INFLUENCE OF TEACHERS' PEDAGOGICAL AND CONTENT KNOWLEDGE ON BASIC SCIENCE STUDENTS' LEARNING OUTCOMES IN BOSSO LOCAL GOVERNMENT AREA OF NIGER STATE

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A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF SCIENCE EDUCATION

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Abstract

This research was designed to investigate the influence of teachers' pedagogical and content knowledge on Basic Science Students Learning Outcomes in Bosso Local Government Area of Niger State. The researcher set four objectives to be achieved and four research questions were formulated to achieve the set objectives. Previous literatures that are related to this study were reviewed in order to establish link and focus for the study. The study adopted descriptive survey method with a total population of 16,402 Basic Science students in Bosso Local Government Area of Niger but only 5,578 students of JSSIII Basic Science Students were the population used for the study. Through proportionate random sampling, 50 students each were selected from 5 sampled secondary schools within Bosso LGA, there a total of 250 sampled students were used for the study. The research instrument was a self-designed questionnaire with reliability co-efficient of 0.86. The study adopted mean and standard deviation using SPSS (statistical package of Social Science) to analyzed data based on the research objectives. From the findings, it was concluded that there is influence of teachers' pedagogical knowledge on Basic Science students learning outcome, there is influence of teachers' pedagogical knowledge on Basic Science students learning outcome based on gender, there is influence of teachers' content knowledge on Basic Science students learning outcome and there is influence of teachers' content knowledge on Basic Science students learning outcome based on gender. From the findings, the research therefore recommended that teachers of Basic Science should be exposed to various teaching strategies to boost students' performance, teachers of Basic Science should have good content knowledge of the subject and be ready be to learn different strategies in teaching and learning effectively and efficiently, Basic Science teachers should adopt the best teaching style which can influence student's positive attitude towards learning of Basic Science and qualified and dedicated basic science teachers who are graduate of integrated science should be employed to teach the subject in secondary school.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Education has been seen as the bed rock through which any nation can build its citizens. It helps to offer adequate knowledge to life in order to eliminate ignorance and inequality in the society. Kosgei, Mise, Odera and Ayugi (2013) referred to education as a basic human right, which provides a key to enlightenment, wealth and power. Teacher as role model is expected to impart knowledge to learners in order to acquire the necessary information needed to function well in the society. Teachers' content knowledge (TCK) and teachers' pedagogy knowledge (TPK) has attracted increasing attention from several agents of change in education industry. It is a well-known fact that any nation whose government strive to achieve greatness should provide students with highly qualified teachers who are vast in content knowledge and pedagogical knowledge.

Teachers' pedagogical competence influences what they do and this in turn influence the attitude developed by the learners. Pedagogical content knowledge in this study connotes knowledge of subject, knowledge of teaching and knowledge of curriculum. Information available from literatures suggest that teachers' intellectual resources significantly affect students' learning experiences (Odumosu, Olusesan & Abel, 2016). This has made educators to focus on the knowledge of the subject matter because researches suggest that teachers of mathematics and sciences lack essential content knowledge for teaching the subject (Olfos, Goldrine & Estrella, 2014).

The primary purpose of teaching at any level of education is to bring a fundamental change in the learner (Tebabal & Kahssay, 2011). In order to achieve this, it is expected

that a Basic Science teacher should have the knowledge and a high level of understanding of the concept (Ladele, 2013). Many studies supported the notion that teachers who taught the subjects that they had previously studied in-depth are particularly effective (Olisama, Odumosu and Egho, 2011). There is therefore strong indication that there is high correlation between teachers' content knowledge, pedagogical and learners' performance in science in general. Gbore (2013) remarked that the ineffective teaching of science in school arises from the quality of teachers recruited to teach science. He reiterated that, the teaching of science subjects by people who are neither interested nor qualified may have led many learners in science class, either to end up as drop outs or withdrew them to other discipline. Popoola (2013), explained that learner's performance (academic achievement) plays an important role in producing the best quality graduates who will become great leaders and manpower for the country. Alimi and Balogun (2010) stated that success of any teaching and learning process which invariably influences students' academic performance depends on how effective and efficient the teachers are. It is obvious that, Basic Science teachers need to be professionally competent and emotionally balanced in order to carry their classroom assignments out effectively.

Basic Science teachers are supposed to establish a conducive environment for learning to take place but the reverse is usually the case, as some of Basic Science teachers developed nonchalant attitude/deviant behaviour towards teaching this subject which has made many learners to develop negative interest/attitude towards the subject. Some absent themselves from the class lesson. Learners with this experience develop negative attitude towards lesson out of frustration. However, professional teaching competency requires the full knowledge of utilizing the right method to adopt by the teacher in order

to create professional learning opportunities for learners especially in the Basic Science. Another important factor in effectiveness of a teacher is the ability to recognize the variance in the learning situation of students and to choose the best method possible for each learner (Liakopoulou, 2011). Teachers teaching style such as teachers' explanation respect to learners, aggressive behaviour, and pace of teaching among others could either motivate or not motivate learners to learn in the classroom (Okoro & Uwah, 2013).

1.2 Statement of the Problems

Teachers' knowledge of the subject matter, methodology and learner coupled with techniques of imparting knowledge are of great attributes which have significant effects on their academic performance of learner. Learners are much more likely to learn when they have opportunities. Therefore the teacher should allow them to express themselves and be calm, patient and perseverant. Teachers are faced with a big responsibility in the classroom and whatever they do would affect the students either positively or negatively. Therefore, teachers must comprehend both learning and instructional principles. Teachers who have the understandings of the subject content very well would be thorough and express themselves clearly unlike those teachers with weaker background of subject matter. It is against the backdrop that the study aimed at investigating into the influence of teachers' pedagogical and content knowledge on Basic Science Students' Learning Outcomes in Bosso Local Government Area of Niger State.

1.3 Purpose of the Study

The main purpose of this study is to examine influence of teachers' pedagogical and content knowledge on Basic Science Students' Learning Outcomes in Bosso Local Government Area of Niger State. Specifically, the study objectives include to;

i. determine the influence of teachers pedagogical knowledge on Basic Science Students Outcome.

ii. determine the influence of teachers pedagogical knowledge on Basic Science students' learning outcome based on gender.

iii. determine the influence of teachers content knowledge on Basic Science Students learning outcome

iv. determine the influence of teachers content knowledge on Basic Science Students learning based on gender.

1.4 Research Questions

In order to achieve the targeted objectives, the research formulated the following research questions.

i. What are the influences of teachers' pedagogical knowledge on Basic Science Students learning outcome?

ii. What are the influences of teachers' pedagogical knowledge on Basic Science Students learning outcome based on gender?

iii. What are the influences of teachers' content knowledge on Basic Science Students learning outcome?

iv. What are the influences of teachers' content knowledge on Basic Science Students learning outcome based on gender?

1.5 Significance of the Study

Findings of this study would greatly benefit the Ministry of Education, Secondary Schools and teachers. The Ministry of Education may use this study to plan for the education improvement in implementing the Education Development Blueprint.

It is hoped that the findings from this study would enable basic science teachers to effectively relate content and pedagogical skills to the teaching and learning of basic science. The teachers may know themselves and how to integrate their qualification to make their teaching techniques become effective which is needed in achieving the education development blueprint as well as achieving the National Mission. Every teacher has their own teaching styles. Therefore, the suitability between teaching styles and qualification will lead to the effectiveness of teaching.

The curriculum planners will also benefit from this study by making adjustment in teacher education programmes in science in such a way that both content and pedagogical knowledge should be taught in relevant educational institutions.

It will enable teacher training programmes to reorient and reorganize their programmes towards a better preparation for professional development of future teachers.

Researchers in science education will equally benefit from the findings of this study by using it as a stepping-stone for further studies in content knowledge and pedagogical skills and other related areas.

1.6 Scope of the Study

The study focused on investigating the teachers' pedagogical and content knowledge on students' learning outcome in Basic Science in Bosso Local Government Area of Niger

State. This is structured to cover all the government secondary schools in Bosso Local Government Area of Niger state. The project was limited to only junior secondary school students and their basic science teachers of the selected schools. Instrument to be used is researcher's structured questionnaire and the time scope was two weeks.

