation

Step 1: introduction

Teacher introduces the lesson by asking a few students to comment on drug misuse by youth and the harmful effects of drugs.(5 minutes)

Step II:Teachers/students' interaction

Students are put into groups and asked to discuss the following; what ways do people take drugs? If injection is mentioned, then what are the consequences of sharing needles? What of using other objects like razor and knives carelessly? Teachers go round to facilitate the discussion. (10 minutes)

Step III:Discussion

Teacher receives contribution from the groups which are accepted, modified or rejected central message is that the risk of infection is very high with drug users who share needles. In fact HIV/AIDS is promoted. (15 minutes)

Step IV: Evaluation

Teacher asks one student to explain how drugs users promote the spread of diseases through the use of needles.(5 minutes)

Lesson 10: LVI

Class: JS II

Duration: 40 minutes

Topic: Infection Rate among Drug Users

Teaching Materials: Syringe and needle,

Performance Objective: By the end of the lesson students will be able to:

- i. Recognize that sharing injection needles make HIV/AIDS infection rate higher among drug users

Previous knowledge: Drug abuse and how drugs are taken by human beings have been discussed

Presentation:

Step 1: Introduction

Teacher introduces the lesson by asking a few students to comment on drug misuse by youth and the harmful effects of drugs. (5 minutes)

Step II: Teachers/students interaction

Teacher shows the picture of a syringe and needle to the students. Other piercing objects like razor blades are presented. teacher explains how the needle is used for injection. The likely effects of indiscriminate use of the needle by drug users which gives rise to infection of diseases such as HIV/AIDS. (10 minutes)

Step III: Discussion

Teacher explains how the needle is used for injection. The likely effects of indiscriminate use of the needle by drug users which gives rise to infection of diseases such as HIV/AIDS. (15 minutes)

Step IV: Evaluation/conclusion

Teacher summarizes the main ideas of the discussion by dictating the main points for students to write. (5 minutes)

Lesson 10: Control

Class: JS II

Duration: 35 minutes

Topic: Infection Rate among Drug Users

Performance Objective: By the end of the lesson students will be able to:

- i. Recognize that sharing injection needles make HIV/AIDS infection rate higher among drug users

Previous knowledge: Drug abuse and how drugs are taken by human beings have been discussed

Presentation:

Step 1: Introduction

Teacher introduces the lesson by telling students how drug are misused by youth and the harmful effects of drugs (5 minutes)

Step II : Teachers and students interaction/discussion

Teacher explains how the needle is used for injection. The likely effects or indiscriminate use of the needle by drug users which gives rise to infection of diseases such as HIV/AIDS is also explained. Basically the teacher dominates the discussion. He/she dictates facts and does not allow room for contribution by students. Teacher is bent on covering so much ground irrespective understanding.

Teacher explains how the needle is used for injection. The likely effects or indiscriminate use of the needle by drug users which gives rise to infection of diseases such as HIV/AIDS is also explained. (25 minutes)

Step III: Evaluation/conclusion

Teacher summarizes the main ideas of the discussion by dictating the main points for students to write. (5 minutes)

Lesson 11: HVI:

Class: JS II

Topic: Living things

Sub-topic: Habitat.

Duration: 70 minutes

Performance Objectives: By the end of the lesson students should be able to:

- i. Mention the different habitats of living things.
- ii. Identify the organisms found in different habitat.

List the distinguishing characteristics of organisms found in different habitats (land, air, water).

Teaching Materials: Charts, diagrams, school garden, video clips, plastics/metal containers, polythene bags, preservatives like formalin.

Previous Knowledge: the idea of a habitat and its importance to animals is known by students

Presentation

Step 1: Introduction

Living things have life and distinguishable characteristics such as ability to move, reproduce, respire, and grow. These characteristics therefore account for choice of environment of where to live comfortably, find shelter, and mates. Teacher goes further to ask students to list all the various living things they know. From each of the groups students are to write the names on the blackboard. (5 minutes)

Step II :Teachers/students' interaction and activities

Teacher recognizes the groups in the class. The groups are asked to discuss and undertake the following activities.

- i. Mention the different habitats of living things earlier named. (5 minutes)
- ii. Attempt a classification of various organisms, living things found in different habitats. (5 minutes)
- iii. List the distinguishing characteristics of organisms found in different habitats. (land, air, water) (10 minutes)

The teaching aids are distributed to the various groups with the help of the co-teacher. For each of the task, the materials are distributed accordingly. The teacher's guide, support and demonstrate and encourage participation. (5 minutes)

Step II: Discussion/plenary

Base on the activities carried out various groups are called upon to begin to list, mention and explain their ideas.

Highlights should include:

- i. Land, air, and water.
- ii. Land, organisms: humans, rodents, goats, pigs.

Air organisms; birds, insects, virus, diseases.

Water organisms; fish, crab, crocodile, sharks.

- iii. Distinguishable characteristics of organisms.

