UNIVERSITY OF EDUCATION, WINNEBA

IMPACT OF CONTEXTUAL SCIENCE TEACHING AND LEARNING APPROACH ON JUNIOR HIGH SCHOOL PUPILS' PERFORMANCE IN INTEGRATED SCIENCE

MASTER OF PHILOSOPHY

MILDRED BOAFO

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**A thesis in the Department of Science Education,
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DECLARATION

Student Declaration

I, Mildred Boafo, declare that this thesis with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted either in part or whole for another degree elsewhere.

Signature…….

Date……

Supervisor's Declaration

I hereby declare that; the preparation and presentation of this thesis was supervised in accordance with the guidelines for supervision of dissertation as laid down by the University of Education, Winneba.

Supervisor's name: Ngman-Wara I.D. Ernest (Phd)

Signature…….

Date……

DEDICATION

This study is dedicated to the Almighty God for good health, my family for their continuous support, prayers and encouragement to me at all levels of my education. Also, to my daughter, Marigold, for your sacrifices at such a tender age which strengthened me and to my late Father, Mr. Boafo, for your encouragement and support before your departure to eternity. Your memories will forever remain in my mind and may your gentle soul find resting in God's Kingdom.

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I thank all the pupils and teachers who participated in my research and gave me the opportunity to gain insight into the contextual teaching and learning approach in improving the understanding of science concepts at Unipra South Inclusive Basic Junior High School in Winneba in the Central Region.

I would also like to thank Gideon Kudesey for typing and proofreading my work. I am grateful and God richly bless you.

The contribution of others whose names I have not been able to mention here are also very much acknowledged.

Last but not least, to my dear husband Mr. Joseph Afedzie Amonoo for his support and encouragement. I say God bless you.

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ABSTRACT

The study examined the impact of the contextual teaching and learning approach on the performance of Junior High School pupils of University Practice Junior High School, South Campus, Winneba in Integrated Science. The study adopted action research design. An intact class of 20 form two pupils was used for the study. The intervention involved five weeks of teaching using contextual teaching and learning strategies. Questionnaire, classroom observation, tests and semi-structured interview guide were used to gather data. Quantitative data were analysed descriptively using frequencies and percentages while the qualitative data was analysed thematically. It emerged from the study that pupils' levels of participation in Integrated Science lessons improved tremendously in the contextualized Integrated Science classes. Also, the pupils were motivated and expressed interest in studying Integrated Science. They attributed this to the use of contextual teaching and learning approach during science lessons. The approach, according to them, related science concepts to their daily activities which gave them a positive outlook towards the subject. The use of the approach increased their attention during science lessons and they were punctual for science lessons. This was reflected in their performance in the tests administered to them during the intervention. Their performance in tests administered during the intervention phase and post intervention phase steadily progressed. The study concluded that contextual teaching and learning approach motivated the pupils to learn Integrated Science and improved pupils' interest in the subject which was reflected in their active participation during the science lessons. It was recommended that the authorities of the school should encourage the science teachers to use the approach in their Integrated Science lessons to sustain their pupils' participation in the lessons and for academic excellence of the pupils.

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter presents the background to the study, statement of the problem, purpose of the study, research questions, and the significance of the study. The delimitation and the limitation of the study are also presented. Also, in the chapter are definition of terms, and ends with the organization of the report.

1.1 Background to the Study

Science, regarded as one of the most important and interesting subjects studied at all levels of education today, continues to make immeasurable contributions to the world and it is crucial that the best approaches to teaching it effectively are adopted and implemented well according to Curriculum Research and Development Division, CRDD (2010).

Science is an integral part of engineering, industry, physical and social sciences, business, nutrition and health (Philips, 2015). Ansah (2005) noted that science knowledge is vital and plays a fundamental role in the scientific and technological progress of any nation. Ansah further remarked that science education has become a primary necessity in most educational systems across the worldwide owing to its enormous benefits it offers nations with regards to development. Because of this Ghana, like most countries, take the issue of science education quite seriously and therefore all Ghanaian students/pupils are required to study science at the basic and secondary educational levels. This, according to Mensah (2012), is essential for their personal development and academic achievement in today's world that is characterized by innovative and sophisticated learning. One of the basic qualifications that can

enhance a pupils' eligibility to proceed to higher level of education such as the senior high school and or university is a good performance in integrated science. Apart from being a basic requirement, Mensah (2012) expressed that there is rapid appreciation in the number of pupils seeking to enter senior high school and or university, especially public institutions and for that matter it has become imperative for each pupil to pass well to gain admission. This means, a candidate must pass the Basic Education Certificate Exams and West African Senior High School Certificate Examination in integrated science conducted by West African Examinations Council (WAEC) in order to progress to Senior High School and Tertiary Institution respectively.

In spite of the fact that science has been described as an interesting subject, it has strongly been viewed as one of the most difficult subjects studied in schools. Mensah (2012) reiterated that science is viewed as a difficult discipline and pupils often fail to grasp the concepts if they are not well presented to them by trained and experienced teachers who will facilitate teaching and learning using appropriate teaching methods and learning materials. This has consistently been emphasized by various researchers (Andam, 2013) that helping pupils to understand science concepts clearly using simpler and innovative methods will be beneficial in improving the study of the subject in the country.

The presentation or teaching of the contents of the integrated science syllabus to children and the difficulty associated with grasping its concepts has been attributed to several factors. For instance, Quist (2013) identified bulky and packed nature of the integrated science syllabus as one of such factors and recommended that Ghana Education Service (GES) reduces its content. Because of the necessity for integrated science topics to be exposed in multiple contexts, there is the need to adopt simpler

and appropriate approaches to teach concepts in science to make the subject easier and improve pupils' performance. Engaging pupils through the use of innovative approaches and skills in teaching integrated science, for example, helps to foster their understanding and enhance their achievement in the subject. This is supported by Post (2012) who pointed out that effective learning of integrated science often involves the use of innovative approaches and skills. Describing his ideas of innovative approaches and skills in teaching science, Post (2012) noted that manipulative materials assist pupils in conceptualizing abstract phenomena. Post intimated that manipulative aids help learners move from concrete situations and problems to abstract ideas. Manipulative instructional items enhance pupils' imagination of abstract ideas. Pupils may do rote memorization, for instance of some concepts in science, if the\ are not challenged and opportune to use manipulative aids. Consider the formations of chemical compounds. Having the pupils to use manipulative aid would help the pupil to understand and apply the concept. However merely quoting and solving problems regarding these concepts may gel pupils to do rote memorization.

Training of science teachers is known to promote their effectiveness in content area, teaching methods, knowledge about their pupils, lesson planning, and making connections between and within subjects (Ansah, 2005). For example, an experienced, trained, and knowledgeable teacher will make appropriate connections between integrated science and geography in map reading, integrated science in the use of ratio and proportion and so forth. Training empowers the teacher to integrate science and other subject areas. Hence training prepares teachers for good teaching and good pupils' achievement results.

In spite of the training of teachers for integrated science education in Ghana, over the past few decades, there have been persistent reports of massive failure from the WAEC Chief Examiner's Report (2010). There have been repeated reports of pupils' poor performance even though schools have teachers to deliver the content and practical aspects of the subject. This means that there are still problems which need to be tackled to get to the root of their problems in order to find the solutions to them. The issue of challenges in teaching and learning science concepts has been a priority in recent reports and plans by Ministry of Education, Ghana Education Service and other agencies and individuals concerned with improvement of science education (Andam, 2013). One of such challenges is the use of decontextualized approaches. Some educational researchers have argued that teaching and learning must assume that the mind naturally seeks meaning in context that is in relation to the learner's current environment and that the learner does so by searching for relationships that make sense and appear useful (Rafida, 2019). This position led to the emergence of contextual learning theory. Contextual learning occurs only when students (learners) process new information or knowledge in such a way that it makes sense to them in their own frames of reference that is, in their own inner worlds of memory, experience, and response. Similarly, in the field of sciences, researchers have expressed worry about the dry and decontextualized manner in which teaching and learning of science has been executed over the years and in fact all the major reform movements in science education such as scientific literacy, science for everyone, critical thinking, constructivism, and contextual teaching are all in disagreement with how science is taught today (Klassen, 2006). These movements all agree on the fact that how science was developed must be taught in addition to how one concept relates to another, not

the factual content of science alone. This has also led many researchers to advocate for contextual science teaching.

1.2 Statement of the Problem

It is a common notion that the primary goal of teaching can be considered as conveyance of information to pupils in such a way as to ensure retention and application. This has therefore necessitated the continuous search for best approaches and methodologies that will facilitate achievement of the above stated goal. This is evident in the efforts made by successive Ghana government to raise the standard of teaching and learning for effective out comes since independence (Ankomah, 2007). Despite their affects, all does not seem to be going well as far as pupils' achievement in the subject is concerned. The consistent reports on JHS pupils' poor performance in integrated science by the West African Examination Council (2010) attested to this disturbing situation. This is not different from what is happening in the University Practice Junior High School, South Campus, Winneba where students' performance at BECE in Integrated Science has been consistently fallen below 35% since 2009 up to date. A very worrying picture of the low performance of students in Integrated Science is that University Practice JHS has scored below 30% in BECE from 2017 to 2019 in the Effutu Municipality (Effutu Municipal Education Directorate, 2019). This has raised concerns on the methods, procedures and approaches that might have been used in teaching students the concepts in Integrated Science.

Mensah (2012) mentioned that pupils' difficulties in understanding most of the concepts in the Integrated Science syllabus requires that an in-depth investigation is conducted to adopt approaches and methodologies that can enhance the teaching and learning of the subject. Mensah confirmed this after studying basic education pupils'

performance in integrated science over four consecutive years from WAEC annual reports from 2007 to 2011. Andam (2013) reported that despite the classroom applications of the numerous teaching and learning theories, the teaching and learning of integrated science was far from satisfactory even when these theories were applied. Andam noted that most people believed that among all school subjects, integrated science was the most feared subject. This was concluded from his findings conducted among basic school pupils in selected schools in Assin South Municipality.

Owing to the importance of integrated science in daily life activities and the development of the country, pupils' underachievement has become a source of worry to parents, pupils as well as integrated science educators (Quist. 2013). This has resulted in studies being carried out to determine the causes of low understanding of pupils in integrated science resulting in low performance. The strongest factor that was attributed to pupils' low performance was teaching methods or approaches and teaching/learning materials (Sessah, 2013). It was suggested that in depth studies should be conducted into adopting effective approaches and methodologies that will improve the teaching and learning of science. One of such approaches is contextual science teaching and learning which links the science content with the context of the learner (Ngman-Wara, Young & Mawusi, 2016). The approach recognizes the learner's cultural context, daily experiences, prior knowledge and previous classroom experiences as contexts that when linked to school content makes the latter relevant to the learner. The researcher therefore argues in this study that adopting and implementing contextual science teaching and learning in Ghanaian schools, specifically basic schools, will help facilitate pupils' understanding of the science concepts taught which will eventually lead to better academic performance.

The study adopted the Story-Driven's Contextual Approach model propounded by Klassen (2006). However, the researcher spotted a theoretical gap in this model worth filling and therefore sought to fill it through this study. Though Story-Driven's Contextual Approach Model is quite comprehensive in terms of explaining the dynamics of the contexts of science learning, it fails to detail the relationship between it and performance in science. This weakness in the approach is what this study seeks to fill as a research gap. The model is therefore problematized under literature review section.

1.3 Purpose of the Study

The study examined the impact of the contextual teaching and learning approach on the performance of Junior High School pupils of University Practice Junior High School, South Campus, Winneba in Integrated Science.

1.4 Research Objectives

The study sought to:

1. Determine the levels of pupils' involvement in contextual and learning approach during teaching and learning of selected concepts in Integrated Science.
2. Examine the extent to which contextual teaching and learning will enhance the pupils' performance in selected Integrated Science concepts.
3. Ascertain the views of pupils about the use of contextual teaching and learning approach in teaching selected Integrated Science concepts.

1.5 Research questions

The following research questions derived from the objectives guided the study.

1. What are the levels of pupils' involvement in contextual and learning approach during teaching and learning of selected concepts in Integrated Science?

2. To what extent will the use of contextual teaching and learning enhance pupils' performance in selected Integrated Science concepts?
3. What are the views of pupils about the use of contextual teaching and learning approach in teaching selected Integrated Science concepts?

1.6 Significance of the study

The findings of this study would be beneficial to all stakeholders in the educational sector in the Effutu Municipal. For instance, it will guide stakeholders in the implementation of the Integrated Science curriculum based on the relationship that would be established between contextual science teaching and learning approach and academic performance of pupils at the Junior High School level. Beyond this, the findings of the study would encourage Integrated Science teachers to use the approach in their science lessons. Additionally, it would help pupils to appreciate the contextual nature of science and see it as an interesting subject. The findings would encourage integrated science teachers of University Practice JHS, south Campus (Winneba) to adopt innovative methods of teaching and learning of Integrated Science to improve the performance of their pupils in integrated science. The study would add to the existing literature on contextual teaching and learning approach in teaching Integrated Science and it may also serve as a source of information for other researchers who would wish to research into similar areas of study.

1.7 Delimitations of the Study

The study focused on the views of Integrated Science teachers and pupils with respect to the use of contextual teaching and learning approach and its improvement in performance in Integrated Science in Junior High Schools. Furthermore, the research focused on University Practice JHS (South Campus), a public JHS in the Effutu

Municipality. The study was focused only on pupils of University Practice (South Campus) due to evidence of poor performance of final year pupils in the yearly Basic Education Certificate Examination (BECE). The school often reported 30% success of the final year pupils in BECE in the Effutu Municipality. The study was limited to second year pupils who, unlike the third years were not preparing for BECE and they had at least experienced teacher-centred teaching approaches characteristic of Integrated Science classroom. The first years were involved in the study because they were yet to become familiar with their new environment.

1.8 Limitations of the Study

A major challenge encountered was with convincing teachers to take part in the data collection process. Some teachers were of the view that any information gathered from them would be used against them. Based on this, some of them were reluctant to provide any information. However, the teachers were given the fullest assurance that the information they would provide would strictly be kept confidential and used only for academic purpose. Another anticipated challenge was with administration and collection of the questionnaire. It was difficult for some of the pupils to response to the questionnaire items because of their low proficiency in the English Language. The researcher had to explain some of the items to the pupils in their first language. The study involved one public JHS in Effutu Municipality so the findings could not be generalized or extended to other schools. However, Integrated Science teachers in the other schools may find the findings and the recommendations useful in their teaching.