1.7 Delimitation of the Study

This study would be limited to basic science teachers in junior secondary school within Bosso only. However, the result obtained here would serve as a base for innovation in other Science related subjects.

The study is delimited to basic science teachers, because the teachers have already covered enough of the content and are well exposed to the science teaching methods which they have learnt throughout their years of study.

1.8 Operational Definition of Terms

Learning Outcome: The score of the student in achieve and retention test after the treatment.

Basic Science: a subject of JSS level of secondary schools in Nigeria.

Pedagogical Knowledge: Teacher knowledge about methodology/instructional strategies/method of teaching.

Pedagogical Skills:- Ability to use teaching method effectively.

Subject Content Knowledge:- This is the teachers' knowledge of the specific content they teach students including topics, facts and relationship within a subject.

CHAPTER TWO

2.0 REVIEW OF RELATED LITERATURE

The main aim of this research study is to investigate the influence of teachers' pedagogical and content knowledge on Basic Science Students Learning Outcomes in Bosso Local Government Area of Niger State. This chapter intend to be discuss in the following sub-headings;-

2.2 Conceptual framework

2.3 Theoretical Framework, and

2.4 Review of previous empirical studies

2.1 Conceptual Framework

2.1.1 Concept of Science

According to Daramola, (2010) science is a dynamic, expanding body of knowledge covering ever new domains of experience. Science is ultimately a social Endeavour. Science is a body of empirical, theoretical and practical knowledge about natural world, produced by refresher making use of scientific methods which emphasis the observation, explanation and prediction of real world phenomena by experiment. Science is knowledge and knowledge is power. Science has the potential to be beneficial or harmful, emancipative or oppressive. In the view of Esiobu, (2015) science is a great enterprise which nations depend on, in-order to advance technologically. Science therefore, is receiving much emphasis in education because of its significance and relevance to life and society. Science has been regarded as the bedrock of modern day technological breakthrough is built. Nowadays, countries all over the world, especially the developing

ones like Nigeria, are striving hard to develop technologically and scientifically, since the world is turning Scientific and all proper functioning of lives depend greatly on Science. According to Ogunleye (2012), Science is a dynamic human activity concerned with understanding the workings of our world. This understanding helps man to know more about the universe. Without the applications of science, it would have been difficult for man to explore the other planets of the universe.

2.1.2 Concept of Basic Science

Basic science or primary science as a branch of science and the prerequisite subject for many fields of learning contributes immensely to the technological growth of the nation. In view of this, basic science is given great emphasis in the basic school curriculum. Basic science involves helping children develop basic scientific ideas and understanding, which will enable them to explore and investigate their world. Thus, basic science may be seen as the active process of the personal construction of meaning and understanding. Children need to practice science to engage in rich scientific inquiry, (Buck, Bratz & Towns, 2008). The dynamic nature of man and his environment stipulates that change is the only thing that is constant in life.

Science as a fast developing discipline may incite changes and development in other discipline. For this reason, the National Policy on Education (2014) asserts that primary science as Basic science is expected among others, to reflect on the distinctive practical and investigative features of enquiry skills. To achieve this, FRN (Federal Republic of Nigeria) asserts that Nigeria will have a new programme assigned to be both functional and practical which would structurally and qualitatively be different from the existing theoretical and rhetoric system. It then became imperative that the existing curricula for

primary and Junior Secondary school should be reviewed, re-structured and re-aligned to fit into a 9 years Basic Education Programme.

2.1.3 Methods of Teaching Science

Teaching method comprises the principles and methods used for instruction. The choice of teaching method or methods to be used depends largely on the information or skill that is being taught, and it may also be influenced by the aptitude and enthusiasm of the pupils (Agbai, 2014). The researcher explained further that there is no single method for the teaching of science. The method adopted at any time depends on a number of factors. Such factors include; the nature of the topic, the age of the learner and the learning environment among others. There are different teaching strategies (methods) in science education. A good science teacher should be able to use variety of methods considered suitable for any given instruction, the different methods are not mutually exclusive. The method or strategies that are frequently used for science education include; the traditional lecture method (chalk and talk) method, the discovery and inquiry method, demonstration method, laboratory method, field trip method and instructional strategies such as cooperative learning, classroom interaction pattern, constructivist approaches (Obiekwe, 2008), Obiekwe also categorized the teaching method into two approaches; teacher centered approaches and student centered- approaches. Guisti (2018) and Campbell (2016) stated that teacher centered approaches to instruction are often referred to as the traditional method of teaching, didactic or direct instruction, and that it include all the methods grounded in behaviorism, such teaching methods like the lecture/expository methods, demonstration and recitation.

The term teacher-centered comes from the role that the teacher assumes in traditional classroom context, as the possessor of knowledge which is transferred to students, the decision taken on how the knowledge transfer takes place depend solely on the teacher. Teachers in a teacher centered environment focus on making relationships with students that are anchored in intellectual exploration of selected materials. They focus more on content than on student. Mc Donald (2012) explained that it is difficult to believe in children's capacity, since the teacher centered approach places control for learning in the hands of the teacher. The teacher uses the expertise in content knowledge to help learner make connections. The effort to get to know the learner and how he processes information is secondary.

Teacher centered approaches stress transmission of knowledge in a manner that emphasizes training or memorization. Guisti, (2018) described teacher- centered approaches to learning as approaches centered on one fact laden text, consisting of assign, recite, test and then discuss the test. Most of the methods under teacher centered approaches especially the lecture method is commonly used among teacher and is criticized by many researchers as poor method of instruction (Mandor, 2012). They argued that the information flow is unidirectional manner making learners to be less active in the learning process, limit the amount of learner's participation, hence are not adequate for teaching hand-on skills and maintaining student's interest in the learning process (Ibe, 2014). Mandor further stated two methods of lecture approaches to learning which are as follows: formal and informal method. The formal lecture method is primarily used when presenting information to large groups. Communication is virtually

a one way communication from instructor to students. Student participation is severely limited.

The informal lecture includes active student participation. Learning is best achieved if students participate actively in a relaxed atmosphere; therefore, the informal lecture is encouraged over the formal. Active student participation can be achieved through the use of questions and is an effective two-way communication process. Guisti (2018) noted that in today's classroom terms such as student- centered, constructivism, inquiry and discovery learning are often interchangeably used, although they share some commonalities, experts in its field feel that there are some important differences. In science classroom, the term is used most often to refer to a student-centered approaches is inquiry teaching method (Campell, 2016 and Guisti, 2018).

Inquiry Method of Teaching

Inquiry entails practicing of attitudinal skills such as honesty, open mindedness and perseverance when carrying out science and technology tasks. Inquiry means more than simply answering questions or getting right answers and emphasizing it. It is an innovative teaching method which encourages active participation of students in the learning process (O'Bannon, 2012 and Exline, 2014). Inquiry is an approach to learning whereby students find and use a variety of sources of information and idea to increase their understanding of a problem, topic or issue (Kuhlthau, 2017). Inquiry requires more than simply answering questions or getting right answers, and emphasizes discovery rather than telling (Guisti, 2018). The word inquiry according to Campell (2016) loosely means 'an investigation' but its meaning in the realm of science education is much more

complex. It includes questioning, designing, conducting and experiment and communicating the result to others or the society which mirrors scientists.

Inquiry also espouses investigation, exploration, search, quest, research pursuit and study (Exline, 2014). Inquiry is a natural introduction to the branch of epistemology known as 'Nature of science' which deals with the characteristics of scientific knowledge (Kirshner, 2016). Thus Guisti (2018) maintains that in science classroom that the term used most often to refer to students – centered approach is inquiry. Inquiry engages interest and challenges students to connect their world with the curriculum (Kuhlthau et al, 2017).

Inquiry process starts from birth and continues till death (Exline, 2014). It begins with gathering information and data through the application and use of human senses: seeing, hearing, touching, tasting and smelling (Saakatchewan, 2010). Effective inquiry is more than asking questions but involves a complex process of converting information and data into useful knowledge (Martin-Hansen, 2017). Thus the essence of inquiry process is to ask questions that stimulate students to think critically and formulate their own questions and construct their own knowledge. Inquiry emphasizes on how we come to know and less on what we know (Guisti, 2018). It involves active participation of students in the learning process, it allows for high degree of interaction among the learners, the materials the content and the environment and also enables both students and teachers to become persistent askers, seekers, interrogators, questioners, ponders, and problem solvers (Orlich , 2016).

