UNIVERSITY OF EDUCATION, WINNEBA

ENVIRONMENTAL FACTORS THAT MILITATE AGAINST ACADEMIC ACHIEVEMENT OF JHS PUPILS IN INTEGRATED SCIENCE IN AGONA EAST DISTRICT OF GHANA

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NOVEMBER, 2021

DECLARATION

Candidate's Declaration

I, Diana Nsiah declare that this thesis with the exception of quotations and references contained in published works which have 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, Dr. Yeboah Kwaku Opoku hereby declare that, the preparation and presentation of this M. Phil Thesis was supervised in accordance with the guidelines on supervision of thesis laid down by the School of Graduate Studies, UEW.

Signature ……

Date ……

DEDICATION

This work is dedicated to the Almighty God with whom nothing is impossible for His grace and mercy. It is also dedicated to my dearest husband; Hakeem Balogun and my daughters Mary and Adelaide for their support and encouragement.

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LIST OF ACRONYMS AND ABBREVIATIONS

B. Ed	–	Bachelor in Education
BECE	–	Basic Education Certificate Examination
BSc	–	Bachelor of Science
CERT „A"	–	Certificate „A"
CRDD	–	Curriculum Research and Development Division
Dip.BE	–	Diploma in Basic Education
Dip.Ed.	–	Diploma in Education
GES	–	Ghana Education Service
HND	–	Higher National Diploma
IJHSSE	–	International Journal of Humanities, Social Sciences and Education
JHS	–	Junior High School
MOE	–	Ministry of Education
MOES	–	Ministry of Education and Sports
PTA	–	Parent Teacher Association
SHS	–	Senior High School
SSCE	–	Senior Secondary Certificate Examination
TIMSS	–	Trends in International Mathematics and Science Study
TLMs	–	Teaching and Learning Materials
UEW	–	University of Education, Winneba
WAEC	–	West African Examinations Council
WASSCE	–	West African Senior School Certificate Examination

ABSTRACT

The study sought to find out the environmental factors that militate against academic achievement in Integrated Science by pupils in JHS in Agona East District. Descriptive survey research design was used for the study. Stratified random sampling was used to obtain the study sample of 315 (15 teachers and 300 pupils). The two main instruments employed for data gathering were questionnaires and an interview protocol. The interview was audiotaped and transcribed verbatim. The main findings were: (1) Majority of the pupils, (61 percent) held the perception that Integrated Science was difficult compared to the other subjects because they thought it was difficult to score high in Integrated Science. (2) The research findings also revealed that about 57% of the pupil respondents said their school environment did not support effective teaching and learning. (3) Many parents (46%) had no or low formal education couple with large family size (4) Both teachers and pupils indicated that the lecture method was the most frequently used teaching method at the expense of practical method for lesson delivery by most of the teachers since there was inadequate supply of teaching learning materials by headteachers and due to large content area of the syllabus. (5) Most of the pupils (79%) did not understand most of the lessons taught by their science teachers as a result were not able to reproduce most of the things they learnt during examinations and pupils (65%) were unable to read and understand the Integrated Science textbooks on their own. It was recommended that, since attitudes can be modified by experience, effective teaching strategies such as the use of modern methods of teaching including use of computers should be used. This can encourage pupils to be more positive in their attitude and perceptual orientation towards Integrated Science. Also, headteachers and government should supply all the necessary materials and resources (infrastructure) needed for efficient implementation of the syllabus on regular basis. The study has established that school environment and home environment of the pupil exert some potent and positive influence on pupils‟ achievement in Integrated Science. Based on the findings of the study, it can be concluded that (1) the fact that both teachers and pupils held the perception that Integrated Science was a difficult subject could reflect in the teaching of the subject by the teacher and in the learning by the pupils which might result in poor performance of the pupils. (2) Most of the parents of the pupils had low or no formal education coupled with large family size which could result in little or no supervision of pupils learning at home might have militated against pupil‟s academic achievement. (3) The excessive use of lecture method of teaching and overcrowding of classrooms with pupils could lead to poor attitude of pupils towards Integrated Science and consequently militate against academic performance of the pupils. (4) The inability of pupils to understand Integrated Science lessons and poor study habits could be a militating factor against pupils‟ academic performance. (5) Financial irresponsibility of some parents towards their wards education might have militated against the academic performance of the pupils.

CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter discusses the background to the study, statement of the research problem, purpose of the study, research questions, significance of the study, delimitation, limitations to the study and organization of the study.

1.2 Background to the study

The importance of education is growing all over the world. The relationship between education and development, as well as the role of education in social inclusion and civil participation is increasingly evident (MOES, 2004). Education is being appreciated as never before, both as a human right and as a factor for development and collective achievement of higher levels of civilization. Within such framework, science education is of primary importance due to our increasingly interdependent global economy, as well as to the globalized labour market and the technological developments that characterize our era and the near future. Before any country can develop, there is the need to develop the human resources through purposeful and relevant education to enable utilization of all other resources fully.

Science refers to a body of knowledge itself, of the type that can be rationally explained and reliably applied. Science involves first-hand experience, inquiry, problem solving, interpretation and communication of findings (Burnie, 2008).

The role of science in the socio-economic development of societies and nations in the world today cannot be over emphasized because the world is rapidly moving towards the use of sophisticated technological tools. As science and technology is advancing, it creates a greater demand for people to study science. Our lives are directly or

indirectly connected to science and technological innovations. The use of mechanical tools, chemical substances, communication and medical services are all related to high level of technological innovations. The future of our society will be determined by citizens who are able to understand and help shape the complex influences of science and technology on our world (Ungar, 2010).

Equipping the Ghanaian child with scientific knowledge and skills has been the ardent desire of many well-meaning Ghanaians since independence. This was echoed by Dr. Kwame Nkrumah, the first president of Ghana, in his last address to the old legislative assembly on 5th March, 1957 that among other things, Ghana"s whole educational system should be geared towards the production of a scientifically and technically minded people (Mc William & Kwamina-Poh, 1975). Since then the direction of science education has been set to play meaningful and effective roles in socio-economic and technological development of the country. In order to achieve this objective in the ever changing needs of the society, the national educational curriculum has gone through series of transformations.

The Ministry of Education in September, 1987 introduced a new educational reform programme which tried to re-align the educational system and to make students function usefully in the nation"s development program. As a result of the reform program, the Ministry of Education (MOE) and the Ghana education Service (GES) instituted programmes that would revamp the educational system to make it more productive. This attempt involved the introduction of innovative science programmes at all levels of the educational ladder.

The new Integrated Science syllabus at Junior High School (JHS) attaches importance to the use of the activity method in schools rather than passive reading in science for

the mere acquisition of knowledge (CRDD, 2012). Reddy, (2003) asserted that, although teachers can facilitate learning, research evidence shows that students must construct the understanding themselves. Scientific ideas are not parcels that can be sent to a student in ready-to-use form but are complex constructions that teachers code into words or symbols and students then have to decode process and accommodate into useful understanding. The efforts made by a student into decoding the information and making sense of it cannot be substituted even by the most excellent presentation given by the teacher. Students must therefore be given the opportunity to collaboratively work on science problems, to discuss their solutions with peers, to argue their point of view and to ask questions and to challenge the views presented by others. Eminah (2009) indicated that a science lesson could be taught successfully without necessarily of using pieces of apparatus and thorough preparation on the part of the science teacher. The key to teaching science successfully is the instructor‟s ability to make the subject exciting to his /her students.

Modern science curricula in various countries do not solely focus on developing the understanding of science concepts in their students rather it embodies a wide variety of goals. For instance, the recent reforms in science, particularly in developed countries, have placed an added emphasis on the development of students‟ understanding about the nature of science (American Association for the Advancement of Science, 1990).

According to Marchaim (2001), educators have been trying to provide a better education to the youth for a better future. A better education lies in motivating students and involving them in the process of learning. Developing individual creativity at the heart of continuous innovation, and encouraging students to use this

skill in shaping their lives should be defined as the foremost goals of today"s education. Science educators have made studies for meaningful understanding of science disciplines and it has been exposed that science education should enable pupils to understand the nature of science and to think like scientists (Roberts, 2001). It is evident that for a meaningful understanding and learning of science to occur, there should be meaningful science teaching.