1.9 Organization of the Study

The study was organized into five main chapters. The first chapter highlights the background to the study, statement of the problem, purpose of the study, research

questions, and significance of the study. The chapter also dealt with the delimitations of the study, limitations, and definition of terms. Chapter Two reviewed the related literature on the topic. Under this, the opinions of other researchers and educationist who have studied and written on the topic under study were discussed. The third chapter described the method that was adopted for the study. It covers the research design, population, sample and sampling techniques, research instrument, data collection procedure and data analysis plan. Chapter Four delved into the data analysis and interpretation of data collected. The fifth and final chapter gave summary of the findings, conclusions drawn and the recommendations offered based on the findings from the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

The main idea of the study is to investigate the impact of contextual science teaching and learning approach on Junior High School pupils. Teaching approaches are integral aspect of the teaching and learning which in turn affect pupils' academic performance in science. It is an important variable in the quest to improve pupils' academic achievements. To better understand this topic and achieve the staled objectives, relevant literature was reviewed. This chapter constituted the review of related literature to serve as a guide to the study. The chapter has been organized into the following sub-headings: theoretical framework, Socio-cultural learning theory, theory of constructivism Concept of Contextual Teaching and Learning (CTL) Approach, improving quality in teaching and learning science and teachers' roles in quality science teaching and learning. The chapter ends with summary of the literature reviewed.

2.1 Concept of Contextual Teaching and Learning (CTL) Approach

Purposeful teaching and learning according to Marfo and Nikoi (2012) can only be meaningful if it employs approaches which have high reliability of producing high results which. for pupils with different learning capacities. In like manner, every individual pupil's success is determined by the quality teaching. Researchers in science education indicate that there is a high correlation between science teaching and learning approaches and the level of academic performance of pupils (Berns & Erickson, 2001). In the field of studying sciences, an effective approach that is

consistently tested and used in improving pupil's understanding of science concepts is the contextual science teaching and learning approach (Marfo, 2012).

Contextualisation, as a terminology, has varied definitions. Mazzeo, Rab and Alssid (2003) define Contextualisation as a diverse family of instructional strategies designed to more seamlessly link the learning of foundational skills and academic or occupational content by focusing teaching and learning squarely on concrete explanations in a specific context. Johnson (2002) defines CTL as an educational process that aims to help pupils see meaning in the academic material, they are studying by connecting academic subjects with the context of their daily lives, that is, with context of their personal, social, and cultural circumstance.

One of the goals of and efforts of contextual and learning approach is to capture students' attention by illustrating the relevance of the learning experience. Contextual and learning approach helps students find and create meaning through experiences drawing from their prior knowledge in order to build upon existing knowledge. the primary principle of contextual and learning approach is that knowledge becomes the student's own learned within the framework of an authentic context. an authentic context helps the learners to see the relevance of information and to create a pathway for them to understand the material.

Diknas (2002) clarifies that the basic understanding of the CTL approach is that knowledge is found and built by oneself or by the pupil themselves not just the knowledge given by another person that is ready to be memorized. This point claims that knowledge is not a set of facts or concepts of rules that come accidentally. Diknas (2002) continues that knowledge grows through exposure and the understanding becomes deeper and stronger if one test is against new encounters. It means that in this

stage pupils are actively involved in learning process based on the previous knowledge (entry behaviour). They will achieve goal based on their prior knowledge and use their own styles to achieve the goal.

Berns and Erickson (2001) intimated that contextual teaching and learning is a conception of teaching and learning that helps teachers relate subject matter content - 'I to real world situations and which motivates pupils to make connections between knowledge and its applications to their lives as family members, citizens, and workers and engage in the hard work that learning requires.

With regard to pupils, learning occurs only when pupils process new information or knowledge in such a way that it makes sense to them in their own frames of reference (their own inner worlds of memory, experience, and response). This approach to learning and teaching assumes that the mind naturally seeks meaning in context by searching for relationships that make sense and appear useful to Contextual leaching and learning is considered as the convincing alternatives in science teaching and learning (Diknas, 2002).

This idea is supported by previous study done by Flora (2003) who concluded that relating subject content to real world situation is extremely needed during the teaching learning process so that the pupils know the benefits of learning in the classroom.

Dewey in Laily (2006) further stated that contextual teaching learning is emphasized on the pupils' interest and their experiences. In fact, introducing science to learners in familiar context provides possibility to enhance learners' interest in and intrinsic motivation for learning science. Contextual teaching and learning science is built on

the recognition that students learn science more effectively when they are taught in a hands-on, real world context rather than in an arbitral manner.

2.1.1 Elements of Contextual Teaching and Learning Approach

The elements of CTL are questioning, inquiry, learning community, modelling, self-reflection, and authentic assessment. Diknas (2002) defines each element of contextual teaching and learning as follows:

Multiple contexts

These support theories of situated cognition suggest that knowledge cannot be separated from the physical and social context in which it develops. How and where a person acquires and creates knowledge is therefore very important. Contextual Teaching and Learning experiences are enriched when students learn skills in multiple contexts, that is, school, community, workplace, and the family.

Inquiry

Inquiry is core in contextual teaching and learning activities. It is a cycling process of observing, questioning, investigating, analyzing, and concluding. In other words, it can be said that the pupils find out something on their own efforts. In this process the pupils have chance to observe the phenomenon. They try to explain and describe the phenomenon being observed. Then, based on their observation, they try to test what they have observed and finally make conclusion.

Questioning

In contextual teaching and learning questioning should not be dominated by the teacher. In teaching and learning process, questioning is seen as teacher's activity to motivate, provide, and assess learner's thinking ability. The teacher should provide or

create situations that promote learners' curiosity. Curiosity leads automatically to a lively teaching and learning atmosphere because pupils are supposed to ask question either to their teacher or colleagues. The process of questioning could be the teacher to the pupils, pupils to teacher and pupils to pupils.

Using interdependent learning groups or community of learners

Students will be influenced by and will contribute to the knowledge and beliefs of others. Learning groups, or learning communities, are established in workplaces and schools in an effort to share knowledge, focus on goals, and allow all to teach and learn from each other. When learning communities are established in schools, educators act as coaches, facilitators, and mentors.

The principle of this element is that learning in a group gives better result than learning alone since pupils will share their knowledge to help other colleagues who have difficulties. It is suggested by Falsetti in Laily (2006) that a group should be of mixed abilities, so that beginning pupils can learn from more advanced ones. By sharing knowledge, the pupil who knows will tell the others who do not know and the pupils who do not will ask the pupils who knows. In line with this, Freeman (1986) slates that in group, pupils can learn from each other as well as the teacher corporation is encouraged.

Self-regulated learning

Ultimately, students must become lifelong learners. Lifelong learners are able to seek out, analyze, and use information with little to no supervision. To do so, students must become more aware how they process information, employ problem-solving strategies, and use background knowledge. Contextual Teaching and Learning experiences should allow for trial and error; provide time and structure for reflection;

and provide adequate support to assist students to move from dependent to independent learning according to Mazzeo, Rab and Alssid (2003).

Modelling

Modeling has an important role in teaching learning process. Modelling can be in the form of something that can be imitated by the pupils (Diknas. 2002). for example, asking pupils to perform a task which the teacher already give the example to pupils. Contextual teaching and learning require either the teacher or the pupils themselves to be the models during the classroom activities. It means that the teacher is not the only person who is responsible for giving the model or the example.

Reflection

Reflection is a way of thinking about what we have learnt. Pupils and teacher review and respond to events, activities, and experiences. They also record what they have learnts, felt and appeared new ideas. This element usually occurs in post activities. Self-assessment (to borrow Underbill's term of reflection) occurs to enable learners to take more responsibility to help their progress. Further, Underhill (1987) states that self-assessment can be introspective, where the learner is asked back on his foreign language experience and rate himself against some kind of state.

Drawing upon student diversity

Student population is becoming more diverse, and with increased diversity comes differences in values, social mores, and perspectives. These differences can be the impetus for learning and can add complexity to the Contextual Teaching and Learning experience. Team collaboration and group learning activities respect students' diverse histories, broaden perspectives, and build inter-personal skills (Mazzeo, Rab and Alssid, 2003).

Employing authentic assessments

Contextual Teaching and Learning is intended to build knowledge and skills in meaningful ways by engaging students in real life, or "authentic" contexts.

Assessment of learning should align with the methods and purposes of instruction. Authentic assessments show (among other things) that learning has occurred; are blended into the teaching/learning process; and provide students with opportunities and direction for improvement.

Authentic assessment is the multiple form of assessment that reflects pupils' learning achievement on instructional relevant classroom activities (Suyanto: 2002). It is used to describe the real competence of pupils to subject matter. Contextual teaching and learning is intended to build knowledge or skill in meaningful ways by engaging pupils in real life, or authentic context. Authentic assessment aims at evaluating pupils' ability in real world context. Authentic assessment is a kind of effective assessment since it is not only done at the period, but it also integrated together with teaching and learning activities. There are many ways of how to do authentic assessment. For example, discussion or debates, expressing idea of the text, project and so on.

In CTL, the pupils are at the centre of learning process. It requires the pupils to be more actively involved in teaching and learning process. It enables the pupils to comprehend the subject matter better. In CTL, the pupils are asked to construct their own learning from new experience based on prior knowledge. This motivates them to make connection between the knowledge that they get from the class and its application to the real situation. Moreover, in learning community, the pupils will share their knowledge with others. The pupils will help each other in comprehending the subject matter. Therefore, the researcher assumes that if all the seven components of CTL have been applied in leaching and learning process, the pupils' interaction with

the content to be taught and with each other will improve (Mazzeo, Rab and Alssid, 2003).

2.2 Contextualisation of Teaching and Learning Approach

Various definitions and implementations of contextualization may be found in literature, including (Baker, Hope, & Karandjeff, 2009). For example, contextualized instruction has been described as the use of real-world materials and activities (Beder & Medina, 2001); the use of critical thinking, problem solving, and creativity on these materials in these activities and connecting the knowledge to its multiple applications in students' lives (Berns & Erickson, 2001); and learning by doing (Berns & Erickson, 2001; Mazezeo, Rab, & Alssid, 2003). In order to increase student motivation to learn new content, the newer material is contextualized and the more students understand the significance and utility of the new material. Perin (2011) argued, based on a review of the data, that students' experiences were more appreciated in contextualized classrooms, which made the learning more meaningful to the students. she intimated that contextualization has the potential to improve short-term academic accomplishment and long-term college progression among students with limited academic preparation. In the classroom, we have been observing students who have demonstrated varying levels of dedication to and awareness about contextualization, and who have been given varying degrees of latitude in terms of how much contextualization we may include into our education through their experiences. Contextualisation framework aids educators in immediately recognizing themes and ways of contextualization by providing a visual framework (Ambrose, Davis, & Ziegler, 2013).

2.2.1 Approaches for implementing CTL

To implement CTL, a variety of teaching approaches may be used (Berns & Erickson, 2001). Over the years, five teaching approaches have emerged that include context as a critical component. They engage pupils in an active learning process. These

approaches are not discrete. They can be used individually or in conjunction with one or more of the others. Although varying in the literature, the following explanations were intended to capture the essence of the concepts as means for implementing CTL:

Problem-based learning: It is an approach that engages learners in problem solving investigations that integrate skills and concepts from many content areas. This approach includes gathering information around a question, synthesizing it, and presenting findings to others (Berns & Erickson, 2001). Problem-based learning is a student-centred pedagogy in which students learn about a subject through the experience of solving open-ended problem found in trigger materials. The problem-based learning process does not focus on problem solving with a defined solution, but it allows for the development of other desirable skills and attributes. This includes knowledge acquisition, enhanced group collaboration and communication.

Cooperative learning: Cooperative learning is defined as an approach that organizes instruction using small learning groups in which pupils work together to achieve learning goals (Berns & Erickson, 2001). It is an educational approach which aims to organize classroom activities into academic and social learning experiences. It involves students working in groups to complete tasks collectively toward academic goals. Unlike individual learning, which can be competitive in nature, students learning cooperatively can capitalize on one another's resources and skills (asking one another for information, evaluating one another's ideas etc.). Furthermore, the teacher's role changes from giving information to facilitating student's learning. Ross and Smyth (1995) described excellent cooperative learning tasks as intellectually demanding, creative, open-ended and involves higher-order thinking activities. This strategy has been linked to increased degrees of learner satisfaction.

Project-based learning: Project-based learning is an approach that focuses on the central concepts and principles of a discipline, involves pupils in problem-solving investigations and other meaningful tasks, allows pupils to work autonomously to construct their own learning, and culminates in realistic products (Buck Institute for Education in Berns & Erickson, 2001). It is student-centred pedagogy that involves a dynamic classroom approach in which it is believed that students acquire a deeper knowledge through active exploration of real-world challenges and problems. Students learn about a subject by working for an extended period of time to investigate and respond to a complex question, challenge or problem. It is s style of active learning and inquiry-based learning.

Service learning: It is an approach that provides a practical application of newly acquired (or developing) knowledge and skills to needs in the community through projects and activities (McPherson in Berns & Erickson, 2001). It is an educational approach that combines learning objectives with community service in order to provide a pragmatic, progressive learning experience while meeting societal needs. Service-learning involves students in service projects to apply classroom learning for local agencies that exist to effect positive change in the community.

Work-based learning: It can be defined as an approach in which workplace, activities are integrated with classroom content for the benefit of pupils an often business (Smith in Berns & Erickson, 2001). The approaches for implementing CTL were outlined as shown in Figure 1 as briefly explained by Berns and Erickson (2001).