Inquiry-based teaching has many benefits to knowledge acquisition as observed by (Okwor, 2017; Guisti, 2018). These include: inquiry encourages active participation of learner in the learning process and help learners to build self-concept and knowledge; it facilitates retention and transfer of knowledge to new but similar situation; it arouses the interest of learners and promotes intrinsic motivation rather than extrinsic motivation; it contributes to the development of effective thinking, creative expression, critical analysis and local reasoning etc. Inquiry orientation prepares students for learning by providing motivations for the activity, creates interest, generates curiosity and makes connections to prior knowledge, thereby identifying learning objectives and criteria for success (Hanson, 2015). Inquiry is important in the generation and transmission of knowledge; hence there is no authentic investigation or meaningful learning if there is no inquiry mind, seeking an answer, solution, explanation or decision (David, 2013). Some weaknesses attributed to the inquiry approach of learning include: It is time consuming and limits content coverage of the syllabus. Too much work load and large class size make supervision of student difficult; Inquiry based teaching complicates and expands the teachers work, owing to the many interactions that are involved in the inquiry process (Orlich, 2016).

David (2013) classified inquiry into structured (guided), unstructured (unguided) and heuristic method (devices-used mainly to aid skills development). Inquiry into such varieties like guided and unguided inductive inquiry, deductive inquiry and problem solving; while many other researchers Guisti, (2018); Bilgin (2016); Saskatchewan; (2010) discussed the nature of inquiry using two concepts guided/structured and unguided/open or unstructured inquiry and stated that to implement an inquiry approach that a teacher may consider the following:

- Present a problem, or a puzzling event or situation which stimulates interest.

- Check with students to ensure that they understand the problem, events or situation.

- Either structure the lesson, to develop specific predetermined generalizations, thereby limiting the number of generalizations developed or

- Identify general problems or questions but not specific generalizations to be develop, thereby allowing unlimited number of generalizations (unguided inquiry).

- Provide and structure appropriate materials equipment, data, classroom, environment, etc.

- Provide instruction about whether students work alone or in groups.

- Either act as class leader throughout the lesson and ask questions and suggest activities which will lead students to desired generalizations (guided inquiry) or ask only initial questions.

- Students interact with materials and each other without further teacher's guidance (unguided inquiry).

- Elicit observation and generalizations in whole class discussion or encourage individual or small grove sharing.

- Observe and listen to students throughout the lesson: note students activities, questions and hypotheses, note processes which lead students to specific conclusion

In the light of later clarification of inquiry, (Guisti, 2018) stated that guided inquiry approach entails an instructional approach where the search for knowledge is initiated by

the teacher's questions and guidance during the process of teaching and learning while unguided inquiry approach includes an instructional process by which the questions or problems and procedures for investigations are initiated and carried out by the students with little or no assistance from the teacher, in which case it may be less structured, (Guisti, 2018). It is on this basis that the present study is interested in investigating the effect of guided inquiry and lecture teaching approaches.

Guided Inquiry

Guided inquiry applies to a range of investigative structured activities, where the instructor provides the problem and encourages students to work out the procedure to resolve it (Guisti, 2018). It is an activity oriented approach to learning where learners are closely monitored by their teachers to find a solution to instructional problems through investigation (Martin-Hansen, 2012) defined guided inquiry as 'a carefully planned, closely supervised, on-going assessed and targeted intervention by an instructional team or school librarians that gradually lead students towards independent learning'. In guided inquiry process, the students are provided with the specifics, the data or facts but are allowed to make generalization on their own (Furtak, 2016) assert that guided inquiry stands in between the boundaries of the traditional teaching methods and other approaches of inquiry such as open inquiry.

Guided inquiry is a more teacher-centered approach than the open/unguided inquiry. The usage of guided unguided method is important in transition from lecturing method to other teaching method which are less and more clearly structured for alternative solutions

(Bilgin, 2016). In guided inquiry method, teachers and learners play crucial roles in asking questions developing answers and structure of materials and cases.

Guided inquiry through the assistance and directives experts make curriculum content more interesting, relevant and thought provoking to students (Exline, 2014). It provides students with both direction and freedom in the classroom (Kuhlthau, 2017). Guided inquiry incorporates information location, evaluation and conceptual understanding. It encourages students at the beginning of a research to develop their ideas and develop questions that motivate them to learn through the inquiry process (Bilgin, 2016 and Kuhlthau et al, 2017). The guidance and direction provided by the instructors ensures success in the discovery of concepts and principles (Okwor, 2017). The structured questions in guided inquiry approach compel students to think critically and analytically and as well as guide the learners in the problem exploration process, help students to organize and facilitate learning and ensure that students do not get frustrated and experience failure in the learning process (Campell, 2016).

Unguided inquiry is described as student-centered approach, because the students form their own research questions (or problem) carry out method of investigating the hypothesis and draw conclusions. Usually the students work directly with the concepts and materials equipment and environment and so forth and then discover the specifics by themselves before making generalization. Open inquiry closely mirrors scientists' and actual work (Martin Hansen, 2012 and Bilgin, 2016). It requires higher order thinking, is intellectually challenging for learners and difficult to implement by teachers .Guided and unguided approach seem to rouse the interest of learners in contrast to traditional

approach to learning. This study tries to investigate the effect of guided inquiry and lecture method of teaching on students' achievement and interest in basic science.

Demonstration Method

Demonstration is a practical display or exhibition of a process and services to show or point out clearly the fundamental principles or actions involved (Kimweri, 2014). Generally in science acquisition of skills for tackling life's problem is highly valued. One of the ways of introducing various skills to the pupils is through demonstration (Atadoga & Onolapo, 2008). Demonstration involves the introduction of new skills. Usually it is accompanied with a lot of explanation and showing how something works or is done. It can be employed in finding facts; identifying problems and displaying materials under demonstration, a range of activities can be planned starting from showing the correct use of science apparatus, illustrating a technique to planning a manipulation of equipment and material in order for the pupils to observe a scientific phenomenon. The demonstration method is a versatile method for teaching certain concept and techniques in science. It is a useful addition during a lecture method. A combination of demonstration and lecture method should be used by teachers of Basic Science. They (teachers) should remember that planning an effective demonstration requires organization and should always seek to provide positive answers which will enhance their demonstration. However, demonstration method limits the students from developing manipulative skill and may not be satisfied psychologically. It also emphasizes sight alone which is not sufficient to provide the scientific information the students require. Investigation carried out has revealed that if well planned, demonstration method can also be more efficacious than the traditional lecture method (Obeka, 2010).

Field Trip Method

According to Atadoga & Onolapo (2008), field trip usually takes place outside the classroom in form of excursion for the purpose of making relevant observations and for obtaining specific firsthand experience. Field trip is believed to be an important part of an effective science instruction if well planned. Field trip helps the students to observe, classify, collect data, study relationship and manipulate objects. Field trip plays the same role as laboratory experiments and demonstrations because first hand experiences are gained in the process. One major shortcoming of field trip is that even with careful and arduous preparations, there is danger of accidents (Aliyu, 2012).

Project Method

The project method is employed by science teachers to individualized instructions. The method is meant to provide for the needs of individual students or sometimes small groups so that those with special abilities have opportunities to fulfill themselves. Educationist believes that the best instruction is to meet individual need and in science, the projects work whether group or individual helps the teacher to do this (Aliyu, 2012). Unlike verification experiments in science, project work requires – bit of originality, which is students are given a free hand to look for problems which are of special interests to them and the solution to the problems which must also be unknown to the students. The students obtain for themselves, through the guidance of the teacher, topic for the project work from many sources including:

i. Interaction with their colleagues

ii. Reading in the scientific journals

iii. Abstract from papers by scientific and reports on science seminars and workshops

iv. Classroom experience on a particular topic

v. Science textbooks field trips and visits to zoos and museums. Odunusi & Nneji (2005), reported that project method appeared to improve the academic achievements of different ability groups.