Thick skin, photosynthesis, lay hard shelled eggs on land, have legs, antennae, 3 body sections, fins, gills, bones pollination (stigma, anthers) nose, eyes, etc. (30 minutes)

Step IV: Evaluation

Students should name there major habitats, and give examples of living things found in the different habitats. (10 minutes)

Lesson 11: MVI:

Class: JS II

Topic: living things

Sub-topic: Habitat

Duration: 70 minutes

Performance Objectives: By the end of the lesson students should be able to:

- i. Mention the different habitats of living things.
- ii. Identify the organisms found in different habitat.

Teaching Materials: Charts, diagrams, school garden, video clips, plastics/metal containers, polythene bags, preservatives like formalin.

Previous Knowledge: the idea of a habitat and its importance to animals is known by students

Presentation:

Step 1: Introduction

Living things and their peculiar characteristics are highlighted and discussed between teacher and students. (10 minutes)

Step II: Teachers/students' interaction

Teacher mentions the different habitat of living things.

Groups are assigned the task of classifying the various organisms found in the immediate environments. The various distinguishing characteristics of organisms that make them suitable in their habitat are to be discussed. The model pictures, video clips are distributed to the students to observe and comment. (25 minutes)

Step III: Discussion

Teachers allow students to make their contribution to the task assigned to them. The ideas are explained or justified. Ideas such as land, air and water habitat. Characteristics such as hair, thick skin, scales, fins and wings enable organisms to live comfortably in their habitat. (30 minutes)

Step IV: Evaluation/conclusion

Teacher asks some students most common habitats and distinguishable characteristics of organisms. (5 minutes)

Lesson 11: LVI:**Class:** JS II**Topic:** living things**Sub-topic:** Habitat**Duration:** 70 minutes**Performance Objectives:** By the end of the lesson students should be able to:

- i. Mention the different habitats of living things.
- ii. Identify the organisms found in different habitat.

Previous Knowledge: the idea of a habitat and its importance to animals is known by students**Presentation:****Step 1: Introduction**

Living things and their peculiar characteristics are highlighted and discussed between teacher and students. (10 minutes)

Step II: Teachers/ students' interaction

Teacher tells students the different habitats of living things.

Teacher identifies organisms found in different habitats.

Teacher asks students in class to attempt an identification of characteristics associated with different organisms found in different habitats. (20 minutes)

Step III: Discussion

The ideas from Step II are further explained or justified. Ideas such as land, air and water habitats. Characteristics such as hair, thick skin, scales, fins and wings enable organisms to live comfortably in their habitat.(30 minutes)

Step IV: Evaluation/ Conclusion

Teacher concludes the lesson by tracing the importance of habitat to organisms. This enables them to recreate their likes and so promote continuity of life. (10 minutes)

Lesson 11: Control**Class:** JS II**Topic:** living things**Sub-topic:** Habitat**Duration:** 70 minutes**Performance Objectives:** By the end of the lesson students should be able to:

- i. Mention the different habitats of living things.
- ii. Identify the organisms found in different habitat.

Previous Knowledge: the idea of a habitat and its importance to animals is known by students**Presentation:****Step 1: Introduction**

Living things and their peculiar characteristics are highlighted and discussed between teacher and students. (10 minutes)

Step II : Teachers and students' interaction/discussion

Teacher tells students the different habitats of living things.

Teacher identifies organisms found in different habitats.

Teacher asks students in class to attempt an identification of characteristics associated with different organisms found in different habitats.

The ideas from step II are further explained or justified. Ideas such as land, air and water habitat. Characteristics such as hair, thick skin, scales, fins and wings enable organisms to live comfortably in their habitat.(50 minutes)

Step III: Evaluation/ Conclusion

Teacher concludes the lesson by tracing the importance of habitat to organisms. This enables them to recreate their likes and so promote continuity of life. (10 minutes)

Lesson 12: HVI

Class: JS II

Topic: Living things

Sub-Topic: Uniqueness of man

Duration: 35 minutes

Performance Objectives: By the end of the lesson students will be able to:

- i. Describe intelligence as a characteristic of human beings;
- ii. List the uses of intelligence to human beings.

Teaching Aids: Film on human exploit, model, pictures of scientific instruments, equipment, gadgets, machines etcetera.

Previous Knowledge: students can identify the differences between human beings and other animals by behaviours at least

Presentation

Step 1:Introduction

Teacher asks students in their groups to think of man and his peculiar characteristics. They are called upon to write them, students are also asked to explain the purpose of these peculiar characteristics.(5 minutes)

Step II: Teacher / Students' interaction

Teacher asks students in groups to discuss and come up with elementary ideas on human brain, reasoning and intelligence. On which part of the human body does reasoning/thinking occur? Is man's thinking and behaviour different from other animals? If yes, in what ways?

Teacher presents diagram of brain, spinal cord and the peripheral nerves of the brain to study and make observation.