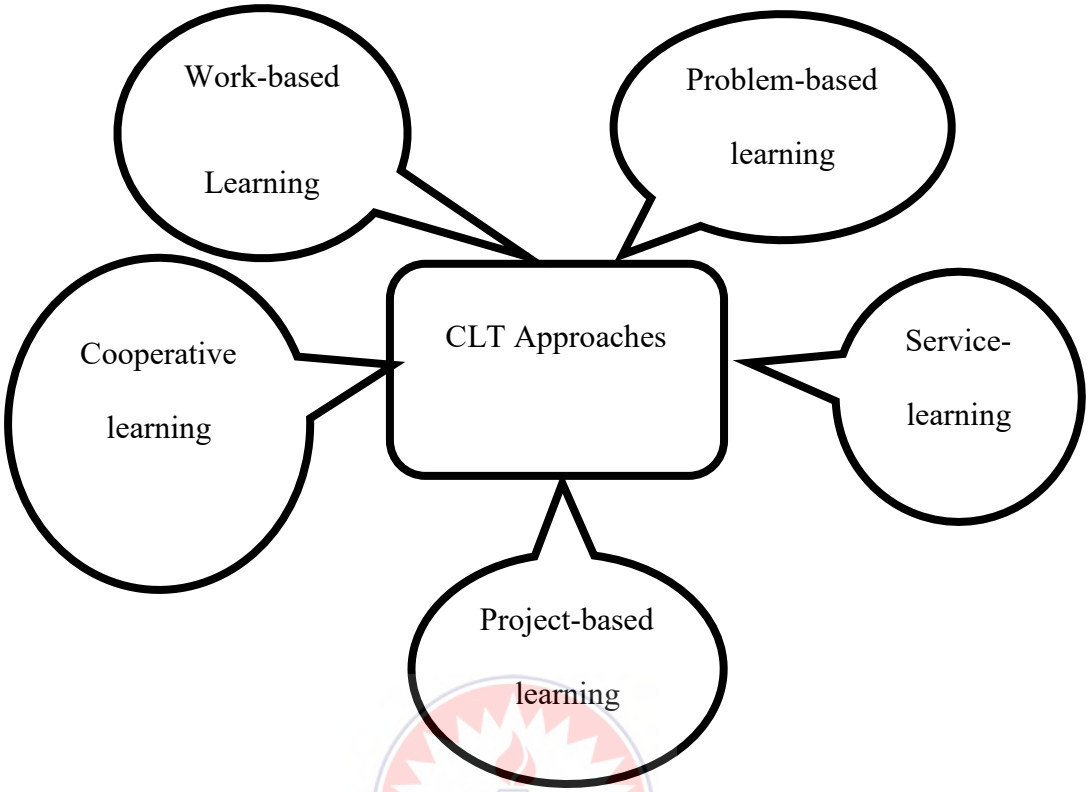

Figure 1: Approaches for Implementing CTL

In this research, the researcher chose Cooperative learning as the approach for implementing CTL. The researcher focused the lesson plan on cooperative learning strategy. The strategy of cooperative learning that was chosen is Learning Together (LT). Then the researcher picked one or more competence that could be implemented by using this strategy. In other words, the researcher emphasized Learning Together strategy in doing the research since learning together is appropriate the elements of CTL that were chosen by the teacher, they were learning community and inquiry.

2.2.2 The role of contextual teaching and learning to purposeful science education

Researchers and science educators have over a decade presented several conflicting perspectives on the purpose and goals of science education (Cobern, 2012). His views about the purpose and goals of science education include to:

1. develop creativity in learners;
2. improve scientific literacy and technological literacy of citizens;
3. prepare citizens for an active contribution towards their own culture; and,
4. inculcate the spirit of scientific thinking in learner.

Bell, Blair, Crawford and Lederman (2003) opined that an adequate understanding of the nature of science and scientific inquiry is the main instructional purpose of science education. The Queensland School Curriculum Council (1999) notes, "science is part of the human quest for understanding and wisdom and reflects human wonder about the world. The study of science as a 'way of knowing,' and a 'way of doing" can help students reach deeper understandings of the world". Shamos (1995) claims, the knowledge of science is important in making crucial decisions on everyday issues and problems, and in the production of informed citizens who are capable of taking personal actions to find solutions to any identified issues and problems.

The American Association for the Advancement of Science (AAAS. 1989) argues that an understanding of science concepts and principles is crucial to developing scientific literacy and also for meaningful and productive careers in science and asserts thus, "more and more jobs today require people who have the ability to learn, reason, think, make decisions, and solve problems and as well engage in scientific discourse".

This assertion supports the goals for science education enumerated in the report of the Nathan (2007) that the knowledge of science concepts and principles would help students to be able to: experience the richness and excitement of knowing about and understanding the natural world; use appropriate scientific processes and principles in making personal decisions; engage intelligently in public discourse and debate about matters of scientific and technological concern; and increase their economic productivity through the use of the knowledge, understanding, and skills of the scientifically literate person in their careers.

According to the Nathan (2007), scientifically literate persons are those who can think, ask questions, and provide logical and coherent answers to any situations and everyday experiences. Thus, a scientifically literate student develops higher order cognitive thinking to identify and evaluate ill-defined problems, to make informed decisions, and also to provide a variety of solutions to any particular problem Resnick, 2012). Therefore, understanding the nature of science and scientific inquiry to foster learners' ability to develop scientific literacy is a purpose and goals for science education.

Researchers argue that understanding of the interactions and relationships between science, technology and society (S.T.S) issues in education is an integral part of contemporary and future science education (Bybee, 2007). Matthews (2014) argue that participation in school science encourages students to develop deeper understandings of scientific concepts, the processes of scientific inquiry, and the nature of science for coping with the technological world.

Jenkins (2012) notes, if teaching and learning of school science is to promote the cognitive excitement and adventure that science undoubtedly offers, it must do so in a context that acknowledges that students are advancing up in a world that has at its

disposal nuclear, chemical and biological weapons and which seems increasingly threatened by new technologies that not only bring great benefits but also problems and may seem to diminish, rather than enhance, individual freedom and choice.

The above assertion acknowledges the fact that an understanding of science and technology through school science is essential for students to understand and cope with the demands of the modern world. School curriculum often delineates science from technology and so students find science not interesting and not related to their lives. Layton, Jenkins and Donnelly (2014) argue that science and technology are relevant to scientific literacy and as such, should be bracketed. Jenkins (2012) further noted that science teaching need not concentrate on scientific features, laws and principles but to be taught within the context of technology.

Science and technology issues therefore need to involve teaching science concepts through technology so that science is developed through interesting contexts (Osborne & Collins, 2015; Shamos, 1995). Also, Science-Technology-Society (S.T.S) issues should be included in the school science curriculum so that learners develop scientific and technological literacy (Bybee, 2007). Essentially, engaging students in problem-solving activities could be achieved through inclusion of Science-Technology-Society issues in the school science curriculum as revealed by a number of researches. These points suggest that there is a need to integrate into school science curricula in Nigeria, issues that involve Science, Technology and Societal (S.T.S) concerns so that citizens develop scientific and technological literacy to live as good citizens and for them to cope with modern day scientific and technological advancement.

2.3 Theoretical framework for contextual teaching and Learning

Socio-cultural learning theory and constructivist learning theory constituted the theoretical framework for the study. They are discussed in the following sections.

2.3.1 Socio-Cultural learning theory

One of the theories the study inclines itself to is Vygosky's (1978) socio-cultural learning theory. In view of this, Vygotsky (1978) adds another layer of understanding with his apt consideration of the socio-cultural dynamics. Vygotsky and the socioculturalists explain these phenomena by asserting that a person's context shapes his or her behavior and determines his or her priorities in learning. They argue, "a culture defines what knowledge and skills children need to acquire and that values and processes-"differ among different races, social classes, dual-career versus one-career families, rural versus urban communities, single-parent versus two-parent families, and so on (Vygotsky, 1978). In the view of Vygossky learning abilities are more specific to the culture in which the child or learner is nurtured. The CTL approach is quite an appropriate in this regard. This is because it helps learners to see meaning in the learning by connecting learning tasks to the context of their daily lives, that is, with context of their personal, social, and cultural circumstance.

2. 3.2 Constructivist learning theory

The use and application of the contextual teaching and learning approach mirrors itself in the theory of constructivism. This is a theory of knowledge that views learning as a personal construction (Jonassen & Reeves, 1996; Newman, Griffin, & Cole, 1989). Constructivists claim that teachers cannot transfer intact knowledge from their heads to the learner and that knowledge is constructed by the learner (Jonassen. 1991). Glaserfeld (1984) noted that learners do not simply reflect on what they are told (i.e.,

objectivist perspective which assumes that knowledge resides outside the bodies of the learner and that learning is a process of mapping entities or concepts onto learners) but learners construct knowledge and understandings and find regularity about the world events and information, and this is an ongoing process which may not be completed.

Duffy and Cunningham (1996) in Jonassen (Ed.) argue that learning is not synonymous with instruction and that it involves an active process of constructing knowledge, rather than acquiring knowledge while instruction is the process by which knowledge construction is supported rather than a process of knowledge transmission.

The Queensland School Curriculum Council (1999) indicates that effective learning occurs only when the learner develops, constructs and accommodates meaning in a context that builds on their prior knowledge. Tytler (2002) argues that to develop a new understanding there is a need for learners to be encouraged to extend their prior knowledge to a new situation and he asserts that if we understand that knowledge is highly contextual, and that the fundamental difficulty in developing new understandings is extending them to new situations, then we need to plan for students to be exposed to a range of situations in which a particular science insight can be used. This would imply, for instance, that one-off activities followed by discussion are ineffective. Students need to be explicitly helped in extending new ideas to different situations as part of the conceptual change process.

Essentially, constructivism is a theory that helps teachers to understand how their students learn and this guides their teaching practice. Constructivism as an approach for improving teaching and learning has been modelled in many science classroom activities (Baird & Northfield, 1992; Bybee, 1997; Driver, 1989; Millar, Leach & Osborne, 2000; Moussiaux & Norman, 1997). The three most influential constructivist

models in science education are the generative learning model (Cosgrove & Osborne, 1985), the interactive learning approaches (Biddulph & Osborne, 1984), and the 5Es instructional model (Bybee, 1997).

The generative model of learning (Cosgrove & Osborne, 2012; Osborne & Wittrock. 2013) describes how children learn and how to teach children. The model consists of four phases; the preliminary, focus, challenge and application. The preliminary phase is characterised by the teacher determining the prior knowledge that students might bring into the learning environment that is relevant to the new topic. Researchers (Gardner, 1993; Osborne & Wittrock, 2013) claim that students' prior knowledge and experiences have a powerful influence on their new knowledge and understanding. The focus phase deals with the activity that students engage in that makes explicit the range of students existing beliefs related to the new concept. The challenge phase is characterized by students comparing the scientific explanation with their own ideas and those of other students through debate, challenge and testing each other's' ideas and so on. The final phase is the application phase during which students determine whether the concept could be useful and applicable to a variety of situations.

The second model, interactive learning approach (Biddulph & Osborne, 1984) consists of five phases namely: preparation, exploratory activities, students' questions, students' investigation and reflection. The preparation phase is the first stage in which the teacher gains the previous knowledge and ideas that students have about the topic and then organises resources together with the students. The next phase, exploratory activities involve the teacher asking students questions and encourages discussion among the students in order to arouse their curiosity of the topic with a view to gain insight into what ideas or prior knowledge the students have about the topic. Students' questions phase is primarily concerned with asking and clarifying of questions by the

students. The students' investigations phase deals with the teacher helping the students in planning and conducting investigations based on the questions chosen through experimentation, reading of articles or books, writing of letters asking for information or consulting with experts. The final phase is reflection during which students are helped by the teacher to record, evaluate and reflect on the results of the investigations and the strategies they employed. Also, students are encouraged to ask more questions, share, discuss and evaluate their findings with other students ((Biddulph & Osborne, 1984).

The third model, that is, the 5Es instructional model (Bybee, 2007) consists of five phases; engage, explore, explain, elaborate and evaluate. The Engage phase is designed to promote interest and motivation with emphasis on activities to arouse curiosity, puzzle students and raise questions for further investigation. The Explore phase provides students with, usually similar, practical experiences in which students continue to raise questions, listen to the views of others and begin to investigate different phenomena. Also, students are encouraged to express and share views while value judgments about views are suspended. The Explain phase provides students with the opportunity to explain their findings to others and their ideas are subjected to greater scrutiny. Teacher introduces relevant scientific explanations during this phase, and students should have developed greater understanding of the phenomena under investigation. The elaborate phase involves students applying their new understandings, developed during previous phases, to a range of contexts. The final phase, that is, evaluation, involves assessing students' understanding and students are also encouraged to reflect on and question the ideas, which they have developed.

Constructivist approaches to science teaching are analogous to the science that scientists do in that they are inquiry-based and offer science teachers the opportunity to fulfill the constructivist promise of improved teaching and learning (Hausfather. 2001; Lorsbach & Tobin, 2008;). Hausfather (2001) notes that constructivist epistemology encourages teachers to make sense of what they see, think, and do in facilitating students" learning. Tobin and Dawson (2012) claim that in a constructivist classroom, teachers understand that the prior knowledge that students bring to the learning environment is crucial and will strive to scaffold learning so that it connects with that prior knowledge. Thus, constructivist teachers are facilitators of learning rather than transmitters of knowledge to the learner's head (Chaille & Britain. 2001). A major criticism of the constructivist approach is that it requires more time for exploring and negotiating understanding with students (Tytler, 2002).

Vasquez (2018) intimated that teachers' roles in a constructivist classroom include encouraging and accepting students' autonomy and initiative; using raw data and primary sources (knowledge of things around them), along with manipulative, interactive and physical materials; when they are framing task, using cognitive terminology such as classify, analyse, predict, and create; allowing student responses to drive lessons, shift instructional strategies and alter content; familiarizing themselves with students' understandings of concepts before sharing their own understanding of those concepts; encouraging students to engage in dialogue, both with the teacher and with one another; encouraging student inquiry by posing thoughtful, open-ended questions and asking students to question each other; seeking elaboration of students' initial responses; engaging students in experiences that pose contradictions to their initial hypothesis and then encouraging discussion; allowing time after posing questions; providing time for students to construct relationships and create metaphors;

and nurturing students' natural curiosity. Yeager and Gregory (2011) also notes that in a constructivist classroom, students' ideas and questions are encouraged, accepted, and used for curriculum planning, cooperative learning, reflection, and analyses. Taylor, Fraser and Fisher (1997) further argue that in a constructivist learning environment, students are given the opportunity to communicate their understandings with other students, to generate plausible explanations for phenomena, to test, evaluate and defend their explanations among their peers, and actively engage in the social construction of knowledge, all of which are reflections of the nature of science.

Students are provided with frequent opportunity to identify their own learning goals, to share control of the learning environment, and to develop and employ assessment criteria within the learning environment. The environment of the classroom is conducive for inquiry. That spirit of inquiry includes the freedom for students to question the operation of their class.

Students must have the opportunity to experience the tentativeness of scientific knowledge. That is, students must understand that scientific knowledge is theory laden and socially and culturally constructed. Taylor (2015) clearly indicates that learning is a social process and that new meanings are negotiated. For this reason, many researchers now use the term social constructivism to emphasis the social dimension to learning. A recent report on the Department of Education and Training, Victoria (Education Victoria, 2003) on science in schools research project summarised by Tytler (2002) states that in effective science classrooms, students are encouraged to actively engage with ideas and evidence; students are challenged to develop meaningful understanding; science is linked with students' lives and interests; students' individual learning needs and preferences are catered for; assessment is embedded

within the science learning strategies; the nature of science is represented in its different aspects; the classroom is linked with the broader community; and learning technologies are exploited for their learning potentials.

In addition, Tytler (2002) views constructivist learning as one wherein learning outcomes depend on the learning environment and the knowledge of the learner; learning involves the construction of meaning: and construction of meaning is a continuous and active process. Therefore, constructivism is an approach in which teachers and learners engage in discourse and problem-solving activities with a view to generate and promote new information (Brooks & Brooks, 2013). Thus, for teachers to successfully implement constructive teaching and learning approaches in their classroom, they need the support of professional development and adequate new curriculum materials (Venville, Wallace & Louden, 2008).