Learning is defined by Partridge (2003) as any change in mental behavior that is lasting and the product of experience. On the other hand, he defined teaching as the coordinated set of activities that require measuring student behavior reflecting instructional intent. In recent decades, it has been aimed for all science disciplines that students should apply the acquired knowledge to everyday issues. This aim has been stressed by Millar and Osborne (2011) that science education should help young people acquire a broad general understanding of the important ideas of science so that they can understand, respond critically to media reports of issues with a science component. American Association for the Advancement of Science (1993) defined achieving scientific literacy as the central goal of science education. Furthermore, science education should make students develop analytical and critical thinking.

The way science is taught in our schools should greatly be influenced by the meaning and nature of science. Humans assimilate new knowledge by producing cognitive structures that are similar to the experiences they are engaged in. They then accommodate themselves to these newly developed knowledge structures and use them within their collection of experiences as they continue to interact with the environment. Scientific knowledge is not separate from experience, rather, it is embedded within experience and interpreted by the learner.

Academic achievement has been described as the scholastic standing of a learner at a given moment (Adeyemi, 2010). This scholastic standing could be experienced in terms of the grades obtained in a course or groups of courses. Akiri and Nkechi (2009) perceived achievement as a measure of outputs and that the main outputs in education are expressed in terms of learning. That is, there are changes in knowledge, skills, behavior and attitudes of learners as a result of their experiences within the school system. Learners‟ academic achievement in both internal and external examinations has been used to determine excellence in teachers and teaching. Teachers play a crucial role in educational attainment because the teacher is ultimately responsible for translating policy into action and principles based on practice during interaction with the learners (Afe, 2001).

Student education is closely linked to their life chances, income and wellbeing. Therefore, it is important to have a clear understanding of what benefits or hinders one‟s educational attainment. Amukowa (2013) has indicated that school-based factors (the availability and use of teaching/ learning facilities), socio-economic factors (the education of the parents and their economic status), student factors (motivation and attitude), school type and the teachers‟ characteristics as the factors that contributed to the learners‟ low achievements in the science subjects.

In Ghana, the direction of science education has been set to play meaningful and effective roles in socio-economic and technological development of the country. In order to achieve this objective in the everchanging needs of the society, the national educational curriculum has gone through series of transformations.

The implementation of the science curriculum at the Junior High School level has become a source of concern in recent times, considering the continual abysmal

performance of a great number of students. Eminah (2007) stated that there was a serious gap between the intended curriculum and the realities of the science classroom transactions between the learners and teachers. Since science and technology play a major role in any country‟s development, the impact of the failure in science subjects will heavily affect the socio-economic development of that country. It is against this background that this study seeks to investigate the environmental factors that militate against academic achievement of JHS pupils in Integrated Science considering the low performance in Integrated Science by the pupils over the last few years.

1.3 Statement of the Problem

There have been public outcries and concerns by parents, teachers, government and pupils over the re-occurring low academic performance in examinations in many Junior High schools in the Agona East District of Central Region of Ghana. Considering the influence the environment has on the students and its importance as a primary influence on the aspirations of students, it can be argued that academic achievements of the student could be enhanced or hindered depending on the environment students come from. It appears that many people have not yet recognized that the environment has a great impact on students‟ academic achievements.

The abysmal performance of Ghanaian Senior High School students in Mathematics and Science in trends in international mathematics and science study (TIMSS) 2003 and 2007 (Anamuah-Mensah, Mereku & Ampiah 2009) is an evidence of the state of science teaching and learning in Ghana. In Ghana, the Chief Examiner‟s Reports from WAEC have underlined consistently, the abysmal performance of JHS pupils in Integrated Science (WAEC, 2013; 2014; 2015; 2016; 2017; 2018). Specifically, the Basic Education Certificate Examination (BECE) results in Integrated Science in

Agona East for many years have been showing similar trend characterized by low performance. An analysis of BECE results from 2012 to 2020 clearly showed that the performance of most of the Junior High School pupils has been abysmal in Integrated Science during their final examinations (BECE). The performance of pupils in Integrated Science as shown in the Tables 1, 2 and 3 evidently indicates that most pupils in Agona East District performed poorly from 2012 to 2020.