Discovery Method

Discovery method is one of the strategies of science teaching. Many science educators have consistently advocated for this method as they believe that science should not be taught to a child but that, he should be left to discover it. A modern science curriculum stresses students' involvement in science activities through discovery experience. Aliyu (2012), defined discovery method as an unstructured exploration in the laboratory in which student, through his mental processes such as observing, measuring, classifying etc. can draw valid conclusions from data which he has gathered. Two types of discovery method are recognized;

Guided inquiry which consists of an instructional mode which can be inductive or deductive in nature. When the general principle is given and the students require using the principle in order to discover the solution to a specific problem, the guided inquiry is employed through deductive method. On the other hand, when the solution to a specific problem is given and the student is required to discover the general principle on which the solution is based, the guided inquiry is adopted through inductive reasoning.

Unguided inquiry: this is however, when neither the general principle nor the solution is given and the students is required to discover both principle and the solutions, the teacher in this particular instance employs unguided inquiry which is also known as "pure

discovery". As guided inquiry and unguided inquiry involves finding out, they both employ discovery method. These two types of discovery method require student to engage in relatively sophisticated mental processes including;

i. Formulating problems for investigation
ii. Formulating hypotheses to guide investigation
iii. Designing experiment to collect data
iv. Synthesizing knowledge in form of generalization or finding solution to a problem

Possessing certain scientific attitude, such as objectivity, curiosity and open-mindedness. An investigation conducted by Ajewole, (1997) showed that guided discovery enhanced students' academic performance in learning. Obeka, (2010) opined that discovery/inquiry method of instruction had a significant effect on students' academic performance.

2.1.4 Teacher Experience and Student Academic Achievement

Teacher experience has a reasonable effect on learners' performance in schools. Experienced teachers have a richer background of experience to draw from and can contribute insight and ideas to the course of teaching and learning, are open to correction and are less dictatorial in classroom. Teachers' experience and student achievement are interlinked in the sense that students taught by more experienced teachers achieve at a higher level, because their teachers have mastered the content and acquired classroom management skills to deal with different types of classroom problems. In the same vein, an experienced teacher is considered to be more able to concentrate on the most

appropriate way to teach particular topics to students who differ in their abilities, prior knowledge and backgrounds.

2.1.5 Teacher Qualification and Student Academic Achievement

Qualification of teachers is an important indicator for their knowledge and competence in teaching and learning, it has only limited utility in analyzing how well prepared teachers are for what they have to teach in schools. More detailed knowledge of the courses they have taken during their training needs to be compared to the actual content and skills required to teach the high school's curriculum. According to Ruthland & Bremer (2002) teacher qualification is of two routes - traditional and alternative qualification routes. Traditional certification is when an individual completes an undergraduate degree or post graduate program in education. Alternative routes of certification are based on coursework in pedagogy and subject area without a degree in education. Also, Hardy & Smith (2006) cite short term activities such as mentoring, peer evaluations and workshops as ways other than formal qualifications for improving teaching.

Huang & Moon (2009) is of the opinion that teacher qualification accounted for approximately 40 to 60 percent of the variance in average of students' achievement in assessment. Richardson (2008) reveals that students in urban areas performed better than those in rural areas. The researcher suggests that the availability of enough qualified teachers must have been a determinant for students' performance (Owoeye & Yara, 2011). The good performance was attributed to excellent instructions given by qualified teachers in addition to other inputs.

Wilson et al. (2001) suggest that even with the shortcomings of current teacher education and licensing, fully prepared and certified teaches are more successful with students than teachers without this preparation. Ashton (1996) notes that teachers with regular state certification receive higher supervisor ratings and student achievement than teachers who do not meet standards, but this observation was based on data with virtually no statistical controls having been imposed. In spite of the quantity of research on the benefits of teacher certification for student learning, little of the past research exercised controls over student "inputs" that would give the critical reader confidence in the findings.

2.1.6 Teacher's Subject Matter Knowledge

Teachers' subject matter is an essential component of teacher knowledge. Teachers' subject matter knowledge may be affected by the attitudes and expectations that their students bring to the classroom. Teacher's understanding of subject content affects their capacity to simplify content to help students to understand. Helping students learn subject matter involves more than delivery of facts and information. Jadama (2014) indicates that a teacher who is ignorant or uninformed about subject content can pass in accurate ideas to students, use texts uncritically and even change unsuitably. He further argues a teacher will find it extremely difficult to answer varied question from students about a subject matter if the teacher has little knowledge about it. Understanding of subject matter of a discipline enables teachers to plan their lesson and also to evaluate their assignment. The researcher further explains that; benefits of knowledge of subject matter include enabling the teachers to teach well using different teaching methodologies, give varied and alternative questions and ability to clarify misconceptions on subject content. This helps the teacher a great deal especially in the evaluation of the learners. Kimosop (2015)

agrees with other researchers in that if the content to be learnt is incomplete the acquisition of curriculum goals will not be achieved.

Subject content knowledge refers to the stuff of a discipline: factual information, organizing principles, and central concepts of the subject. Similarly, Shulman (2008), defined subject content knowledge as "teachers' knowledge of the specific content they teach to students including topic, facts and relationship within a subject. Also, Olorukooba, (2007) defines subject content as the knowledge which the teacher has in any of the STM subject disciplines of either biology or physics or chemistry or integrated science or mathematics or geography.

Subject content knowledge of science teachers and students includes:-

• concepts and principles understood through science

• concepts and relationship unifying science domain

• process, of investigation in science disciplines

• application of mathematics in science research

Subject content knowledge can therefore be defined as the teachers' knowledge which they teach their students and the content knowledge of the prospective science teacher is developed primarily in science courses taught by science department. National Science Teachers Association maintained that content knowledge provide the science teachers with adequate knowledge to make connections and see relationship between scientific concepts.

2.1.7 Pedagogical Skills

Pedagogical knowledge in science is a knowledge that a teacher uses to deal with everyday task of teaching and relating to students in the classroom. It is that kind of knowledge that teachers hope to improve when they say they want to become better teachers because they realize that this is where they drew all the "tricks"' to make their students learning experiences valuable. Pedagogical skills enable the teachers to have background knowledge of their students and to build on that. It also enables the teachers to elaborate on students' ideas and are able to link same to new contents.

2.1.8 Teacher Pedagogical Content Knowledge

Teacher knowledge is certainly a component of teacher professionalism, professional competence involves more than just knowledge. Skills, attitudes, and motivational variables also contribute to the mastery of teaching and learning. Teacher knowledge is a complex issue that involves understanding key underlying phenomena such as the process of teaching and learning, the concept of knowledge, as well as the way teachers' knowledge is put into action in the classroom. Pedagogical 'knowledge base' of teachers includes all the required cognitive knowledge for creating effective teaching and learning environments. Basic science curriculum objectives emphasize both the content knowledge as well as the pedagogical skills of teaching science.

2.1.9 Relationship between Subject Content Knowledge and Pedagogical Skill

It is observed that both teachers' pedagogical knowledge skills and subject content knowledge are crucial to good science teaching (Shulman, 2008). Similarly, the recent development of the National Science Education Subject content knowledge is the

teachers' knowledge of the specific content they teach their students including topics, facts and relationship within a subject.

The pedagogical skills are the actions and strategies of teaching organization of classroom experiences, providing for diverse learners needs, evaluation and implementation of learns' prior notions, and transformation of ideas into understandable pieces. Pedagogical content knowledge is the integration or synthesis of teachers' pedagogical knowledge and the subject content knowledge.

According to Shulman (2008), having knowledge of subject and general pedagogical strategies, though necessary were not sufficient for capturing the knowledge of efficient science teacher. To characterize the complex ways in which teachers think about how particular content should be taught, he argued for pedagogical content knowledge as the teacher's base of knowledge that distinguishes a teacher from a subject specialist. If teachers were to be successful they would have to confront both issues (of content and pedagogy) simultaneously by embodying "the aspect of content most germane to its teachability". The heart of pedagogical content knowledge is the manner in which subject matter is transformed for teaching. This occurs when teachers interpret the subject content, find ways to represent it and make it accessible to learners.

Pedagogical content knowledge as the transformation of several types of knowledge for teaching is a core of science teacher education which includes the following elements:-

• The goals of science education and their relationship to teaching science (knowledge of orientation to teaching science, knowledge of science goals and objectives)

• instructional strategies that match particular orientations to teaching science (knowledge of subject-specific strategies, knowledge of specific science curricula).