2.4 Related Literature

2.4.1 Views on Contextual Teaching and Learning Approach

As stated elsewhere Diknas (2002) intimates that the CTL approach helps the pupil to find the benefit of learning in the classroom because they can relate the subject to the real situation where they can make connections between what they are learning and how that knowledge will be used. This implies that the teaching circumstance will call upon pupils' active participation in the teaching process since the pupils are actively involved in learning process by awakening their entry behavior or schemata (previous knowledge).

Successful contextual teaching and learning approach engages teachers and students in active classroom activities, ensuring that that learning is student-centred and engaging. Thus, CTL approach is based on a constructivist educational theory which is a

conceptual framework that asserts that learners are continuously updating their memory based on ongoing experiences. It relies on the notion that students create their own meaning of concepts when they learn through experiences which fosters an innate motivation and desire to learn.

Moore (2009) shares that with the CTL approach pupils no longer have difficult time understanding the content of what they are taught since they are provided with many practices. This may result that the pupils are actively engaged and encouraged to speak up since they are free to say what they have in mind. The pupils can share with their friends about the topic during the teaching and learning process in the classroom.

Realizing that learning in group will give better results than learning alone, the pupils can help other friends who have difficulties. As a result, learning cooperation is encouraged.

Ansah (2010) holds the view that CTL approach affords the pupils chance to observe learning activities by themselves and finally make the conclusion of what they have observed. The teacher can find the pupils' abilities and problems in acquiring the knowledge during the teaching and learning process so that the teacher can describe the real competence of pupils to the subject matter. On the contrary, Bring (2013) opines that the approach which is self-discovery will not occur if all pupils in a group are weak. It forces the teacher to make special preparation before teaching in the classroom because the teacher needs appropriate kinds of media.

2.4.2 Impact of contextual science teaching and learning on pupils' performance in science

Application of contextual teaching and learning approach in teaching science concepts has been of interest to science teachers in most schools as observed by Rogue (2012).

Contextual teaching and learning advocates believe that through this strategy learners can develop foundational knowledge, that is, understanding of specific ideas or concepts, develop the ability to engage this information in action and understand the relationships between knowledge learned and human dimension. Much research has been done on how to use contextual science teaching and learning to improve pupils' learning in the classroom. Some research reports indicate that using contextual teaching and learning to teach science concepts to learners has positive impact on students' learning. Premose, 2005) reported on positive impact of CTL on students' learning behaviour. He reported that 84 % of participants in his study said that they learned a lot more in CLT strategy classrooms than in traditional courses in the same subject area. In similar study conducted by Choo (2007) more than 80 % of the participants, reported from their experience of CTL, expressed that they were able to think more deeply about the topics they were able to participate more actively in the learning. while the data in these studies are self-reported they point to areas for potential further research.

Again, research reports indicate that using contextual science teaching and learning to teach science concepts to learners improved their retention of the concepts (Wheeler, 2003). These authors also indicated that contextual science teaching and learning is usually considered as a method of self-learning, where pupils take to understand concepts based on what they have learned from their environment and lake standardized tests to assess their knowledge and aptitude. The researchers further assert that in many circumstances contextual science teaching and learning is generally perceived as important to pupils where their interest is awakened because they have prior knowledge. It is believed that the neglect of contextual science teaching and learning at all levels of education is misguided (Bangert-Drowns, Chen-Lin & Morgan,

1991; Leeming, 2002) and that if pupils know they will learn from what they have prior knowledge about they will study more and will space their study throughout the semester rather than concentrating it just before examinations.

Gates (2007) claimed that, contextual science teaching and learning has a powerful positive effect on future retention if pupils are tested on material and successfully recall or recognize it, they will remember it better in the future than if they had not been tested. This phenomenon Gates called the contextual science teaching and learning effect, has been studied sporadically over a long period of time but is not well known outside cognitive psychology as most experiments on the testing effect have been conducted in the verbal learning tradition using word lists (Tulving & Thompson, 1973) or picture lists (Wheeler & Roediger, 1992) as materials. Gates (2007) has also earlier indicated that few experiments use materials found in educational contexts.

Bush and Glover (2009) found in two experiments which reported an investigation to test the effect of contextual science teaching and learning under educationally relevant conditions, using prose materials and free-recall tests without feedback (somewhat akin to essay tests used in education). Most previous research has used tests involving recognition (like multiple-choice tests) or cued recall (like short-answer tests). These studies report that taking test in science concepts learnt in the classroom improves retention of concepts (Wheeler & Roediger, 1992). They observed that in some contextual science teaching and learning effect experiments, a study-test condition is compared with study-only condition on a delayed retention test. When the subjects in the former condition outperform those in the latter on a final test, one could wonder whether the testing effect is simply due to study-test subjects being exposed to contextual science teaching and learning before the test. It is no surprise that pupils

will learn more with two presentations of varying learning approaches than one (Cull, 2000).

Researchers have offered several possible explanations for why contextual science teaching and learning should benefit teaching and learning. The first is that more frequent testing provides extrinsic motivation for pupils to work harder throughout the course because they want to get good grades on the tests (Tulving & Thompson, 1973; Gates 2007). Secondly, contextual science teaching and learning offers the pupil feedback or knowledge of their learning strengths, giving them the opportunity to see their areas of strengths and weakness and giving the pupil more time to work towards eliminating the areas of weakness (Standlee & Popham, 2009). The third possible explanation is what Standlee and Popham called enforced activity of the subject matter. The process of employing contextual science teaching and learning forces the pupil to process information at a deeper level than they may otherwise. Fourth, it was found out that explanation of contextual science teaching and learning leads to improved class discussion. Also, Dustin (2011) proposed that contextual science teaching and learning may reduce stress since each test represents a smaller portion of the total grade.

A substantial body of research has been conducted on the effects of contextual science teaching and learning on pupils of which the earliest studies was done by Turney which were good examples of the typical contextual science teaching and learning study. A description of Turney's work depicts how most such studies have been conducted. Turney studied the effects of contextual science teaching and learning, short objective quizzes upon the achievement of college junior and seniors learning biology concepts. Turney wanted to see if pupils would perform better when even exposed to contextual

science teaching and learning to determine their relative grades or standing in the class and whether this information motivated the pupils to study harder. Turney was interested in determining the effects of contextual science teaching and learning on teaching and learning of science concepts. A modified version of the final examination was used as a pretest. The class section that scored the lowest on the pretest was determined to be the experimental group, the other as the control. The experimental group contained 40 pupils while the control group had 28 pupils. The lectures, readings, and laboratory work were identical. The experimental group scored a mean of 81.2 and the control group scored 18.8. Both groups were given the same mid-semester and final exam; however, the experimental group was given an additional quiz each week while the control group was given only one additional quiz during the course. Both classes were taught by the same instructor.

During Turney's last class meeting, a questionnaire was distributed to determine how the experimental group felt about receiving frequent quizzes. Almost the entire experimental group believed they studied harder, thought that they learned the material more thoroughly, and liked knowing where they stood at all times in relation to the rest of the class. The experimental group was strongly in favour of the short, frequent quizzes. Many other studies have been conducted since Turney's work. Bangert-Drowns, Chen-Lin and Morgan (1973) conducted a thorough meta-analytic review on what they considered to be the soundest research on contextual science teaching and learning. In conducting this meta-analysis, Bangert-Drowns et. al. (1973) used variables to identify the most methodologically sound studies including testing procedures, experimental design, classroom setting, and publication histories. For effects on achievement, for example Bangert-Drowns et. al. (1973) found only seven studies. Their analysis found positive results from contextual science teaching and

learning and showed that pupils generally performed better on tests on smaller units of instruction than on long tests covering larger units of instruction. In the typical study, the experimental group outperformed the control group by 0 .49 standard deviations.

For effects on knowledge retention, Bangert-Drowns et al. (1973) found 32 studies that met their standards and of the 32 studies. 26 showed results favoring frequent testing. Six showed that frequent testing had a negative effect. However, in their final analysis they were unable to conclude with significantly positive results. They observed that when exposed to contextual science teaching and learning and tested pupils were compared to other pupils who were not exposed to contextual science teaching and learning, they only showed minimal, non-significant superiority on a summative achievement measure, about one tenth of a standard deviation. The correlation between the number of tests given to the regularly tested pupils and effect size was actually negative, (r = -0.6), though not significantly so. For pupil's preference, Bangert-Drowns et. al. (1973) found five studies that measured pupil preference. Pupils in the regular testing condition had attitudes that were more positive by 0.46 standard deviations. That is, 14 pupils had a more favorable opinion of their instruction when they were tested frequently. Even though these were the leading studies to date, closer examination reveals some evidence of extraneous variables that could have confounded the results leading to inconclusive results of frequent testing. Most of the studies included in the meta-analysis were quasi- experimental designs and not true experimental designs because the pupils were not randomly assigned to groups.

On the other hand, Tulving and Thompson (2007) conducted a study of 137 college pupils enrolled in three sections of a junior-level management course. One section received three tests during the semester, the second section received seven tests and

the third section received thirteen tests. The section with thirteen tests scored the highest with 82.50%, the seven-test section scored 82.37%, and the third section scored 81.59%. Although there appeared to be a slight relationship between test frequency and achievement, the differences were not significant. However, the pupils in the seven and thirteen test conditions overwhelmingly preferred regular testing.

According to Ansah (2010), it is a fact that, the primary goal of varying teaching approaches can be considered as conveyance of information to pupils in such a way as to ensure retention. There is therefore a continuous search for best teaching approaches that will facilitate in achieving the above stated goal. This is evident in the efforts made by researchers in the field of education with the intention to raise the standard of teaching and learning for effective outcomes from pupils.

In most Ghanaian schools and educational institutions, various teaching approaches are employed for several purposes but more importantly for improving the understanding of different categories of pupils. According to Brookhart (1997), the major aim of varying teaching approaches is to help pupils to grasp quickly new concepts as well as improve pupils' learning. An ideal of varying teaching approach is one that is objective and reliable as teaching approaches as means of improving pupils' achievements in the classroom have been a contentious issue in educational circles. Teaching approaches advocates argue that teaching approaches that link the content of what a teacher is teaching to a pupil's cultural contexts, daily life experiences, prior knowledge, and previous classroom experiences make learning very relevant and easy to the pupil. This would be imperative to improving instructional effectiveness and would encourage pupils to study hard.

Opponents of varying classroom teaching approaches are of the view that these approaches would take away instructional time. According to Standlee and Popham (2009) teaching approaches rather than exerting a positive influence on pupils learning could take away valuable instructional time. Generally, teachers use classroom teaching approaches to diagnose pupils' strength and weakness (McLean & Lockwood, 1996). Other authors have noted that teachers use varying teaching approaches to categorize pupils (Senk, Beckmann & Thompson, 1997). However, the usefulness of varying teaching approaches on teaching and learning appears not to have been fully realized in most Ghanaian schools.

Many teachers tend to use contextual teaching approach reflecting on prior knowledge about a new topic being introduced. The analyses of these teaching approaches are sometimes used to find gaps in pupils understanding and use these gaps as guides for further lessons. In the light of this pupils need to be aware of the purpose of the teaching approaches they are exposed to regularly in the classroom. According to Fontana and Fernandes (1994) and White (1997) experimental studies have shown that pupils who understand learning objectives and assessment criteria have opportunities to reflect on their work and show great improvement than those who do not. However, the focus of this study was to find out how contextual science teaching approach could help in aiding pupils to acquire the necessary competencies needed to learn and understand science concepts at the basic level with ease. It was to also assess whether contextual science teaching approach helps pupils to answer questions on the different levels of bloom's learning taxonomy.

Experience as a teacher showed that, pupils put much effort in their studies whenever new teaching approaches and methods are announced. Seemingly, regular and similar

learning task would help pupils to recognize and apply the information that would show a considerable improvement in their understanding of concepts in science.

2.5 Summary of literature review

As earlier indicated the primary purpose of the study was to investigate the impact of the contextual teaching and learning to the teaching and learning of science concepts. Based on this, the review of literature was arranged to have bearing on the topic understudy. Two theories were adapted to guide the course of the study; which were the Vygosky's (1978) socio-cultural learning theory and the constructivism theory of learning. Based on these two theories the idea, elements and tenets of the contextual teaching and learning approach were mirrored to be appropriate to the study. Other relevant themes and areas were developed as they were important to the research objectives of the study. These were: concept of contextual teaching and learning (CTL) approach, elements of contextual teaching and learning approach, approaches for implementing CTL, the role of contextual teaching and learning to purposeful science education, views on contextual teaching and learning approach, impact of contextual Science teaching and learning on pupils performance in Science, improving quality in teaching and learning science, teachers' roles in quality science teaching and learning. In conclusion, it could be viewed that in improving the society and the world in which we live in, it is important that the teaching and learning of science concepts is simplified such that students will develop much interest in the subject as well as improve on their performance levels

CHAPTER THREE

METHODOLOGY

3.0 Overview

This chapter discusses the methodology used in the study. It presents the structure around the research design, study area, population of the study, sample and sampling technique used to obtain the sample for the study. It also describes instruments used to collect data. Its further reports on the worthiness of the qualitative instruments and validity and reliability of the quantitative instrument. This chapter proceeds to describe the intervention activities and data collection procedure and data analysis. It ends with ethical considerations that governed interaction with the respondents.

3.1 Research Design

The study employed action research design. The design aimed at improving JHS pupils' performance in integrated science concepts through the use of contextual teaching and learning approach. Action research design was considered suitable for the study because it could improve teacher's classroom practice and enhance pupils' learning and also promote personal and professional growth of the teacher (Johnson, 2005). The design was carried out in three major phases. The first phase consisted of pre-intervention activities and the second phase involved implementation of the intervention. The third phase was devoted to post intervention activities. These phases were discussed in detail under the appropriate sections.

3.2 Setting

The setting for this action research was the University of Education, Winneba Practice JHS, located at the South Campus in the Effutu Municipality of the Central Region of Ghana with a student population of 147 and 20 teachers. The school is one of the

several basic schools in the municipality. The population of the municipality is one hundred and seven thousand, seven hundred and ninety-eight (107, 798) according to 2021 Population and Housing Census (PHC) data with annual population change of 4.3%. This number comprised of 54, 723 males and 53, 075 females, representing 50.80% and 49.20% respectively. The Municipality covers an area of 80.45 km^2 and having a population density of 1 340 per square kilometre (Ghana Statistical Service, GSS website). Winneba is located on latitude DMS 5°21'44.03"N and longitude DMS 0°37'47.61" W at an elevation of 30.96m (101.57 feet) above sea level. The annual range of temperature in the community is 2.7°C with a mean of 27.6°C while the average annual rainfall is 761.4mm with a range of 910.9mm. A cross-section of Effutu Municipality is shown in Figure 2 while Figure 3 shows the age distribution of the of the population as captured by 2021 PHC.