Summary of Passes by school candidates in Integrated Science (BECE 2012-2020) In Agona East District

Table 1: Pupils performance (2012, 2013 & 2015)

Year	No. of candidates that obtained grade 1-3	No. candidates that obtained grade 4-5	No. of candidates that obtained grade 1-5	Total No. of candidates that sat for the exams	Pass rate (%)
2012	94	294	388	1232	31.5
2013	142	374	516	1390	37.1
2015	175	392	576	1590	35.7

Table 1 covers passes of pupils from grades 1-5 during those years, with a the cut-off point of aggregate 30 and the best 6 subjects of the candidate were used to grade pupils.

Table 2: Pupils performance (2014, 2016 & 2017)

Year	No. of candidates that obtained grade 1-3	No. candidates that obtained grade 4-6	No. of candidates that obtained grade 1-6	Total No. of candidates that sat for the exams	Pass rate (%)
2014	140	632	772	1522	50.7
2016	244	780	1024	1773	57.8
2017	223	817	1040	1972	52.7

Table 2 covers passes of pupils from grades 1-6 during those years, the cut-off point was aggregate 36 and the best 6 subjects of the candidate were used to grade pupils.

Table 3: Pupils performance (2018, 2019 & 2020)

Year	Total No. of candidates that sat for the exams	No. of candidates that obtained grade 1-6	Pass rate (%)
2018	2144	1189	55.46
2019	1941	1165	60.02
2020	2053	1414	68.87

Source: Agona East District Education Office

Table 3 shows a progressive improvement in the performance of pupils from 2018 to 2020 although there was no available data indicating the number of pupils that had strong and weak passes. During those years, the best 6 subjects of the candidate were used to grade pupils. Pupils who had grade 9 in any of the core subjects namely English, mathematics and integrated science did not get placement in any of the second cycle institutions for further studies.

The best performing year from Table 1 recorded 37.1% as the pupils‟ pass rate. This meant that pupils that were considered to have passed the subject obtained grades ranging from 1 to 5 while the best performing year from Table 2 recorded 57.8% as

the pupils‟ pass rate. The meaning was that pupils that were considered to have passed the subject obtained grades ranging from 1 to 6. The best performing year from Table 3 recorded 68.9% as the pupils‟ pass rate. This also meant that, pupils that were considered to have passed the subject obtained grades ranging from 1 to 6.

The seeming improvement in performance of pupils in Tables 2 and 3 was as a result of the fact that the pass grade was from grade 1-6 as compared to table 1 whose pass grade was from 1-5.

In view of the abysmal performance of the pupils, this study will therefore attempt to unravel the environmental factors that militate against academic achievements of JHS pupils in Integrated Science in Agona East District.

1.4 Purpose of the Study

The purpose of the study was to investigate the environmental factors that militate against academic achievements of JHS pupils in Integrated Science in the Agona East District of Ghana.

1.5 Study Objectives

The main objective was to determine the environmental factors that militate against academic achievement of JHS pupils in Integrated Science in Agona East District of Ghana.

Other objectives of the study were to:

1. Find out the influence of school environment on pupils‟ academic achievement in the Junior High Schools.
2. Determine the impact of home environment (parents‟ educational level and family size) on pupils‟ academic achievement in the Junior High Schools.

3. Find out the teaching methods that are being used in the teaching and learning of integrated science in the Junior High Schools.
4. Find out some of the challenges teachers and pupils encounter during the process of teaching and learning of Integrated Science in the Junior High Schools

1.6 Research questions

1. What are the school environmental factors that influence academic achievement of pupils in the Junior High Schools?
2. To what extent does home environment (parents‟ educational level and family size) influence pupils‟ academic achievement in the Junior High Schools?
3. What teaching methods are being used in the teaching and learning of integrated science in the Junior High Schools?
4. What are some of the challenges teachers and pupils encounter during the process of teaching and learning of Integrated Science in the Junior High Schools?

1.7 Significance of the Study

This study would increase the knowledge of policy and decision makers so as to adequately deal with the challenges faced by teachers and pupils in the teaching and learning of science subject in Ghanaian schools. The results of this study could also help educators, curriculum developers and teachers to improve the teaching and learning of Integrated Science by getting rid of the challenges which interfere with high academic achievement in Integrated Science. It would also add to the existing body of knowledge.