• planning, conducting and reflecting upon teaching specific science topic, guided by considerations of students understandings (knowledge of students understanding, knowledge of science assessment) and the appropriateness/value of using particular instructional strategies (knowledge of topic specific strategies)

• planning and administration of assessment that are compatible with ones orientation to science teaching and targeted goals and objectives.

2.3 Theoretical Framework

Teacher Efficacy theory

The study adopted Teacher Efficacy theory for the purpose of the study to be under taken. According to Berman, McLaughlin, Bass, Pauly and Zelman (1977) teacher efficacy has been defined as the extent to which the teacher believes he or she has the capacity to effect student academic achievement. This can be done or achieved mainly through confidence in content delivery, class management and other teaching practices. Gusky and Passaro (1994) indicate that it can also mean the teachers believe or conviction that they can influence how well students learn, how they retain the subject matter, even those who may have difficulties or unmotivated. Improving the efficacy of in-service teacher includes training and professional development of teachers on teaching methodology which is extremely paramount in classroom instruction. A teacher who is practicing teaching is better than who has already left teaching. Gusky (1982) in his study revealed that great efficacy was related more on positive attitude about teaching as well as high

level of confidence in the teacher, Mastery of content by the teachers and implementation of teaching practices also discussed by Gusky as parameters used to measure teacher efficacy. Therefore, this theory connected with the study carried.

2.4 Review of Related Empirical Studies

Azmil, Jahidih and Mohammed (2015) relationship between teachers (PCK) and the student achievement of al-Quran tajweed in Special Class on Reading and Memorizing Al-Quran Skill (KKQ) at Wilayah Persekutuan Kuala Lumpur. The study was implemented by involving a group of respondent which consist of 134 students in (KKQ). The data of the respondents was collected by using a survey as an instruments which verified by a panel of experts. The level of alpha Cronbach reliability for overall division of the survey was high (>0.7). The quantitative data for survey was analyzed in an inferential manner by using Statistical Package for Social Science (SPSS) v20 to get the relationship between the variable involved. The results of the study shows, there was a lower significant relationship between the teachers PCK and the student achievement of tajweed al-Quran in KKQ. Therefore, the KKQ teachers must know this knowledge because it is one of the factors that will determine the effective learning besides it will affect the students' achievement in tajweed al-Quran subject in KKQ.

Dumosu and Areelu (2018) teachers' content and pedagogical content knowledge on students' achievement in algebra. Using a test re-test quasi- experimental design with a 3x3x2x2 factorial matrix, the researchers purposively sampled 421 senior secondary school II students and 12 mathematics teachers from eight (8) public and four (4) private schools in Education District 5 of Lagos State. The three instruments used are TCTA,

OSTP and SATA. OSTP has Spearman' rho reliabilty coefficient of 0.77, while the TCTA and SATA produced reliabilities of 0.79 and 0.81 respectively using the Gutman' split half reliability method. The three instruments developed were validated and used for data collection. Data were analyzed using graphs and ANCOVA. The results $F(2, 387) = 0.56$; $p = 0.67$ revealed that all categories of the subject were equally affected by TCK in algebraic achievement after exposure to teacher' content knowledge. However, $F(2, 387) = 12.91$; $p = 0.00$ indicated that students were not equally affected by TPK in algebraic achievement test. On the other hand, $F(1, 387) = 0.11$; $p = 0.90$ indicated that gender has no significant effect on students' achievement in algebra after exposure to teachers' content and pedagogic knowledge. Furthermore, $F(1, 387) = 0.21$; $p = 0.81$ showed that school type has no significant effect on students' achievement in algebra after exposure to teacher' content and pedagogic knowledge. Also, $F(1, 387) = 0.90$; $p= 0.34$ revealed no significant interaction effect of content and pedagogical knowledge, gender and school type on students' achievement in algebra. In view of the findings, the study recommends that teachers of Mathematics, with in-depth knowledge of the subject and well groomed in teaching pedagogy should be allowed to teach algebra in schools.

Adegbola, (2019) investigated teachers' pedagogical competence as determinant of students' attitude towards Basic Science in South-West Nigeria. The study was a descriptive survey type study. Participants were 2160 students randomly selected from 108 secondary schools across four States in South- west Nigeria together. 324 teachers teaching Basic Science in Junior Secondary Schools were purposively selected for the study. Two instruments were used for data collection. The first was a 25 item questionnaire titled "Basic Science Teachers pedagogical Competence Questionnaire

(BSPCQ) and the second instrument was also a questionnaire with 25 structured item questions titled "Students' Attitudinal Questionnaire" (SAQ). The reliability of the instruments was determined through test and re-test method which yielded a correlation co-efficient of 0.87 and 0.89 for BSPCQ and SAQ, respectively at 0.05 level of significance. Mean and Ranking Order and Multiple Regression analysis were used to analyze the data. Findings revealed that, teachers' pedagogical competence can significantly influence students' attitude towards Basic Science. It was recommended that, emphasis should be laid on teachers' qualifications while employing Basic Science teachers. Teachers should also intensify efforts in using various teaching styles which could influence students' attitude. It was also recommended that adequate measures should be taken by the teachers to ensure that students benefit from their teaching. In addition, the government and other educational stakeholders should arrange for seminars and workshops for their teachers to boost their levels of competence in the classroom. Teachers should also exhibit positive attitude that can influence students' attitude towards Basic Science.

2.5 Summary of Literature Review

Teaching and learning is a complex cognitive process in which an individual draw on knowledge from multiple domains in order to teach learners. What a teacher needs to know, how that knowledge should be learnt and used to teach effectively has been a central theme for many educationist. From the reviewed, it is shown that teacher content knowledge influence planning in that it gives the teachers a sense of what is important in the content, what they wanted the students to know and how to sequence the content presentation.

The reviewed was done extensively based on the following sub-headings; concept of science, concept of Basic science, methods of teaching science, teacher experience and students' academic achievement, teacher qualification and students' academic achievement, teacher's subject matter knowledge, pedagogical skills, teacher pedagogical content knowledge and relationship between subject content knowledge and pedagogical skills. Similarly, the chapter also reviewed theory and previous studies as they relate to the current study.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

This chapter describes the methodology that was adopted in carrying out the research study under the following sub-headings; research design, population of the study, sample and sampling techniques, research instrument, validity and reliability of the instrument, method of data collection and method of data analysis.

3.1 Research Design

In order to investigate influence of teachers' pedagogical and content knowledge on Basic Science Students' Learning Outcomes in Bosso Local Government Area of Niger State, a descriptive survey research method was employed. A descriptive survey design is one in which a group of people or items are studied by collecting and analyzing data from only a few people or items considered to be representative of the entire group. This method is therefore appropriate for this study.

3.2 Population of the Study

The total population is 16, 402 Basic Science students in Bosso Local Government Area of Niger State (See Appendix A), but due to the volume of the students' population in Bosso only some selected students from junior secondary schools III with the targeted population of 5,578 was selected to represent the overall population from 22 junior Secondary School in Bosso LGA. The choice of these respondents is based on the fact that they are in best position to provide information concerning the current issue.

3.3 Sampling and Sampling Techniques

The samples were selected through proportionate random sampling from the five (5) state public secondary schools within the Bosso Local Government Area of Niger State. This method is aimed at giving fair chance to all the targeted respondents in the school of being chosen and not being chosen as well. Sample size for the study is 250 (two hundred and fifty) respondents comprising of fifty (50) junior secondary school students each from the five (5) selected schools.

The sampled secondary schools are:

Table 3.1: Sample Size

S/No	School	Sample
1	Maitumbi Secondary School, Minna	50
2	Hill Top Secondary Schools, Minna	50
3	Maryam Babangida Girls Science College	50
4	Abdullahi Dada Secondary School, Maikunkele	50
5	Ahamadu Bahago Secondary School	50
	Total	**250**

3.4 Instrument for Data Collection

The researcher constructed questionnaire containing 20 (twenty) items on “influence of teachers’ pedagogical and content knowledge on Basic Science Students’ Learning Outcomes Questionnaire (ITPCBSLOQ)”. The questionnaire is a closed ended type four Likert scale (4) options of Strongly Agree (SA = 4), Agree (A = 3), Disagree (D = 2) and Strongly Disagree (SD = 1). The decision mean is 2.5. Any mean from 2.5 and above is accepted while any mean below 2.5 is rejected.