Figure 2: A cross-section of Effutu Municipality

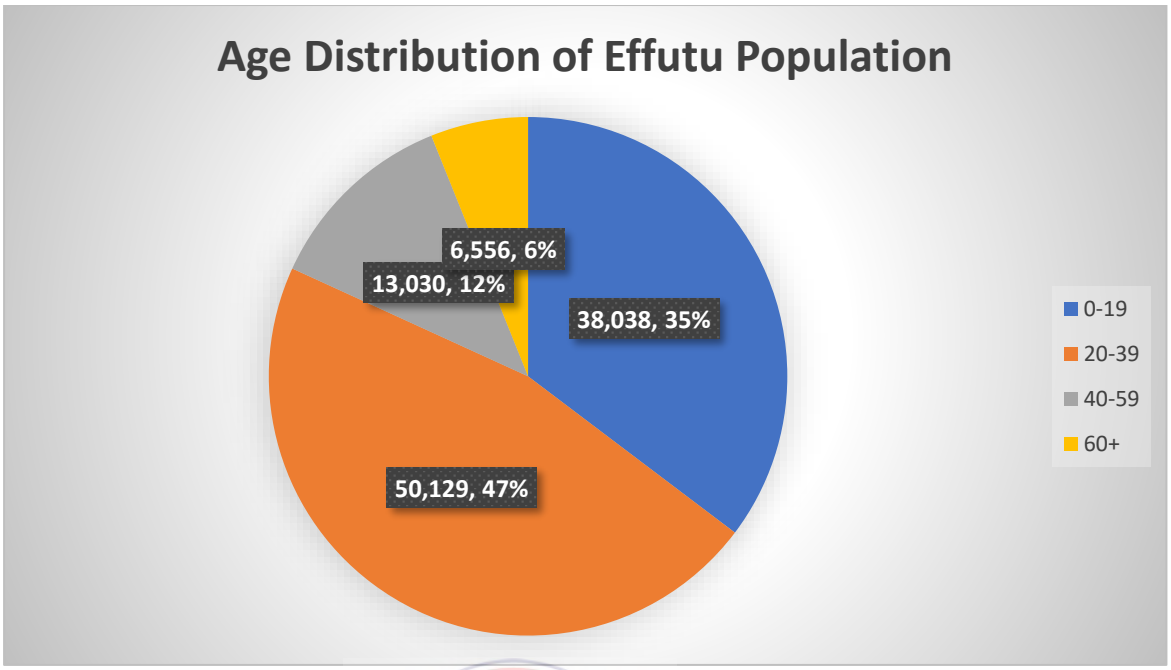

Figure 3: Age Distribution of Effutu Population

3.3 Research Approach

A research paradigm which is also called philosophical stance is a set of assumptions about how the issue of concern to the researcher should be studied (Henn, Weinstein & Foard, 2016). The researcher is attracted to the pragmatist paradigm derived from the work of Cherryholmes (1992). The central premise of the paradigm is that it helps the researcher to have a better understanding of the research problems (Creswell & Plano, 2007). The study dwelled on the mixed method paradigm or approach for quantitative and qualitative data collection. Tests and closed-ended questionnaire were used to gather quantitative data while semi structured interview schedule was used to gather the qualitative data.

3.5 Population

A population includes all elements that meet certain criteria for inclusion in a study (Burns & Grove, 2003). Polit and Beck (2004) also refer to a study population as an aggregate or totality of all the objects, subjects or members that conform to a set of specifications. The target population included all pupils of University Practice Junior High School, South Campus, Winneba in the Effutu Municipality totaling 147.

3.6. Accessible population of the Study

The accessible population of the study was the form two pupils of the school. The total number was 20.

3.7 Sample and Sampling Technique

Purposive sampling technique was used to obtain the study sample. A class of 20 pupils was sampled for the study. the form two pupils were sampled for the study because they were not under pressure to write any external examination. They had also been introduced to some basic concepts in their first year and at least acquired some fundamental principles in Integrated Science.

Convenience sampling technique was used to obtain a sub sample of six pupils for the second phase of the study. Etican, Musa and Alkassim (2016) are of the view that convenience sampling is used where members of the accessible population meet certain criteria, such as easy accessibility, geographical proximity, availability at a given time or willingness to participate in the study. The six participants were available to the researcher and willing to participate in the second phase of the study were used. The second phase involved interviews of the sub-sample on their views about contextual teaching and learning approach used in the intervention.

3.8 Instrumentation

The purpose of the study demanded the need to gather data on pupils' learning outcomes and progress on the impact of contextual teaching and learning approach in teaching and learning some integrated science concepts. Both quantitative and qualitative data collection instruments were used to collect the data for the study. Tests and a structured questionnaire were used to gather quantitative data while an semi-structured interview schedule was used to obtain qualitative data.

3.8.1 Structured questionnaire

Subar, Ziegler and Thompson (2001) posited that the main reason for using questionnaire is the fact it is economical. It also provides quantifiable answers for a research topic which are also easy to analyse. A structured questionnaire was designed by the researcher for the study to collect data to answer research question two (Appendix A). It was a 3-point Likert Type scale. Each item consisted of a statement followed by three options with weightings: Agree =3, Not sure =2 and Disagree =1. The respondents were expected to select one of the options that best explained their opinion about the corresponding item. The items were based on the pupils' views about the impact of contextual teaching and learning approach on their learning integrated science topics.

3.8.2 Tests

Teacher-made tests were administered during the pre-intervention, intervention and post-intervention stages. Six multiple tests were constructed based on the topics taught during the period of the intervention. The topics taught included soils, soil conservation, cells and cell division, growth in plants, photosynthesis, carbon cycle and water movement. each comprised 20 items. (Appendix B).

3.8.3 Lesson observation guide

An observation checklist was used to gather data on the pupils' level of involvement in contextual teaching and learning approach during integrated science instruction. Kumar (1999) defined observation as a purposeful, selective and systematic way of watching and listening to an interaction or phenomenon as it takes place. Cohen, Manion, and Morrison (2007) asserted that the distinctive feature of observation as a research process is that it offers an investigator the opportunity to gather live data from naturally occurring social situations. In this way, the researcher can look directly at what is taking place in situ rather than relying on second-hand accounts. The use of immediate awareness, or direct cognition, as a principal mode of research has the potential to yield more valid or authentic data than would otherwise be the case with mediated or inferential methods. The purpose of persistent observation was to identify aspects the pupils' involvement in the lessons relevant to the problem or issue being pursued and to focus on them in detail (Lincoln & Java, 1985).

3.8.4 Semi-structured interview.

A semi-structured interview guide, as shown in Appendix C, was developed by the researcher. It was used to collect data for the post-intervention stage after lessons were taught. With semi-structured interviews, the interviewer still had a clear list of issues to be addressed and questions to be answered. However, the interviewer was prepared to be flexible in terms of the order in which the topics were considered, and perhaps more significantly, to let the interviewee develop ideas and speak more widely on the issues raised by the researcher (Denscombe, 2007).

The areas covered by the structured interview were: the pupils' views about the use of contextual teaching and learning approach in lessons taught, their views on the impact of the approach on their interest and performance in Integrated Science.

3.9 Validity of the Instruments

According to Golafshani (2003) validity describes whether the means of measurement are accurate and whether they are actually measuring what they intended to measure. The face and content validity of the instruments were determined by experts in integrated science teaching and science educators. Content validity is the extent to which the items of the test, questionnaire and the semi structured interview and the responses to the items were representative of all the possible questions that would be asked about the content or areas covered by the instruments (Creswell, 2012).

3.9.1 Validity of the tests

The face and content validity of the tests were determined by two experienced Junior High School Integrated Science teachers who had taught the subject for ten years and the research supervisor. They were to determine the clarity of the test items and whether the items reflected and well represented the objectives of the lesson and the content or subject matter taught. They were also to determine whether items were within the cognitive levels of the pupils. Suggestions from the reviewers were used to modify some of the items that appeared ambiguous.

3.9.2 Validity of the questionnaire

The opinions of the supervisor and experienced JHS Integrated Science teachers were sought to establish the face and content validity of the items. The face validity established the clarity of instructions, appropriateness of the language and the format of the questionnaire. The content validity on the other hand was used to determine

whether the questionnaire items reflected the objectives of the study. The reviewers' suggestions were used to modify some of the items which appeared ambiguous and items that did not reflect the objectives of the questionnaire were replaced with appropriate items.

3.9.3 Validity and Trustworthiness of the semi-structured interview schedule

Copies of the semi-structured interview schedule were scrutinized by colleagues of the researcher before it was given to the supervisor for consideration. The instruments were further pilot tested to identify potential deficiencies before using it for the actual study. Arthur and Nazroo (2003) affirm that, when assessing the scope of the guide, it is important to review whether it allows participants to give a full and coherent account of the central issues and incorporate issues they think are important.

The interview was conducted to check for bias and subjectivity in the questions. Recorded audio-interview was played back for the respondents to listen and verify if it was the true reflection of the interview. Transcription was done verbatim and respondents read through to check for additions and corrections where necessary. A peer review of the recorded interview was done and compared to its corresponding transcription.

The findings from the pilot test led to a number of changes in the instrument. For example, the wordings of the interview questions were amended to make them more understandable. Corrections were made to some items whiles some items were dropped based on the pilot results. During the piloting, the researcher found out that some of the pupils could not provide meaningful responses to some statements and for that reason those items were eliminated. The interview also revealed that semi structured format was more appropriate since it allowed enough room for the

respondent to explain their own views about the impact of contextual teaching and learning approach on their interest and performance in Integrated Science.

Streubert and Carpenter (2011) describe trustworthiness as establishing the validity and reliability of qualitative research. Qualitative research is trustworthy when it accurately represents the experiences of the study participants. Four criteria were used to measure the trustworthiness of data collected: credibility, dependability, transferability and confirmability that is Guba's model for establishing trustworthiness of qualitative research (Streubert & Carpenter, 2011).

Credibility is demonstrated when participants recognise the reported research findings as their own experiences (Streubert & Carpenter, 2011). The following strategies were applied to ensure credibility: Prolonged engagement requires that the investigator be involved with a site long enough to detect and take into account distortions that might otherwise creep into the data (Lincoln & Java 1985). The researcher engaged in prolonged engagement with the participants to detect distortions in the data. Peer debriefing exposes a researcher to the searching questions of others who are experienced in the methods of inquiry, the phenomenon or both (Lincoln & Java 1985; Polit & Berk, 2004). In this study, the researcher exposed the research work to colleagues for constructive criticism.

Member check was used to establish the trustworthiness of the semi-structured interview. Member check is whereby data, analytical categories, interpretations and conclusions are tested by members of those stake-holding groups from whom the data were originally collected (Lincoln & Java 1985; Polit & Berk, 2004). The transcription and audio recording were given to the interviewee to test the audio recording and to

read the transcription to ascertain the authenticity of the recording and the transcription.

Confirmability is a neutral criterion for measuring the trustworthiness of qualitative research. If a study demonstrates credibility and fittingness, the study is also said to possess Confirmability (Lincoln &Java, 1985; Streubert & Carpenter, 2011). The study established rigour with the decision trial and proved Confirmability through credibility, transferability and dependability.

3.10 Reliability of the Questionnaire

Reliability refers to the ability of research results to be replicated or repeated (Bryman, 2004). the questionnaire was pre-tested among 20 JHS two pupils. The data collected was analysed using SPSS version 17 and the reliability determined using Cronbach Alpha reliability coefficient. the reliability was found to be 0.78 which was an indication that the questionnaire was reliable for data collection. This is supported by Bryman (2004) who intimated that an instrument with a reliability coefficient above 0.68 is reliable for data collection. Also, Cronbach Alpha reliability coefficient values equal to or greater than .70 are generally acceptable (Perry, Charlotte, Isabella & Cozens, 2004). Therefore, the questionnaire appeared to have a good internal consistency.

3.11 Pre-intervention and Intervention Activities

A test consisting of 20 multiple test items was administered to the sample. This was to assess the pupils' knowledge on the concepts intervened on. The scores were analysed and converted into percentages and recorded and stored for further analysis after the intervention stage. A weekly lesson plan was developed on topics from the Integrated Science syllabus. The topics used were part of the scheme of work for the second term.

According to the scheme of work for Integrated Science for the second term of the Junior High Schools in Ghana, the pupils were to learn excretion and excretory system, the respiratory system, blood and its functions in humans as well as transport system in plants and animals, reproduction and inheritance. The researcher did not want to disrupt the school's scheduled scheme of work. The teaching and learning activities were developed and presented systematically specifying the instructional objectives to be achieved each week. The prior knowledge and their previous experiences with the topics were incorporated in the lesson plans. Also, the content of the lessons was related to the environment of the learners to motivate and sustain their interest. Moreover, the lessons were learner-centred in order to promote active participation of the pupils.

The test items which were used in the weekly tests were constructed based on the activities and concepts taught. The test consisted of multiple-choice question items. Multiple choice test items are easy to mark and to provide immediate feedback to both teacher and pupils. Each test lasted 30 minutes. Each test was marked and scored and distributed to the pupils before the next lesson. Descriptive feedbacks were provided on each incorrect response provided by the pupils. This was done to enable the pupils to identify specific strengths and areas needing improvement. General discussion on the feedback from the tests was done after the distribution of the marked scripts to the pupils. Pupils' weaknesses and misrepresentations of concepts which indicated poor understanding of the concepts by the pupils were addressed during the lesson.

3.12 Post-intervention Activities

This phase or stage of the study involved checking the effects of the intervention strategies on the pupils' learning and evaluation of the intervention strategies. This was

done by checking pupils' work output at the end of each week. Pupils' output was checked by the researcher based on the responses of the former to the items in the weekly tests as well as during the lesson.

3.13 Data Collection Procedure

The data for the study was collected in three phases. Weekly tests were administered in the first phase while the questionnaire and the interviews were administered in the second and third phase respectively.

3.13.1 Administration of tests

Series of tests were organised on weekly basis to ascertain whether the intervention was effective. The tests were on the concepts taught during each week. The test items were constructed with increasing in cognitive demand and to examine whether the respondents applied the principles learnt in answering the items. Descriptive feedback in the form of written comments was also provided on any incorrect responses which did not reflect the pupils' understanding of the concepts tested. They were assisted to identify and correct their mistakes and how to overcome similar mistakes in the consequent tests. Feedbacks on the outcome of the tests were discussed with the pupils. This strategy helped them to use the best and correct approaches in finding solutions to the questions to the test items. The tests were scored and analysed.

The questionnaire was administered in the last week of the intervention. The purpose of the questionnaire was explained to the pupils. Each item of the questionnaire was explained to the pupils and they were asked to respond to the items independently. The researcher ensured that there was no interaction among the pupils during the exercise. The researcher moved around to explain any item any of the pupils found difficult to

understand. The completed questionnaires were collected after the pupils indicated that they were done with them.