1.8 Delimitation of the Study

This study did not cover the whole Central Region but was limited to some selected Junior High Schools in the Agona East District of Central Region of Ghana and

focused mainly on environmental factors that militate against academic achievement in Integrated Science at the JHS level in Agona East District.

1.9 Limitation of the Study

This study like all other research work was not without limitations. The result of this study might not reveal a general picture about the environmental factors that militate against academic achievement of pupils in Integrated Science in Ghana as a whole because the study was limited to some selected Junior High Schools in only one district of Central Region of Ghana. Therefore, generalizing the findings of this study must be done with caution.

1.10 Organization of the Study

This research consists of five chapters. Chapter one deals with the introduction under which the background to the study, statement of the problem, purpose of the study, research questions, significance of the study, delimitation, limitations to the study and organization of the study of work are discussed. Chapter two reviews the related literature on science teaching and learning materials, learning environment, teaching and learning methods used in science, family size, educational background of parents, the content of the JHS syllabus and challenges faced by pupils and teachers during the teaching and learning of science.

Chapter three represents a comprehensive description of the methods and techniques that were used in carrying out the study. These are the research design, target population, sample size, sampling techniques, research instruments, data collection and methods which were used to analyze the data. The fourth chapter presents the results of the study obtained through the analysis of data. Results from data analysis of questionnaire are presented and followed by interview results. It also goes on

further to discuss the research findings. The last chapter, chapter five, considers the summary, conclusions and recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

Chapter two reviews the related literature on environmental factors that impact academic achievement, science teaching and learning materials, methods used in the teaching and learning of science, the content of the JHS syllabus and challenges faced by pupils and teachers during the teaching and learning of science.

2.2 Environmental factors that impact academic achievement

Generally, environmental factors are the physical, social and attitudinal aspects that individuals are routinely exposed to in performing their daily tasks at home, workplace or school. This can include physical aspects such as buildings, the glare of a computer screen, space, light, colour and vibrations and noise from machinery, or the layout of a classroom or workplace. Social and attitudinal aspects can include coping mechanisms and the relationships between individuals.

According to Okebukola and Ogunbiyi (2012), the environment is the surrounding in which a school is situated and from which it draws its pupils or students. They further noted that the relationship between the school and the society or community, forms the environment because the school is situated within a given society or community and the students come from the society or community. Since it is the society that creates the school to inculcate culture into the young ones; it greatly influences the learning character of the students. Merriam Webster dictionary (2020), also defines environment as the circumstances, objects or conditions by which one is surrounded.

Environmental factors that influence students learning include both home factors and school factors. It has to do with the debate “Nature or Nurture, which has more impact

on a child‟s potential for academic success?" Nature refers to all of the genes and hereditary factors that influence who we are, our physical appearance, personality and intelligence. Nurture on the other hand refers to all the environmental factors that impact who we become and what we achieve (Cherry, 2020). She further added that in the past, there have been several debates over the relative contributions of nature and nurture on academic achievement of students. Today most experts recognize that both factors play a critical role in an individual‟s achievement in life. According to Chomsky (2018), all children are born with an instinctive mental capacity that allows them to both learn and produce language. How a person views academic excellence and achievement is linked to influences such as parenting styles and their learned experiences. For example, a child may learn through observation and reinforcement to be punctual at school and study at home after school. Another child may learn truancy and behave aggressively and think learning is only done by listening to the teacher teach in the classroom by observing parents and other people in their environment.

This debate has waged on for decades on but scientists now believe that environment is far more important to students‟ success than genetics. One thing is certain that the young brain is highly influenced by the environment. Learning in a healthy environment helps the learner acquire a deeper understanding and sound knowledge of the subject matter. It is therefore essential to be aware of such environmental factors that hamper the learning process of an individual, and learn to avoid negative stimulants to increase one‟s performance (Chomsky, 2018).

For the purpose of this study some of the environmental factors that influence students learning and academic achievement that shall be discussed are, family size,

parents educational background, noise pollution, overcrowding and classroom lighting and learning environment.