Teacher allows students to explore, the film clips on human models and model pictures, instruments and machines. (10 minutes)

Step III: Discussion

In plenary, responses are received, and presented for general consumption. Ideas should be received from various groups given room for inclusiveness and a sense of belonging. Teachers will accept, explain, prompt, probe, praise, justify and so no.

Response should include:

Human brain is better developed than is the brain of any other animal. Human beings can think well, solve problems, use words and numbers to write and speak and remember

things. Can think about themselves; No other animal can do this. This is the endowment of intelligence. Humans are more intelligent than other animals. They can produce machines to ease their work e.g pencil, biro, paper, car, motorcycle, beds e.t.c. (15 minutes)

Step IV: Evaluation

Teacher asks students to describe how man organizes his work as a mark of intelligence. (5 minutes)

Lesson 12: MVI:

Class: JS II

Topic: Living things

Sub- Topic: uniqueness of man

Duration: 35minutes

Teaching Materials: : Film on human exploit, model, pictures of scientific instruments, equipment, gadgets, machines et cetera.

Performance Objectives: By the end of the lesson students will be able to:

- i. Describe intelligence as a characteristic of human beings;
- ii. List the uses of intelligence to human beings.

Previous Knowledge: students can identify the differences between human beings and other animals by behaviours at least

Presentation

Step 1: Introduction

Teacher asks students in their groups to think of man and his peculiar characteristics. They are called upon to write them, students are also asked to explain the purpose of these peculiar characteristics. (5 minutes)

Step II: Teachers / Students' interaction

Whole class teaching; teacher describes characteristics of human intelligence as a feature of a well-developed brain which helps in reasoning/ thinking. As a result of this human beings can solve problems systematically. They can use words, numbers and will be able to remember things. (10 minutes)

Step II: Discussions

Teachers distribute pictures, models of machines and other materials being products of human activities. Students are asked to discuss how humans come about such things. The students may ask questions to seek for clarification. If they remain silent; the teachers will give direction, or explain further. (15 minutes)

Step IV: Evaluation/ Conclusion

Teacher asks students to list as many as they can equipment, materials or products manufacture by man by reason of intelligence. A few students should explain how scientists organize activities to address a problem or challenge. (5 minutes)

Lesson 12: LVI:

Class: JS II

Topic: Living things

Sub- Topic: uniqueness of man

Duration: 35minutes

Teaching Materials: Film on human exploit, model, pictures of scientific instruments, equipment, gadgets, machines etcetera.

Performance Objectives: By the end of the lesson students will be able to:

- i. Describe intelligence as a characteristic of human beings;
- ii. List the uses of intelligence to human beings.

Previous Knowledge: students can identify the differences between human beings and other animals by behaviours at least

Presentation:

Step 1:Introduction

Teacher asks students in their groups to think of man and his peculiar characteristics. They are called upon to write them, students are also asked to explain the purpose of these peculiar characteristics. (5 minutes)

Step II :Teacher/ Students' interaction

Teacher explains human intelligence to students as a characteristic of human beings. Teacher list some of the uses of intelligence to human beings. Teacher asks a few students in the class to list other uses of human intelligence to human beings. Teacher distributes pictures on human exploits to help student response to task assigned to them. Teacher does not observe wait-time but rather supply answers when students delay. (10 minutes)

Step III : Discussion

Teacher explains that human brain is better developed than the brain of any other animal. Human beings can think well, solve problems, use words and numbers to write and speak and remember things. Can think about themselves; No other animal can do this. This is the endowment of intelligence. Humans are more intelligent than other animals. They can produce machines to ease their work like using pencil, biro, paper, car, motorcycle, beds among others. (15 minutes)

Step IV: Evaluation/ Conclusion

Students are directed to source for more information on human intelligence and its relevance in day to day human activities.(5 minutes)

Lesson 12: Control

Class: JS II

Topic: Living things

Sub- Topic: uniqueness of man

Duration: 35minutes

Performance Objectives: By the end of the lesson students will be able to:

- i. Describe intelligence as a characteristic of human beings;
- ii. List the uses of intelligence to human beings.

Previous Knowledge: students can identify the differences between human beings and other animals by behaviours at least

Presentation:

Step 1: Introduction

Teacher explains to students in the groups, man and his peculiar characteristics as a function of intelligence. (5 minutes)

Step II: Teacher and Students' interaction/discussion.

Teacher lists some of the uses of intelligence to human beings. Teacher asks a few students in the class to list other uses of human intelligence to human beings. Teacher distributes pictures on human exploits to help student response to task assigned to them. Teacher explains that human brain is better developed than the brain of any other animal. Human beings can think well, solve problems, use words and numbers to write and speak and remember things. Can think about themselves; No other animal can do this. This is the endowment of intelligence. Humans are more intelligent than other animals. They can produce machines to ease their work like using pencil, biro, paper, car, motorcycle, beds among others. (25 minutes)

Step III: Evaluation/ Conclusion

Students are directed to source for more information on human intelligence.

How are human beings different from other animals in their ways of thinking? Are the capacities of their brains the same? (5 minutes)