3.13.2 Lesson observations

The researcher employed a media expert in video-recording to video-record (audiovisual recording) all the five lessons taught during the intervention. This was to monitor the quality of pupils' involvement during the lessons based on the areas of interest highlighted in Appendix C. The recordings were reviewed with the expert and some colleagues of the researcher. The review was guided by the quality of the videos in terms of clarity of the pictures, quality of the sound and coverage, that is, whether all the pupils were captured. The review of the tapes led to the selection of three recordings of the lessons, namely first, third and the fifth lessons for further analysis. These lessons met the criteria set and also presented snapshots of the progress of pupils' involvement in the lessons during the intervention.

3.13.3 Interviews

A subsample of six pupils was interviewed after the administration of the questionnaire. The researcher introduced herself to each of the interviewee to establish rapport with them. They were also briefed on the purpose of the interview and they were assured that the outcome of the interview would not affect their academic work. They were assured of anonymity and confidentiality of their responses. The interview session for each interviewee lasted between 30 and 40 minutes. They were interviewed at a conducive place at the school where there were minimal distractions from other pupils. Each interview was audio-taped with the consent of the interviewee after which the recorded interview was played back for them to confirm if it was a true recording

of the interview. The audio-recorded interviews were transcribed the same day the interviews were conducted.

3.14 Data Analysis

Data analysis is a process of reducing and organizing data into meaningful and interpretable forms (Bryman, 2004). Quantitative and qualitative data methods of analysis were used to organise the qualitative and quantitative data respectively.

3.14.1 Quantitative data analysis

The pupils' test scores obtained from each test during the intervention stage of the study were organised into mean scores and standard deviations. The results of the analysis were used to determine the progression of pupils during the intervention period.

Descriptive statistics function of the Statistical Product for Service Solutions (SPSS version 23) was used to organise the pupils' responses to the questionnaire items into frequencies and percentages. The responses to the questionnaire items were categorised into agree, not sure and disagree. This was to ease analysis of the responses. The results of the questionnaire items were used to answer research questions 3.

3.14.2 Qualitative data analysis

3.14.2.1 Analysis of lesson observation data

The researcher employed the assistance of two colleagues to view the tapes severally based on the observation guide.Frequency counts were taken for the number of times each criterion was identified in each lesson. In this identification, all judgments were used liberally; for instance, any observation made on the issue of interest was counted.

The total frequency counts for each criterion were determined by each of the colleagues and the researcher. After validation of the three sets of frequencies mean frequencies were determined and converted to percentages. This was used to determine the pupils' levels of involvement in lessons as indications of the impact of contextual teaching and learning approach to the teaching and learning of Integrated Science.

3.14.2.2 Analysis of interview data

The interview data was analysed thematically. Morse and Field (1996) explain that, thematic analysis involves the search for and identification of common trends that extend throughout an entire interview or set of interviews. The researcher transcribed the tape-recorded interviews and then grouped them under their appropriate themes to answer research questions 2 and 3. The researcher transcribed the tape-recorded interviews, then read and reread the interviews in their entirety, reflecting on the interviews as a whole. Then, the researcher summarized the interviews; keeping in mind that more than one theme might exist in a set of interviews. Once identified, the themes that appeared to be significant and concepts linking substantial portions of the interviews were written down.

3.15 Ethical Considerations

The researcher executed the ethical procedures practised by researchers in conducting research including the following:

1. **Avoided plagiarism:** Works of people which were used to buttress analysis of and in the literature review, were duly acknowledged in-text and listed in reference section.
2. **Informed consent:** In order, not to violate the principle of informed consent as recommendation in the social research, letters of introduction were sent to the

school authorities to seek permission before the conduct. In these letters the purpose of the study was clearly stated to both the respondents and the schools' authorities. The consent of the participants was also sought to participate in the study.

3. **Assured confidentiality:** The respondents were assured that their identities would be concealed. In achieving this purpose, respondents were given numbers which they wrote on their questionnaire sheets instead of their names which made it difficult for people to identify the respondents. Individual respondents were assured of voluntary withdrawal from the study. The data collected was however kept in a safe place under lock and key to protect the interest of the participants' and also safe from other people so they do not have access to.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Overview

This chapter presents the results of the study. Principally this research had the primary intent of investigating how contextual teaching approach of teaching and learning can be used to assist pupils of University Practice Junior High School at the South Campus of the University of Education, Winneba in the Effutu Municipality to improve their performance in learning Integrated Science concepts. Improvement in pupil's performance through contextual teaching approach of teaching and learning is expected to impact positively on performance levels of pupils in performance in biology as well as other topics in the integrated science syllabus. The results of the study and discussion of the findings are presented in the following sections.

4.1 Presentation of Results

The results of the study are presented based on the research questions.

4.1.1 Research question one

What are the levels of pupils' involvement in contextual and learning approach during teaching and learning of selected concepts in Integrated Science?

The first research question sought to examine the level of involvement in contextual teaching and learning approach when used during science lessons. This was done through building an observation report as the approach was used during the intervention phase of the study. The results of the analysis were presented in Table 1 as percentage frequencies. The percentage frequency counts are taken to mean the levels of involvement of the pupils during the implementation of contextual teaching and learning approach in the integrated science lessons. The observation data on the

three lessons were sampled for analysis because the data captured almost all the interactions during the lessons. The audiovisuals were also comprehensive with high quality sound and clarity of the captured pictures.

Pre-intervention observations were made by the researcher to assess pupils' levels of involvement in identified aspects of pupils' participation during lessons. Less than half of the sample (45 %) was punctual for the lesson (Table 1). Only two pupils (10 %) were involved in teacher-led classroom discussion during the lesson as again shown in Table 1. The pupils' participation in group work was low as only seven (35 %) of the pupils were captured in audiovisual tape recording during the lesson. The level of interaction between the teacher and the pupils was quite low since only five pupils were seen to be responding to the teacher's questions and only two of them asked the teacher for clarification during the lesson. Most importantly only 35 % (7) of the pupils attempted to use science terminologies or science concepts or concepts when responding to the teacher's questions or during class discussion. All the pupils were punctual and they were seated before the lesson. Also, all the pupils participated in classroom discussions and group work. Majority of the pupils (95 %) interacted with the teacher in terms of responding to the latter's questions and in their desire to ask questions to seek clarification to concepts that appeared difficult for them to understand respectively. The level of use of science concept words or science vocabulary among the pupils improved tremendously as 85 % (17) appropriately used these words in class discussions and interactions between the pupils and the teachers.

Table 1: Percentage frequency distribution of pupils' level of involvement in contextual teaching and learning instruction during integrated science lessons

S/N	Level of pupils' involvement	% freq. Pre-IO	Lesson 1 % Freq.	Lesson 3 % Freq.	Lesson 5 % Freq.
1	Pupils' punctuality to classroom lessons	45 (9)	60 (12)*	90 (18)	100 (20)
2	Pupils' participation in class discussions during lessons	10 (2)	20 (4)	50 (10)	100 (20)
3	Pupils' participation in group work during lessons	35 (7)	40 (8)	70 (14)	100 (20)
4	Pupils' interaction in terms of responses to teacher's questions during lessons	25 (5)	30 (6)	60 (12)	95 (19)
5	Pupils' use of terminologies during lessons	35 (7)	45 (9)	60 (12)	85 (17)
6	Pupils' desire to ask questions for clarification during lessons	10(2)	20 (4)	60 (12)	95 (19)

*Frequencies in parentheses Pre-IO = pre-intervention observation

Generally, all these indicators showed that to some extent pupils had progressed considerably in adapting to the contextual teaching and learning approach. Besides these, the researcher equally observed that:

(i) pupils concentrated and contributed to classroom discussions

(ii) pupils listed difficult words/items and looked up their meanings in the dictionary

(iii) pupils were highly prepared and motivated to express themselves in class to indicate their mastery and/or progress in science

(iv) pupils argued constructively and participated satisfactorily on issues of interest during discussion sessions.

These observations did not only indicate that pupils had remarkably gained interest in the activities created by the contextual teaching and learning approach but they improved understanding of Integrated Science concepts taught. It therefore stands to conclude that pupils' ability improved (Glover, 2009).

4.1.2 Research question two

To what extent will the use of contextual teaching and learning enhance pupils' performance in selected Integrated Science concepts?

The intent of this research question was to assess the extent to which the contextual science teaching and learning approach would enhance pupils' performance on selected concepts in Integrated Science. Data on this research question was collected via questionnaire, tests, and interviews. The pupils' responses to the questionnaire items were organised into frequency counts and converted into percentages. The mean scores and standard deviations of the test scores for each week were determined. The interview data was organised into themes and used to triangulate the quantitative data.

The descriptive statistics of the pupils' test scores are presented in Table 2.

Table 2: Descriptive statistics of pupils' weekly test scores

Mean/Weekly test	Week 1	Week 2	week 3	Week 4	Week 5
Mean	2.05	3.73	5.40	6.88	9.37
Std. Deviation	1.176	1.281	1.317	1.202	0.806

Field data (2021)

From Table 2, the mean scores ranged from 2.05 (SD = 1,176) to 9.37 (SD = 0.806). The mean scores increased steadily as the intervention progressed from week one to week five (Table 2). The pupils' scores in the last week clustered around the mean score which suggests that the differences among the pupils were even as the intervention progressed. The results suggest that the use of contextual teaching and learning strategies improved the pupils' performance in the selected concepts in Integrated Science.

The questionnaire data was then used to interrogate the enhanced performance of the pupils on the selected Integrated Science concepts taught during the intervention. This was to assign reasons to the pupils' progressive performance on the concepts. The results of the analysis are presented in Table 3.

Table 3: Percentage frequency distribution of JHS pupils' views about contextual teaching and learning approach on their performance

S/N	Statement	% frequency responses		
		Agree	Not sure	Disagree
1.	Contextual teaching and learning approach encourages me to see science as an easy subject	100(20)	0.0	0.0
2.	My scores in classroom tests encourage me to improve my studies	100(20)	0.0	0.0
3.	I have acquired simpler methods of learning science Concepts	80(16)	20 (4)	0.0
4.	Learning has become interesting as each learning activity is linked to my daily experiences	100(20)	0.0	0.0
5.	I am encouraged to learn when reference is made to my past and present learning situation	90(18)	10 (2)	0.0
6.	Every circumstance is a learning situation for me	100(20)	0.0	0.0
7.	Contextual teaching and learning makes confident in learning integrated science	90(18)	10 (2)	0.0
8.	Conceptual teaching and learning approach helps pupils to share knowledge	95(19)	5 (1)	0.0
9.	Conceptual teaching and learning approach should be encouraged	90(18)	10 (2)	0.0
10.	Conceptual teaching and learning approach should be regarded as a means of improving pupils performance	85(17)	10 (2)	5 (1)
11.	Conceptual teaching and learning approach puts enormous pressure on pupils	25 (5)	35 (7)	40 (8)
12.	Conceptual teaching and learning approach eases pupils' academic work	90(18)	10 (2)	0.0
13.	Conceptual teaching and learning approach prepares pupils well for final examination	90(18)	10 (2)	0.0
14.	Conceptual teaching and learning approach is generally a good exercise for pupils	75(15)	25 (5)	0.0
15.	Conceptual teaching and learning approach broadens the intellect of pupils	90(18)	10 (2)	0.0

Field data (2021)

The results from Table 3 shows all the pupils (100%) agreed that contextual science teaching and learning approach enhanced their learning because each learning activity

was linked to their daily experiences. Also, all the pupils (100%) agreed that through contextual science teaching and learning approach they were encouraged to see science as an easy subject. These results show that pupils were motivated to study Integrated Science. Similarly, all the pupils (100%) agreed that their improved scores in classroom tests encouraged them to improve on their studies.

Again, all the pupils (100%) agreed that contextual science teaching and learning approach helped them to understand that every circumstance is a learning situation. It was however agreed by 90% of the pupils that contextual science teaching and learning approach made them to feel confident in learning Integrated Science.

Also, the sample (100%) agreed that contextual science teaching and learning approach encouraged them to see science as an easy subject. This result shows that pupils were very active when studying via contextual science teaching and learning approach. Apart from item 11 the responses of the pupils to the rest of the items (3, 5, 12, 13, 14 and 15) favoured the use of contextual teaching and learning strategies during Integrated Science instruction.

The interview data confirmed the pupils' views about the usefulness of contextual teaching and learning approach in teaching Integrated Science and its impact on their understanding of concepts in Integrated Science. The responses from the pupils were similar to those of the questionnaire. Their responses are summarised under the following themes:

Contextual teaching and learning improved study habits

From the responses shared, it became apparent that the pupils' study habits were improved because of contextual science teaching and learning approach. This exemplified by the following excerpts: Pupil 3 shared that:

> *Initially, I thought it was just too good for us to be listening to the teacher and taking some few notes almost every week, but after the fourth week I realized serious positive change in my study habits and performance.*

Similarly, pupil 5 contributed in his statement that:

> My study pattern has changed totally after this five-week period programme. The way the teacher taught us improved my understanding in science when he was teaching. This way, I found it very easy to study on my own because I was understanding that each encounter was linked to my previous experiences.

The pupils could relate to contextual teaching and learning because the use of the approach related the science concepts to the pupils' every day experiences. The pupils made it clear that they did receive much benefit from the contextual science teaching and learning approach as this improved study habits.

Contextual teaching and learning improved our level of attentiveness and participation during lessons

The responses shared by respondents made it evident that pupils were attentive and participated in the lessons. This is evidenced in the following excerpts: The lessons are made very interesting so we got very interested. [Pupil 4].

Another pupil had this to say:

"Contextual teaching and learning **approach** got me involved in the lessons. Class participation was improved we had to contribute class discussions and asked questions to understand the concepts well. The participation came about because we understood the concepts when we were involved much in the lesson"

[Pupil 5]

Development of strong interest in science

Participants shared their experiences with the **use of** contextual teaching and learning approach during the intervention. They mentioned that contextual science teaching and learning approach improved their interest in learning concepts in science as well improved their performance during class exercises. Pupil 1 had this to share:

I had developed great interest in science because of the new approach I was practically involved in the lessons and that made me come to understand that science is not as difficult as I had been told by friends. I see that the more you are involved in the lesson by a teacher, the faster you store the information in your mind and understand concept after concept. Because I was not learning science very often, my interest was then very low.

Similar response from another pupil was that:

"Before this time, I found it difficult to understand and perform well in science so I naturally did not like the subject. But after these weeks of lessons in science, my interest in the subject has improved as well as my performance in the test we are given. I am very much pleased with my performance after writing and receiving my scores". [Pupil 6]

It has become clear from the responses that contextual teaching and learning approach had positive impact on pupils' interest in studying science as they came to like the subject. The pupils found the approach useful in their study of integrated science. The motivation of the pupils to actively participate in the teaching and learning of integrated science stemmed from the fact that the approach linked the science concepts to their everyday and previous science classroom experiences.