The instrument is made up of section A and B. Section A deal with respondents' information, section B contains 20-items on the influence of teachers' pedagogical and content knowledge on Basic Science Students' Learning Outcomes in Bosso Local Government Area of Niger State.

3.5 Validity of the Instrument

To ensure validity of the instrument, it was subjected to reviewed by three (3) expert in the field of Science Education and their contributions were used to produce the final copy of this instrument.

3.6 Reliability of the Instrument

For the reliability of the instrument the researcher conducted a pilot test of the validated instruments at a school that was not used for the study but is in the study area. A total of 20 students were used for pilot test. The data collected was analyzed using SPSS version 23.000 and reliability co-efficient of 0.86 was obtained using Kuder Richardson formula.

3.7 Method for Data Collection

Table 3.2: Illustration of Data Collection Procedure

S/N	WEEK	ACTIVITY
1.	Week one	Receiving permission/introductory letter from the school authority
2.	Week two	Visit to the schools and submit letter of introduction indicating purpose of the visit to the school principals
3.	Week three & four	Meeting with the teachers and students to sampled needed respondents, selection of research assistants, administration of questionnaire to the sampled respondents and immediate retrieval to avoid lost.

3.8 Method of Data Analysis

Data collected was analyzed using Statistical Packages of Social Science (SPSS) mean and Standard Deviation (SD). The analysis was carried out using SPSS.

CHAPTER FOUR

4.0 RESULT AND DISCUSSION

The research was carried out largely through survey with the use of research questionnaires. This chapter therefore, discusses the data analysis and the findings thereof.

4.1 Presentation and Analysis of Data

Demographic Analysis of Respondents

Table 4.1: Respondents Age Bracket

Age bracket	Frequency	Percentage (%)
10 – 15years	126	50.4
16 – 20years	85	34.0
21 years and above	39	15.6
Total	**250**	**100%**

Source: Field Survey, 2021

Table 4.1 shows the results of data on the respondents' age bracket. The analysis indicated that 126 respondents representing 50.4% of the respondents fall between age bracket of 10 – 15years while 85 respondents representing 34.0% fall within age bracket of 16 – 20years and 39 respondents fall within age bracket of 21 years and above representing 15.6% respectively.

Table 4.2: Gender status of the Respondents

Gender Status	Frequency	Percentage (%)
Male	131	52.4
Female	119	47.6
Total	250	100%

Source: Field Survey, 2021

The above Table 4.2 presents the analysis of data concerning gender status of the respondents. The result revealed that 131 respondents representing 52.4% were male while 119 respondents representing 47.6% were female respectively.

4.2 Presentation of Research Questions

4.2.1 Analysis of Research Question 1: What are the influences of teachers' pedagogical knowledge on Basic Science Students learning outcome?

Table 4.3: Influences of teachers' pedagogical knowledge on Basic Science Students learning outcome

S/N	Item	Mean	S.D	Remark
1	Use of instructional materials by teacher makes learning interesting and enhance better understanding	3.81	.485	Agreed
2	Knowledge of subject matter of teachers enable him/her to handle teaching and learning of Basic science effectively	3.53	.550	Agreed
3	Teachers' motivation encourage teachers to improve their commitment thereby leads to better transfer of knowledge	3.65	.513	Agreed
4	Teachers' communication skill leads to better understanding of concept	3.74	.477	Agreed
5	Teachers' teaching style enhances active participation of the side of students.	3.63	.625	Agreed
	Grand Mean	**3.67**		

Source: Field Survey, 2021

Table 4.3 presents analysis on the perceived influences of teachers' pedagogical knowledge on Basic Science Students learning outcome. The grand mean is 3.67 which is greater than the decision mean of 2.50. The result indicated that the respondents agreed positively to the statements that use of instructional materials by teacher makes learning interesting and enhance better understanding, knowledge of subject matter of teachers enable him/her to handle teaching and learning of Basic science effectively, teachers' motivation encourage teachers to improve their commitment thereby leads to better transfer of knowledge, teachers' communication skill leads to better understanding of

concept and teachers' teaching style enhances active participation of the side of students with mean ranging between 3.53 and 3.81 respectively.

4.2.2 Analysis of Research 2: What are the influences of teachers' pedagogical knowledge on Basic Science Students learning outcome based on gender?

Table 4.4: Influences of teachers' pedagogical knowledge on Basic Science Students learning outcome based on gender

S/N	Item	Mean	S.D	Remark
1	Students understand better when male teachers use instructional materials to teach Basic science	3.56	.754	Agreed
2	When female teacher have good knowledge of subject matter she handle teaching and learning of Basic science more effectively	3.50	.549	Agreed
3	Better motivation of male teachers leads to effective transfer of knowledge	3.34	.773	Agreed
4	Female teachers with good communication skill teaches Basic science that leads to more understanding of concept	3.66	.580	Agreed
5	Teaching style of male teachers enhances more active participation of students.	3.34	.821	Agreed
	Grand Mean	**3.48**		

Source: Field Survey, 2021

The above Table 4.4 shows the result of data analysis concerning perceived influences of teachers' pedagogical knowledge on Basic Science Students learning outcome based on gender with grand mean of 3.48 which is greater than the decision mean of 2.5. The analysis indicated that respondents were in agreement with the statements that students understand better when male teachers use instructional materials to teach Basic science, when female teacher have good knowledge of subject matter she handle teaching and learning of Basic science more effectively, better motivation of male teachers leads to effective transfer of knowledge, female teachers with good communication skill teaches

Basic science that leads to more understanding of concept and teaching style of male teachers enhances more active participation of students with mean rating on the items ranging between 3.34 and 3.66 respectively.

4.2.3 Research Question 3: What are the influences of teachers' content knowledge on Basic Science Students learning outcome?

Table 4.5: Influences of teachers' content knowledge on Basic Science Students learning outcome

S/N	Item	Mean	S.D	Remark
1	Teacher's subject content knowledge is a measure of teacher effectiveness in teaching	3.48	.671	Agreed
2	Subject Matter knowledge allows the teacher to effectively alternate teaching methodologies leading to good performance	3.63	.543	Agreed
3	Subject matter knowledge allows the teacher to give varied and alternate answers to learners hence affecting their performance	3.51	.696	Agreed
4	Subject matter knowledge helps the teacher in planning of lessons and evaluation of the learners' assignments hence good performance	3.62	.583	Agreed
5	Subject matter knowledge gives the teacher the ability to clarify misconceptions and hard concepts to learners helping them to perform well	3.53	.630	Agreed
	Grand Mean	**3.55**		

Source: Field Survey, 2021

Table 4.5 above presents the result of data analysis on the perceived influences of teachers' content knowledge on Basic Science Students learning outcome with grand mean of 3.55 which is greater than the decision mean of 2.5. The analysis revealed that the respondents were in agreement with statements that teacher's subject content knowledge is a measure of teacher effectiveness in teaching, subject Matter knowledge allows the teacher to effectively alternate teaching methodologies leading to good performance, subject matter knowledge allows the teacher to give varied and alternate

answers to learners hence affecting their performance, subject matter knowledge helps the teacher in planning of lessons and evaluation of the learners' assignments hence good performance and subject matter knowledge gives the teacher the ability to clarify misconceptions and hard concepts to learners helping them to perform well with mean score ranging between 3.48 and 3.63 respectively.

4.2.4 Analysis of Research Question 4: What are the influences of teachers' content knowledge on Basic Science Students learning outcome based on gender?

Table 4.6: Influences of teachers' content knowledge on Basic Science Students learning outcome based on gender

S/N	Item	Mean	S.D	Remark
1	You enjoy learning basic science when taught by a male teacher	3.24	.889	Agreed
2	You prefer to be taught basic science by a female teacher	3.45	.737	Agreed
3	Male teachers are more better in teaching basic science as a subject	3.37	.784	Agreed
4	Female teachers are better in teaching basic science as a subject	3.32	.874	Agreed
5	Teacher's gender has significant effect in the teaching and learning of basic science.	3.46	.772	Agreed
	Grand Mean	**3.37**		

Source: Field Survey, 2021

The above Table 4.6 presents the result of analysis concerning influences of teachers' content knowledge on Basic Science Students learning outcome based on gender with grand mean of 3.37 which is greater than the decision mean of 2.5. The analysis indicated that the respondents were in support of the statements that they enjoy learning basic science when taught by a male teacher, they prefer to be taught basic science by a female teacher, male teachers are more better in teaching basic science as a subject, female teachers are better in teaching basic science as a subject and teacher's gender has

significant effect in the teaching and learning of basic science with mean scores ranging between 3.24 and 3.46 respectively.