4.1.3 Research question three

What are the views of pupils about the use of contextual teaching and learning approach in teaching selected Integrated Science concepts?

The research question sought the views participants about the use contextual teaching and learning approach in Integrated Science lessons. Data for this research question was gathered through a questionnaire and interviews. The data from the questionnaire was organised into frequency counts and converted into percentages while the data from the interviews thematically organised. The latter was used to corroborate questionnaire data. The results of the questionnaire data analysis are presented in Table 4.

Table 4: Pupils' views on contextual teaching and learning approach in integrated science

Statement	Reponses		
	Agree	Not sure	Disagree
Contextual teaching and learning approach helps pupils to share knowledge.	85 (17)	5 (1)	10 (2)
Contextual teaching and learning approach should be encouraged	75 (15)	15 (3)	5 (2)
Contextual teaching and learning approach should be regarded as a means of improving pupils performance	90 (18)	10 (2)	0.0
Contextual teaching and learning approach puts enormous pressure on pupils.	70 (14)	20 (4)	10 (2)
Contextual teaching and learning approach make pupils serious with their academic work.	90 (18)	0 (0)	10 (2)

Majority of the pupils (90%, 18) agreed that the contextual teaching and learning approach made them to be serious with their academic work Table 4). Similarly, 85% (17) of the pupils acknowledged that contextual teaching and learning approach helped them to share their knowledge as shown in Table 4. This perhaps encouraged 90 % (18) to agree that contextual teaching and learning approach should be regarded as a means of improving pupils' performance. These results imply that the contextual teaching and learning approach is effective in ensuring that pupils are involved in lessons which may impact positively on their class performance (Table 4).

It was agreed by 75 % (15) of the sample that the use of contextual teaching and learning approach during instruction should be encouraged. The process skills involved in the approach are important to help pupils to understand integrated science concepts and to answer complex questions. Therefore, the contexts used to facilitate teaching

within the approach are important to help pupils to attempt to put in their best to ensure their understanding of difficult concepts. It can be deduced from the results that the contextual teaching and learning approach offers an effective approach for teachers to help pupils to learn effectively and this is expected to improve their performance. However, about more two thirds of the sample (70%, 14) indicated that contextual teaching and learning approach puts enormous pressure on pupils. This may be borne out from their experiences with teacher-centred teaching approaches where they are passive recipients of science knowledge rather than as active participants in a contextual teaching and learning situation with the teacher as a facilitator scaffolding pupils' learning. Therefore, the pressure will be more on the learner. Also, pupils may feel pressurized to demonstrate their knowledge gained in exercises and examinations since a lot would have been put into contextual teaching and learning.

The pupils' showed that their understanding and interest was developed with the introduction of the Contextual teaching and learning approach. This is evidenced in the following excerpts from the interview data:

> "I have come to enjoy lessons very much after we were introduced to this style of learning. I see this style allows the pupil an opportunity to develop a way of easily learning with little assistance from the teacher. I am of the view that this way of learning will go a long way to help us in our studies. There is a strong reason to believe that good results are expected at the final examination" [Pupil 4].

Another response from a pupil showed how their interest and performance had improved through their engagement in contextual teaching and learning approach:

> "My interest in learning science has been rekindled by this approach we have been introduced to. I earlier saw this topic as a very difficult

one but after these weeks of learning with this approach I am always putting in my best to ensure that I perform well in my group as well as class perform. I endorse the guided discovery approach as an effective approach to teaching and learning" [Pupil 6].

The responses provided by participants showed that the Contextual teaching and learning approach of teaching integrated science concepts had been very effective in improving pupils understanding and performance. The result is indicative that all things being equal if pupils are exposed to this method of learning in science, there is a high possibility of improvement of their understanding of integrated science concepts.

4.2 Discussion of Findings

The findings for each research question were discussed under themes developed from the research questions.

4.2.1 Levels of pupils' involvement in contextual teaching and learning approach during teaching and learning of selected Integrated Science concepts

Five weeks on the use of contextual teaching and learning and approach among pupils, had been helpful in increasing pupils' concentration span and has developed in pupils a life-long love for learning science. Similarly, pupils have acquired immeasurable positive experience through their exposure to wide range of skills and tests which has improved pupils' desire to learn and perform better in science.

The whole programme began on a low seriousness during the first week but after the first week the participation rate increased and the gradually, the programme took its rightful intent. The pupils with low level of seriousness in learning science concepts gradually improved because they were engaged in problem-based learning.

These observations do not only indicate that pupils have remarkably gained skills in using the contextual approach in the activities they were involved in. The pupils exhibited positive interest in learning how to use the approach in their learning. The pupils have improved and it therefore stands to conclude that pupils' interest and ability is improved if they are involved and lessons are made very practical enough (Lay & Charles, 2010). Thus, the amount of time spent in getting involved in lessons is related to pupils' understanding. To further ground empirically the observation that pupils' involvement in lessons improves ones performance in the long run.

The results from the study showed that after the intervention was put in place pupils seriousness has immensely improved. It can be deduced from the results that pupils participated in lessons while comparing this with the pre-intervention score shows an increase in score. As regards pupil's participation in group study majority of the pupils were observed to have developed positive attitude.

It can be inferred from the results gathered that the interventions put in place has been very beneficial in helping pupils improve their understanding of science concepts. Building pupils concept in science through the use of contextual approach is effective in helping pupils understand concept of science better.

The research has brought to the fore the issue of pupils' adaptation to the contextual teaching and learning approach. It has established that pupils had problems learning science concepts which are attributed to so many causes among which are inadequate learning activities and materials, lack of challenging methods of teaching to propel pupils learn beyond the classroom. These problems render pupils unable to easily progress in understanding science concepts.

This can however be curbed through the use of the successful application of the contextual teaching and learning approach. Pupils have equally acquired measurable knowledge about unfamiliar words while learning new concepts (Glovers, 2009). For instance, most pupils did well in introducing more scientific words in their exercises.

Changes in pupils' attitude towards reading have also been observed in the survey of pupils' attitude. Attitude shifts occurred in both attitude towards learning which implies that pupils had developed more positive attitudes towards learning in school with the CTL approach (Berns & Erickson, 2001).

In addition to gains in achievement and shift in attitude, the approach broadened pupils' background of information, thus providing them with a better knowledge base with which to relate to the content of other subject areas and teachers. Most particularly, it enabled pupils to draw and sing as well about characters and some revealing images in texts read. To this point, Flora (2003) stresses that the kind of wide reading that pupils engage in during the CTL approach will condition pupils to learn that pupils will eventually learn that learning is interesting adventuring, exploring, or finding out how to do things. It is evident from the findings that these are some key elements that contribute towards the effectiveness or otherwise of the CTL instructional approach.

4.2.2 The use of contextual teaching and learning approach and pupils' performance in selected Integrated Science concepts

This result conforms to Adler and Fagley (2005) who discovered from his study that teachers who used the contextual method of teaching appeared to be well accepted, supported and encouraged by their pupils and stood a better chance of improving the performance of their pupils. He observed that pupils' scores improved as pupils were

introduced to the contextual teaching and learning approach. Again, where there is a strong academic environment in the school, pupils tend to study harder and better.

This study therefore, contributes to the existing evidence from Bangert-Drowns, Chen-Lin and Morgan (1991) who suggested when pupils are guided to develop their learning of concepts it has a great role in pupils performance as well as in their academic pursuits. They hold that if the teacher has the knowledge, patience, resources, and supports their pupils and creates academic environment, the pupils reared-up in such schools do better in their academic performance. This implies that motivating pupils on the part of teachers has impact on pupils learning which may in turn affect their performance.

The study therefore revealed that the performances of the pupils improved from the previous weeks to the beginning of week one when the intervention started to week 6 as shown by the mean of each week. The implication thereof is that, the intervention carried out was effective.

In the effort to improve pupils cognition and affective outcomes in learning science and/or school learning, educational psychologists and science educators, have continued to search for variables (personal and environmental) that could be manipulated in favour of academic gains. Of all the personal and psychological variables that have attracted researchers in this area of educational achievement, pupils personal efforts seems to be gaining more popularity and leading other variables (Laily, 2006).

Concerning the impact of guided discovery method on understanding and performance of pupils tremendous change was observed by White (1997). The number of tasks done

by the pupils in the previous semester and present semester was compared in relation to their performances in the pre-intervention exercise and the weekly tests. Discoveries from pupils' workbooks revealed that pupils were tested thrice and they improved in their scores in science at the end of fourth week of present semester. It was realized that they did develop much interest in learning as well as their performance improved.

The contextual teaching and learning approach have affected pupils' performance in the class room. Before the implementation of the intervention, pupils could not understand and describe some concepts science. However, after the intervention improvement in pupils performance was observed. Analyses of the pre-intervention exercises revealed low performance of pupils in science (Table 1).

Most of the responses that were provided by pupils after the intervention tests and exercise reflect that they have good understanding of the concept learnt. When the intervention was presented, pupils were taught and tested weekly for six uninterrupted weeks. Pupils performance in science improved considerably (see week 6, Table 5).

The weekly tests improved pupils understanding and performance in learning geometrical concepts and skills needed to solve circle theorem problems. The pupils knew that they would be having class test at the end of the week so they tried answering more questions asked in class to ascertain their level of understanding of concepts and also to remove any doubts in their understanding of concepts learnt before the class test. Pupils maintained this attitude throughout the period of the study.

The contextual teaching and learning approach according to Acquah (2009) is effective in helping learners build mental models. In addition, it provides learners with real-world problem-solving opportunities, thus, participatory learning environment. Guided

discovery was employed in the lesson when the teacher paired learners up to task and come out with solutions to a problems as demonstrated their tests.

The finding is in line with alternative studies proposed by Wolf and Smith (1995). In Marfo's study it was found out that pupil performed better when they took a multiple-choice test that would be scored compared to a parallel test that would be scored. Wolf and Smith (1995) got the same result using similar conditions as Marfo's. The pupils were introduced to the guided discovery approach to learn the concepts and they understood that their classroom work was interesting and important. They were more cognitively engaged in trying to learn and understand the concepts. An indication of significant progress in pupils understanding of concepts showed how the intervention of contextual teaching and learning approach motivated pupils to put in much effort in their learning. The contextual teaching and learning approach engages pupils in fruitful learning activity.

Johnson (1996) argues that the will to learn is at the very heart of the learning process and that this is very closely aligned with the contextual teaching and learning approach. She further argues that the will to learn is derived from a person's sense of deep meaning, or sense of purpose, and can be described as the energy to act on what is meaningful. Further, Johnson continued that the will to learn is related to the degree to which the learner is prepared to invest effort in the learning process, and is that which engages their motivation to process, perform and develop as learners over time. Research into testing programs, however, has been used to show that increase in test scores over time is likely to be due to greater familiarity of teachers and pupils with the contextual teaching and learning approach rather than increasing learning (Laily, 2006).

4.2.3 Pupils' views about the use of contextual teaching and learning on their understanding of Integrated Science concepts

The results show that the intervention has not been wasteful. This indicates that pupils' understanding in science is effective in improving understanding. This paves way for pupils to improve their performance, knowledge skills and general competence in the subject area to a large extent. This is also indicative that shows that in teaching concepts provides pupils with the opportunity to work extra hard to enhance their academic performance as is expected of them by the teacher, school and the nation at large. This enables pupils to acquire a lot of ideas, knowledge and skills to answer questions which will be required of them at their final exams. This reveals that Contextual teaching and learning approach enables one to understand concepts better.

Again, the findings suggest that the study of Contextual teaching and learning approach broadens the intellect of pupils in understanding concepts. This concurs with Diknas (2002) position that illustrations play a major part in allowing pupils to develop knowledge, understanding and skills which help them to make sense of science concepts. By broadening pupils mind and exposing them to new information, Suyanto (2002), noted that pupils' perspectives and learning skills will change and develop as part of the process of improving performance. As Diknas (2002), noted, illustrations cultivate valuable intellectual attitudes to pupils by enabling them to understand concepts better.

Flora (2003), presses the view that the inability of stakeholders in education to evaluate the standard of classroom lesson testing has contributed to the falling standard of education in Nigeria. The implication here is that if pupils' test is, as a rule, made a part of evaluative process, instructional improvement in schools could result.

Fontana (2011) state that there are really many questions about the reliability, validity and utility of pupil regular class test by their teachers, especially when they are for personnel decision and other summative purposes. Whether the situation in colleges of education is the same as other parts of the world is also part of the concern of this study.

Isiaka (1998), shows that tutors in selected Colleges of Education in Ghana and Kenya accepted the idea of pupil's illustrations is for classroom effectiveness. Anderson and Smith (2003), also found out that teachers in most American Colleges are disposed to pupil evaluation. The lecturers' acceptance cuts across gender (males and females).

Isiaka's work emphasises the use of illustrations in lessons for formative purposes only. In his study, teachers' opinions were no dependent on gender, but on seniority (teaching experience), as more experienced lecturers were found to show more preference for pupil rating of teaching effectiveness than their junior counterparts.

Jackson (1994), revealed that teachers in their perception of pupils practical lessons through illustrations did not differ on the basis of gender, location of school, academic attainment, teaching experience, and teaching subjects, under both formative and summative purposes in selected American universities. Thus, schools and teachers in developed nations of the world like the United States, Canada and Great Britain have recognized the role of illustrative lessons have harnessed the immense importance and contributions of this exercise for the good of the school.

With the perception of pupils in the use of illustrations in learning science concepts, some pupil had a positive feeling towards the approach whilst some also had negative feeling. It was also confirmed from pupils' perception about the approach of teaching; their perceptions of learning through test indicated that the treatment improved their

abilities and confidents to interpret and comprehend understanding science concepts, cater for different learning styles and motivated them to learn the concept. Considering the results from Table 2, it means that pupils have positive attitudes towards the use of teaching approaches they were introduced to. It was also noticed that it does not necessarily meant that integrating different modes of instructions should follow a particular order. Contrary, the results indicated that pupils do not like to be instructed by verbal mode of instruction, so using practice tests on a regular basis can see a dramatic improvement.

Analyses of data on pupils performance in the classroom as shown in Table 2 indicate a significant improvement in pupils learning and understanding of concepts as seen in their performance. Hence pupils' benefiting from illustrative lessons partially relates to the belief that one can successfully perform tasks to achieve desired outcomes (Chemers, Hu & Garcia, 2001). The task is learning course material; the desired outcome is better grades. Pupils were helped to illustrate circle figures which enabled them to understand science concepts.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

5.0 Overview

This chapter of the study is devoted to presentation of the summary of the study. Additionally, the summary of findings, conclusions drawn from the study, and recommendations made from the findings are taken care of. Lastly, areas suggested to be considered for further research are catered for in this chapter.