4.3 Major Findings of the Study

Finding for Research Question 1

i. There is influence of teachers' pedagogical knowledge on Basic Science students learning outcome.

Finding for Research Question 2

ii. There is influence of teachers' pedagogical knowledge on Basic Science students learning outcome based on gender.

Finding for Research Question 3

iii. There is influence of teachers' content knowledge on Basic Science students learning outcome.

Finding for Research Question 4

iv. There is influence of teachers' content knowledge on Basic Science students learning outcome based on gender.

4.4 Discussion of Findings

Findings on the perceived influences of teachers' pedagogical knowledge on Basic Science Students learning outcome revealed that use of instructional materials by teacher makes learning interesting and enhance better understanding, knowledge of subject

matter of teachers enable him/her to handle teaching and learning of Basic science effectively, teachers' motivation encourage teachers to improve their commitment thereby leads to better transfer of knowledge, teachers' communication skill leads to better understanding of concept and teachers' teaching style enhances active participation of the side of students. This finding is in support of findings from Olfos, Goldrine and Estrella (2014) in their study found a strong correlation between teachers' content knowledge and students' understanding in learning.

Similarly, findings on the perceived influences of teachers' pedagogical knowledge on Basic Science students learning outcome based on gender indicated that students understand better when male teachers use instructional materials to teach Basic science, when female teacher have good knowledge of subject matter she handle teaching and learning of Basic science more effectively, better motivation of male teachers leads to effective transfer of knowledge, female teachers with good communication skill teaches Basic science that leads to more understanding of concept and teaching style of male teachers enhances more active participation of students. This is in consonant with Odumosu and Akudo (2017), finding that male students performed better than their female counterpart when exposed to problem solving in mathematics classroom. Therefore, there is correlation between gender and pedagogical knowledge of the teacher.

Also findings on the perceived influences of teachers' content knowledge on Basic Science students learning outcome shows that teacher's subject content knowledge is a measure of teacher effectiveness in teaching, subject matter knowledge allows the teacher to effectively alternate teaching methodologies leading to good performance, subject matter knowledge allows the teacher to give varied and alternate answers to learners

hence affecting their performance, subject matter knowledge helps the teacher in planning of lessons and evaluation of the learners' assignments hence good performance and subject matter knowledge gives the teacher the ability to clarify misconceptions and hard concepts to learners helping them to perform well. The finding is in line with the findings of Festus, (2008) that when students are taught by teachers of high content knowledge they perform better. Similarly, in line with the works of Ishola and Udofia (2017).

Finally, findings on influences of teachers' content knowledge on Basic Science Students learning outcome based on gender revealed that they enjoy learning basic science when taught by a male teacher, they prefer to be taught basic science by a female teacher, male teachers are more better in teaching basic science as a subject, female teachers are better in teaching basic science as a subject and teacher's gender has significant effect in the teaching and learning of basic science.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

This chapter dealt with the discussion of the findings of the study, the recommendations based on the findings of this research and the conclusion drawn from the study as well as the suggestion for further study.

5.1 Conclusion

This research work was designed to examine influence of teachers' pedagogical and content knowledge on Basic Science Students' Learning Outcomes in Bosso Local Government Area of Niger State. Specifically, the objectives of the study include to;-

i. determine the influence of teachers pedagogical knowledge on Basic Science Students Outcome.

ii. determine the influence of teachers pedagogical knowledge on Basic Science students' learning outcome based on gender.

iii. determine the influence of teachers content knowledge on Basic Science Students learning outcome

iv. determine the influence of teachers content knowledge on Basic Science Students learning based on gender.

The researchers formulated research questions to achieve the set objectives of the study. Chapter two critically review the issues and concept regarding influence of teachers' pedagogical and content knowledge on Basic Science Students Learning outcomes based

on the following major sub-headings: conceptual framework, theoretical and empirical framework as they are related to the study.

The third chapter deals with the research procedure and methodology adopted in finding answers to the research questions in chapter one. It laid emphasis on the method of data collection, presentation and analysis. It also bore a sample of the questionnaire used in collection the data used in this study. The researcher constructed questionnaire containing items (questions) on "influence of teachers' pedagogical and content knowledge on Basic Science Students Learning Outcomes in Bosso Local Government Area of Niger State". The questionnaire consisted of four (4) options of Strongly Agree (SA = 4), Agree (A = 3), Disagree (D = 2) and Strongly Disagree (SD = 1). The interpretation of the data collected and its analysis is done in the fourth chapter of this study. The data collected through the questionnaire were tabulated for easy computation and analysis. Decisions were drawn from the results obtained after the analysis using SPSS to determine mean and Standard Deviation (SD). The findings adequately answer the research questions raised in chapter one of the study.

From the study, it was revealed that:

i. There is influence of teachers' pedagogical knowledge on Basic Science students learning outcome.

ii. There is influence of teachers' pedagogical knowledge on Basic Science students learning outcome based on gender.

iii. There is influence of teachers' content knowledge on Basic Science students learning outcome.

iv. There is influence of teachers' content knowledge on Basic Science students learning outcome based on gender.

From the findings, it is concluded that teachers' content knowledge and pedagogical knowledge have great impact on students' learning outcome. This mean that students taught by Basic Science teachers with low pedagogical content knowledge performed lower than those taught by high and average pedagogy content knowledge while teachers with high pedagogical and content knowledge perform better compare their counterparts. Therefore, there is also strong relationship between teachers' pedagogical and content knowledge and students' understanding in learning of Basic Science learning outcome.

It is also, deduced that there is correlation between teachers' content knowledge on Basic Science learning outcome based on gender.

5.2 Recommendations

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

i. Teachers of Basic Science should be exposed to various teaching strategies to boost students' performance.
ii. Teachers of Basic Science should have good content knowledge of the subject and be ready be to learn different strategies in teaching and learning effectively and efficiently.
iii. Basic Science teachers should adopt the best teaching style which can influence student's positive attitude towards learning of Basic Science.
iv. Teacher should intensify efforts in developing their knowledge of subject matter through the attendance of seminars, workshops and in-service training.

v. Qualified and dedicated basic science teachers who are graduates of Integrated Science should be employed to teach the subject in secondary school.

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Appendix A

QUESTIONNAIRE ON INFLUENCE OF TEACHERS' PEDAGOGICAL AND CONTENT KNOWLEDGE ON BASIC SCIENCE STUDENTS LEARNING OUTCOMES IN BOSSO LOCAL GOVERNMENT AREA OF NIGER STATE

Dear respondent,

I am a student of Federal University of Technology, Minna conducting a research on the project titled above. The success of my research work depend on the various question asked. I therefore appeal for your kind and full co-operation towards the successful completion of my study. I promise that the information supply will be treated as confidential and utilized for the purpose of the research.

Demographic Data

Age Bracket:- 10 - 15 [ ], 16 – 20 [ ], 21 and above [ ]
Gender:- Male [ ], Female [ ]
Class: JSS I [ ], JSS II [ ], JSS III [ ]

SECTION B

Instructions:- Please read the following statements & rate how much you personally agree or disagree with these statements by ticking in appropriate columns

SA = Strongly Agreed, A = Agreed, D = Disagreed, SD = Strongly Disagreed

Research Question I: What are the influences of teachers' pedagogical knowledge on Basic Science Students learning outcome?

S/N	Item	SA	A	D	SD
1	Use of instructional materials by teacher makes learning interesting and enhance better understanding				
2	Knowledge of subject matter of teachers enable him/her to handle teaching and learning of Basic science effectively				
3	Teachers' motivation encourage teachers to improve their commitment thereby leads to better transfer of knowledge				
4	Teachers' communication skill leads to better understanding of concept				
5	Teachers' teaching style enhances active participation of the side of students.				

Research question II: What are the influences of teachers' pedagogical knowledge on Basic Science Students learning outcome based on gender?

S/N	Item	SA	A	D	SD
1	Students understand better when male teachers use instructional materials to teach Basic science				
2	When female teacher have good knowledge of subject matter she handle teaching and learning of Basic science more effectively				
3	Better motivation of male teachers leads to effective transfer of knowledge				
4	Female teachers with good communication skill teaches Basic science that leads to more understanding of concept				
5	Teaching style of male teachers enhances more active participation of students.				

Research Question III: What are the influences of teachers' content knowledge on Basic Science Students learning outcome?

S/N	Item	SA	A	D	SD
1	Teacher's subject content knowledge is a measure of teacher effectiveness in teaching				
2	Subject Matter knowledge allows the teacher to effectively alternate teaching methodologies leading to good performance				
3	Subject matter knowledge allows the teacher to give varied and alternate answers to learners hence affecting their performance				
4	Subject matter knowledge helps the teacher in planning of lessons and evaluation of the learners' assignments hence good performance				
5	Subject matter knowledge gives the teacher the ability to clarify misconceptions and hard concepts to learners helping them to perform well				

Research Question IV: What are the influences of teachers' content knowledge on Basic Science Students learning outcome based on gender?

S/N	Item	SA	A	D	SD
1	You enjoy learning basic science when taught by a male teacher				
2	You prefer to be taught basic science by a female teacher				
3	Male teachers are more better in teaching basic science as a subject				
4	Female teachers are better in teaching basic science as a subject				
5	Teacher's gender has significant effect in the teaching and learning of basic science.				

Appendix B

Table 3.1: Population of Study

S/N	School	Male	Female	Total
1	Hilltop Model Sec. Sch.	920	1300	2220
2	Niger State Sch. For Special Edu., Minna	52	37	89
3	Day Sec. Sch. Maitumbi	613	723	1336
4	Day Sec. Sch., Gbada	446	349	795
5	Junior Sec. Sch., Beji	339	384	723
6	Day Sec. Sch., Garatu	397	289	686
7	Day Sec. Sch., Kampala	194	174	368
8	Day Sec. Sch. Shatta	109	93	202
9	Govt Day Sec. Sch., Pyata	194	189	383
10	Govt Science College, Chanchaga	638	716	1354
11	Junior Sec. School, Shakwataa	58	48	106
12	Junior Sec. School, Kodo	194	98	292
13	Junior Sec. School, Kadna	135	140	275
14	Bosso Sec. School, Minna	701	627	1328
15	Sheikh Muh. Sambo College of Art and Islamic Studies	920	105	1025
16	Govt Junior Sec. school, Gurusu	90	91	181
17	Day Sec. School, Chanchaga B Minna	686	641	1327
18	Govt Army Day Sec. School Minna	932	885	1817
19	Abdullahi Dada Sec. School, Maikunkele	291	329	620
20	Day Secondary School, Maikunkele	235	230	465
21	Federal Government College, Minna	400	314	714
22	Junior Secondary School, Birji	42	54	96
	Total	**8586**	**7816**	**16402**

Source: Niger State Ministry of Education, 2021

Appendix C

RESEARCH INSTRUMENT VALIDATION FORM

Sir/Ma,

The candidate OGBONNA IDA OUTINYECHI with Admission Number 2017/3/69247BE is a student of the department. You are requested to make amends or inputs that will improve the quality of the instrument. Your professional expertise is expected to assist the researcher towards the award of the degree.

Thank you

Dr. Rabiu M. Bello

HOD (Signature, Date & Official stamp)

Head of Science Education, Federal University of Tech. Minna
21 JUN 2021

Title of the Research Instrument: QUESTIONNAIRE ON INFLUENCE OF TEACHERS' PEDAGOGICAL AND CONTENT KNOWLEDGE ON BASIC SCIENCE STUDENTS LEARNING OUTCOMES IN BOSSO LOCAL GOVERNMENT AREA OF NIGER STATE

SECTION A

1. Appropriateness of the Research Instrument title: Appropriate
2. Suggest amendment if not appropriate: Satisfactory
3. Completeness of Bio-data Information: Satisfactory
4. Suggest inputs if incomplete: Satisfactory
5. Suitability of items generated: Suitable
6. Structure of the questionnaire/ test items generated: Well Structured
7. Structure of the instrument in line with the objectives of the study: The structure is in line with the objectives
8. Items coverage and distribution across constructs and domains measured: It has covered to an extent
9. Appropriateness of the instrument in relation to the type of data to be collected: Appropriate to the type of data collected.
10. What is the general overview and outlook of the instrument? Satisfactory
11. Rate the instrument between 1-10 (8)

SECTION B

Name of the validator: Dr (Mrs) Gimba R. W.

Designation/Rank: Associate Professor

Name of institution: FUT Minna

Department/ School: Science Education

Telephone No/GSM No: 08032853603

E-Mail Address: _____

28/06/2021

Signature, Date and stamp (if available)

Appendix D

Reliability

Scale: Teachers' pedagogical knowledge on Basic Science Students learning outcome

Case Processing Summary

		N	%
Cases	Valid	20	100.0
	Excluded[a]	0	.0
	Total	20	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
.864	.867	5

Reliability

Scale: Teachers' pedagogical knowledge on Basic Science Students learning outcome based on gender

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.807	.819	5

Reliability

Scale: Teachers' content knowledge on Basic Science Students learning outcome

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.823	.825	5

Reliability

Scale: Teachers' content knowledge on Basic Science Students learning outcome based on gender

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.859	.864	5

Reliability

Scale: ALL VARIABLES

Reliability Statistics

Cronbach's Alpha	N of Items
.858	20

The instrument is reliable since the reliability coefficient is 0.858.

What are the influences of teachers' pedagogical knowledge on Basic Science Students Learning Outcome?

Item Statistics

	Mean	Std. Deviation	N
Use of instructional materials by teacher makes learning interesting and enhance better understanding	3.81	.485	250
Knowledge of subject matter of teachers enable him/her to handle teaching and learning of Basic Science effectively	3.53	.550	250
Teachers' motivation encourage teachers to improve their commitment thereby leads to better transfer of knowledge	3.65	.513	250
Teachers' communication skill leads to better understanding of concept	3.74	.477	250
Teachers' teaching style enhances active participation on the side of students	3.63	.625	250

Scale: What are the influences of teachers' pedagogical knowledge on Basic Science Students learning outcome based on gender?

Item Statistics

	Mean	Std. Deviation	N
Students understand better when male teachers use instructional materials to teach Basic Science	3.56	.754	250
When female teacher have good knowledge of subject matter she handle teaching and learning of Basic Science more effectively	3.60	.549	250
Better motivation of male teachers leads to effective transfer of knowledge	3.34	.773	250
Female teachers with good communication skill teaches Basic Science that leads to more understanding of concept	3.66	.580	250
Teaching style of male teachers enhances more active participation of students	3.34	.821	250

Scale: What are the influences of teachers' content knowledge on Basic Science Students learning outcome?

Item Statistics

	Mean	Std. Deviation	N
Teachers' subject content knowledge is a measure of teacher effectiveness in teaching	3.48	.671	250
Subject matter knowledge allows the teacher to effectively alternate teaching methodologies leading to good performance	3.63	.543	250
Subject matter knowledge allows the teacher to give varied and alternate answers to learners hence affecting their performance	3.51	.696	250
Subject matter knowledge helps the teacher in planning of lessons and evaluation of the learners' assignments hence good performance	3.62	.583	250
Subject matter knowledge gives the teacher the ability to clarify misconceptions and hard concepts to learners helping them to perform well	3.53	.630	250

Scale: What are the influences of teachers' content knowledge on Basic Science Students learning outcome based on Gender?

Item Statistics

	Mean	Std. Deviation	N
You enjoy learning Basic Science when taught by a male teacher	3.24	.889	250
You prefer to be taught Basic Science by a female teacher	3.45	.737	250
Male teachers are more better in teaching Basic Science as a subject	3.37	.784	250
Female teachers are better in teaching Basic Science as a subject	3.32	.874	250
Teacher's gender has significant effect in the teaching and learning of Basic Science	3.46	.772	250