5.1 Summary of the Study

The study examined the impact of the contextual teaching and learning approach on the performance of Junior High School pupils of University Practice Junior High School, South Campus, Winneba in Integrated Science. The study sought to:

1. Determine the levels of pupils' involvement in contextual and learning approach during teaching and learning of selected concepts in Integrated Science.
2. Examine the extent contextual teaching and learning will enhance the pupils' performance in selected Integrated Science concepts.
3. Ascertain the views of pupils about the use of contextual teaching and learning approach in teaching selected Integrated Science concepts.

The following research questions derived from the objectives guided the study.

1. What are the levels of pupils' involvement in contextual and learning approach during teaching and learning of selected Integrated Science concepts?
2. To what extent will the use of contextual teaching and learning enhance pupils' performance in selected Integrated Science concepts?

3. What are the views of pupils about the use of contextual teaching and learning approach in teaching selected Integrated Science concepts?

The researcher employed action research design for the study. The sampled used for the study was an intact class of 20 Junior High School form two pupils from University Practice Junior High School, South Campus, Winneba. Pupils were engaged in five weeks teaching and class test intervention activities. Pre-test and post-test including other instruments observation, questionnaire and interview were used to gather data which used to answer the research questions.

Both quantitative and qualitative data analysis were used to analyse the data. The data collected from the questionnaire, test and observation schedule were analyzed quantitatively using descriptive statistical tools to organise the data into frequency counts and converted into percentages. The data from these instruments were complemented with data from interviews which was analyzed qualitatively based on themes derived from the data.

5.2 Main Findings

1. The levels of pupils' involvement in contextual and learning approach during teaching and learning of selected concepts in integrated science were expressed in the levels of pupils' contributions during classroom discussions, and their level of motivation in Integrated Science lessons.
2. The use of contextual teaching and learning approach improved the pupils' understanding of the science concepts taught which improved their performance on the concepts. This was as a result of their improved their level of participation in science lessons and their improved study habits through contextual teaching and learning approach used in the Integrated Science lessons.

3. The pupils had positive views about the use of contextual teaching and learning approach in teaching Integrated Science concepts. The findings indicated that the pupils' understanding and interest was developed through their engagement in contextual teaching and learning approach.

5.3 Conclusions

1. This study confirmed that contextual teaching and learning approach positively improved pupils' levels of engagement in Integrated Science lessons.
2. Based on the findings of the it could be concluded that contextual teaching and learning approach in many ways improved pupils' study habits and their pupil's performance.
3. The positive views the pupils expressed about the use of contextual teaching and learning had brought home the importance of using contextual teaching and learning approach to improve pupils understanding of science concepts.

5.4 Recommendations

Based on the findings and the conclusion drawn, they following recommendations were made:

1. The Integrated Science teachers should be encouraged to employ contextual teaching and learning approach in their lesson delivery to sustain pupils' interest and motivation tin Integrated Science.
2. The use of contextual and learning approach in science lessons brings the context of the learners into the lesson. This is likely to improve pupils' participation in science lessons and hence improve their performance. It is recommended that CTL should be used to improve pupils' performance in Integrated Science.

5.5 Suggestions for Further Research

This research was conducted in one class in the school. It is suggested that the study should be replicated in other classes in the school to provide comprehensive information on the benefits of contextual teaching and learning approach to learners.

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APPENDICES

APPENDIX A

Views of pupils on influence of contextual teaching and learning approach on understanding science concepts

S/N	Statement	Agree	Not sure	Disagree
1	Contextual teaching and learning approach encourages me to see science as an easy subject			
2	My scores in classroom tests encourage me to improve my studies			
3	I have acquired simpler methods of learning science concepts			
4	Learning has become interesting as each learning activity is linked to my daily experiences			
5	I am encouraged to learn when reference is made to my past and present learning situation			
6	Every circumstance is a learning situation for me			
7	I am made to feel there is something in me that makes me a good pupil			
8	Conceptual teaching and learning approach helps pupils to share knowledge			
9	Conceptual teaching and learning approach should be encouraged			
10	Conceptual teaching and learning approach should be regarded as a means of improving pupils performance			
11	Conceptual teaching and learning approach puts enormous pressure on pupils			
12	Conceptual teaching and learning approach makes pupils with their academic work			
13	Conceptual teaching and learning approach prepares pupils well for final examination			
14	Conceptual teaching and learning approach is generally a good exercise for pupils			
15	Conceptual teaching and learning approach broadens the intellect of pupils			

Statement	Agree	Not sure	Disagree
Contextual teaching and learning approach helps pupils to share knowledge.			
Contextual teaching and learning approach should be encouraged			
Contextual teaching and learning approach should be regarded as a means of improving pupils performance			
Contextual teaching and learning approach puts enormous pressure on pupils.			
Contextual teaching and learning approach make pupils serious with their academic work.			

APPENDIX B

INTERVIEW GUIDE

How do you find the study of science concepts as compared to other subjects?

What are your views on your teachers' introduction of innovative methods of teaching science concepts?

In which ways has your science teachers applied or used contextual teaching and learning approach in teaching science concepts?

What are your concerns on the contextual teaching and learning approach? Prompt: (help pupils to understand contextual teaching and learning approach as they have been practicing in
integrated science class)

How has contextual teaching and learning approach improve your study of science?

To what extent has the use of contextual teaching and learning approach helped to improve on attentiveness, that is, your participation and concentration?

To what extent has contextual teaching and learning approach help to improve your performance in science tests?

APPENDIX C

OBSERVATION GUIDE

1. Pupils' punctuality to integrated science lessons
2. Pupils' participation during integrated science lessons
3. Pupils' responses to questions during integrated science lessons
4. Pupils' participation in group work during integrated science lessons
5. Pupils' attitude towards teacher during integrated science lessons
6. Pupils' use of science terminologies or science vocabulary during integrated science lessons
7. Pupils' desire to ask questions during integrated science lessons

APPENDIX D

INTRODUCTORY LETTER

UNIVERSITY OF EDUCATION, WINNEBA
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Our ref. No.: ISED/PG.1/Vol.1/32
Your ref. No.:

25th April, 2023

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

LETTER OF INTRODUCTION MISS. MILFDRED BOAFO

We write to introduce, **Miss Mildred Boafo** an MPhil. Student of the Department of Integrated Science Education, University of Education, Winneba, who is conducting a research titled: ***"Impact of contextual Science Teaching and Learning Approach on Junior High School Pupils Performance in Integrated Science".***

We would be very grateful if you could give the assistance required.

Thank you.

Yours faithfully,

DR. CHARLES K. KOOMSON
HEAD OF DEPARTMENT

www.uew.edu.gh

APPENDIX E

APPENDIX E

12/20

PRE-INTERVENTION TEST

1. The following are all causes of teenage pregnancy except

A. Peer pressure B. Broken homes C. Rape D. Abstinence

2. Casual and loose sex life can result in the spread of

A. Cholera B. Tuberculosis C. Gonorrhea D. Measles

3. The complete development of a human baby in the womb normally takes

A. 8 months B. 10 months C. 7 months D. 9 months

4. Which of the following substances is a compound?

A. Argon B. Iron C. Water D. sulphur

5. The number of hydrogen atoms present in a molecule of water is

A. 4 B. 6 C.2 D. 1

6. The product formed when nitrogen reacts with hydrogen is

A. Ammonia B. Water C. Sodium Chloride D. Oxygen

7. Which of the following is a semi-conductor?

A. Gold B. Silicon C. Mercury D. Potassium

8. Nucleons consists of

A. Electrons. Protons and Neutrons B. Neutrons and Electrons

C. Electrons and Protons D. Protons and Neutrons

9. Which of the following diseases is inheritable?

A. Malaria B. Tetanus C. sickle Cell D. Polio

10. The materials that contains the traits that are passed on from parents to offspring is

A. Cytoplasm B. Mitochondria C. Genes D. Vacuole

11. Which of the following characteristics is not inheritable?

A. Armed Robbery B. Height C. Blood Group D. Shape

12. Microorganisms that cause diseases are collectively known as

A. Pathogens B. Infections C. Bacteria D. Cholera

13. All the following diseases are water-borne except

A. Cholera B. Typhoid C. Bilharzia D. Aids

14. Pathogenic diseases are caused by

A. Diseases Causing Organisms B. Pest C. Adverse Climatic Conditions D. Nutrition Disorders

15. An atom of clement Y has 11 protons and 12 neutrons. What is the number of electron in it?

A. 12 B. 11 C. 23 D. 1

16. Which of the following elements does not exist as an isotope?

A. Carbon B. Oxygen C. Magnesium D. Argon

17. Which of the following substances is a common household chemical?

A. Chloroform B. hydrochloric Acid C. Iodine Tincture D. Water

18. Which of the following characteristics is not acquired?

A. Wickedness B. Tongue Rolling C. Shape of Ear D. Height

19. All the following diseases affects the skin except

A. Ringworm B. Yaws C. Malaria D. Scabies

20. All the following diseases can be vaccinated except

A. tetanus B. Measles C. Poliomyelitis D. Aids

APPENDIX F

APPENDIX F

14/20

INTERVENTION TEST

1. Science can be defined as a method of obtaining knowledge through

A. Guesses B. prayers C. libation and ablution

D. observation and experimentation

2. Gases are more compressible than solids because

A Solids have harder surfaces

B. Gases have wider spaces between their molecules

C. The particles of solids are regularly arranged

D. The molecules of gases are randomly arranged.

3. The following are characteristics of all living organisms except

A. Reproduction

B. photosynthesis

C. respiration

D. Movement

4. Which of the following instruments is used for measuring atmospheric pressure?

A. Opisometer B. Aneroid Barometer C. Anemometer D. Photometer

5. These are all organic fertilizers except

A. Urea B. compost C. poultry droppings D. cow dung

6. Which of the following is not an Applied Science?

A. Biology B. Medicine C. Engineering D. Agriculture

7. A bottle of water removed from a refrigerator soon becomes covered with droplets of water because

A. Bottle is porous

B. Bottle is full of water

C. water in the surrounding atmosphere is colder than the water in the bottle

D. water in the surrounding atmosphere is warmer than the water in the bottle

8. The removal of metabolic waste substances form the body is known as

A. Egestion B. excretion C. reproduction D. growth

9. A micrometer screw gauge is used for

A. Measuring the depth of a liquid
B. Tighten a screw
C. measuring the diameter of a wire
D. measuring the length of a rod

10. Which of the following is not a characteristic of a sandy soil?

A. The particles are large
B. the particles are very small
C. There are a lot of air spaces in sandy soil
D. it has a low water retaining capacity

11. The physical property that refers to how rough or smooth soil, is known as

A. Capacity
B. air content
C. water holding ability
D. texture

12. Luminous intensity can be measured in

A. Mol
B. ohm
C. candela
D. joule

13. All the following are common features of animal cells except

A. Nucleus
B. cytoplasm
C. cell wall
D. cell membrane

14. Which of the following properties is/ are common to both liquids and gases

i. They have fixed shapes
ii. They have definite volumes but no definite shape
iii. Their molecules are compact

A. I only
B. I and II
C. II only
D. I, II and III

15. The method used by scientists to solve problems is known as

A. Scientific hypothesis
B. Scientific method
C. Natural investigation
D. Technological research

16. Which of the following fields of science?

A. Physics
B. Chemistry
C. Botany
D. History

17. When a piece of candle is heated it changes from

A. Liquid to gas
B. liquid to flame
C. solid to liquid
D. solid to gas

18. Which of the following is a unit of the power?

A. Js-1
B. Nm
C. Ns
D. Js-2

19. Which of the following is an organic component of soil?

A. Air
B. soil particles
C. humus
D. mineral salts

20. The use of computer to process information is known as

A. Information technology
B. food technology
C. Biotechnology
D. Pathology

APPENDIX G

APPENDIX G

POST INTERVENTION TEST

1. The process by which naphthalene ball changes directly into the gaseous state is known as

A. Evaporation B. sublimation C. condensation D. boiling

2. The word meniscus refers to the

A. Volume of liquid Post B. mass of a liquid C. density of a liquid

D. curved surface of a liquid

3. The particle of soil which gives a gritty feeling when rubbed between the fingers is

A. Clay B. sand C. slit D. loam

4. Which of the following is not found in the soil?

A. Air B. ammonia C. mineral D. water

5. Humus is composed of

A. Clay and plant material B. Animal and plant materials

C. water and minerals D. sand and plant materials

6. Which of the following is equal to 1kg?

A. 1000mg B. 1000g C. 100g D. 100mg

7. In the relation W=mg, g stands for

A. Force of gravity B. Acceleration due to gravity

C. gravitational attraction D. gravitational field

8. Water change into vapour at

A. 0°C B. 100°C C. 37°C D. 10°C

9. When water vapour is cooled it changes into

A. Ice B. water C. Steam D. cubes

10. Which of the following statements best describes the misuse of the knowledge of science?

A. Making of atomic and nuclear bombs B. Invention of mobile phones

C. construction of roads and highways

D. construction of farm machinery like tractors and bulldozers

11. The knowledge acquired through the study of science is called

A. Scientific method B. scientific knowledge C. hypothesis D. experimentation

12. The process of separating soil into its various soil particles and humus is called

A. Sedimentation B. capillarity C. drainage D. leaching

13. Calculate the weight of an object whose mass is 4000g given the acceleration due to gravity as 10m/s?

A. 40000N B. 40N C. 4.0ND D. 400N

14. A molecule of water consists of

A. Two atoms of oxygen and one atom of hydrogen

B. Two atoms of hydrogen and one atom of oxygen

C. Three atoms of oxygen

D. Three atoms of hydrogen

15. Which of the following statements about science is not correct?

A. Science has helped in the exploitation of natural resources

B. Science has made communication easier and faster

C. Science has provided all the solutions to the world's problems

D. Science has brought about improved health and education

16. In flowering plants, calyx refers to

A. The sex cells B. the petals C. the sepals D. the base of the flower

17. The removals and scattering of fruits and seeds from their parent plants to other places is known as

A. Transpiration of fruits and seeds B. Dispersal of fruits and seeds

C. Propagation of fruits and seeds D. Germination of seeds and fruits

18. Which part of the seed develops into a true root?

A. The hilum B. the plumule C. the edosperm D. the radical

19. Sandy soils can be improved for growing crops by the addition of

A. Lime B. organic manure C. sulphur D. muriate of potash

20. The female part of a flower is called the

A. Filament B. petal C. pollen grain D. style

APPENDIX H

APPENDIX H

ANSWERS TO PRE INTERVENTION MULTIPLE CHOICE QUESTIONS

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

ANSWERS TO INTERVENTION MULTIPLE CHOICE QUESTIONS

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

ANSWERS TO POST INTERVENTION MULTIPLE CHOICE QUESTIONS

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