2.2.1 Family size and type

Family size in the context of this study refers to the total number of children in a student‟s family in addition to the student himself or herself. Large numbered families whether rich or poor are difficult to maintain, because they are characterized by a high number of children and rowdiness and this is not convenient for learning.

Olayinka (2019), pointed out that the family is the bedrock of the society and reported that a stable and well developed childhood can be guaranteed by a stable family. The larger the family, the greater the pressure on parental resources, and the more limited are the educational chances of each child. Hence, parents face trade-off between quantity and educational chances of children when making decisions regarding the size of their family. A vast majority of studies carried out in the developed countries confirms a negative association between number of siblings and educational outcomes (Steelman, 2002).

According to Ella, Akpabio & Sampson-Akpan (2015) most parents in large families in the world have exposed children to undesirable challenges that have negatively affected their academic performance in school. Whatever may be the reason for these poor performances should constitute a cause for concern because students‟ academic performance plays an important role in producing best quality graduates who will become great leaders and manpower for the country thus responsible for the world‟s economic and social development.

Family type and size in children‟s education have not been given adequate attention in various countries and this may contribute negatively to a student‟s academic performance. The student may be in a small or large family. In a small family, the learner may find silence with a peaceful learning environment but may not get anyone to assist in their learning at home. However, it may be a bit noisy and messy in a large family, but the children can find other individuals, who can help and support their studies and learn better. So, both small and large family size has its pros and cons, affecting the learning process of students accordingly. All families have their own culture and follow their customs differently. The culture implanted in the students during their growth shapes their perception and cognitive capacity. In large families, children may not get the needed attention, supervision and support to attain high academic achievement (Ella, et al., 2015)

There is documented evidence of influence of family size on students‟ academic performance in various subjects in school (Odok 2013). The studies of Odok (2013) and Eamon (2015), attest that small family sizes are linked to higher educational attainment. Large family size creates in the upbringing of children some identified problems such as poor feeding, poor clothing, insufficient funds, and lack of proper attention for children, disciplinary problems and malnutrition which impact negatively on the child‟s academic performance (Ella, et al., 2015). Studies carried out in Scotland found that, children with relatively small size families performed better in verbal and non-verbal tests, than children from large family size in the same test. This according to them is because children from large families have less frequent interactions with adults. Similarly, parental attention by parents declines as the number of siblings increases and latter born children perform less well than their earlier born siblings.

Bysenk and Locksoh (2011), affirmed that, most extroverted children come from smaller homes and that they adjust more easily to school environment, express themselves easily in the classroom leading to a greater academic performance as opposed to introverted children of larger family size. Booth and Kee (2006) confirmed that children from larger families have lower levels of education and also perform poorly in academics. However, Powell and Stellman (2010) argued that children‟s academic attainment depends on inputs of time and money from their parents as the more children there are in the family, the less of both inputs. These inputs are not money alone, but other essential things like attention, resource dilution and so on.

The family type that a child comes from either monogamous (nuclear), polygamous, divorced parents, re-married parents, single parents, or step-parents usually has an impact on a child‟s academic performance. The nuclear family consists of two parents and children. It is held in high esteem by society as being the ideal family in which to raise children. Children in nuclear families receive strength and stability from the two parents‟ structure and generally have more opportunities due to financial ease of two parents. According to US census data, almost 70% of children live in nuclear families and statistics have also shown that children from such families tend to fare better on a number of cognitive, emotional and behavioural needs. Single parented family consists of one parent raising one or more children on his/her own. Most at times it involves a mother with her children and in some cases fathers as well (Gabriel, 2013). Billings (2012) stated that such children become delinquent because they are most often deprived of security, protection and love that should come from both parents and these impacts negatively on academic success of the child or children.

Stone (2012), asserted that children from single homes are more likely to show to a great extent, the effects of under nourishment, illness, insufficient rest as well as negative attitude towards school, which manifest in infancy, a factor that can affect achievement and performance negatively. In the same vein, Kessler (2013) blamed poor academic performance to another family type known as step family. Individuals who divorce most times choose to remarry. This type of family constitutes two separate families merging into one unit (a new husband and new wife and their children from previous marriage or relationship). Kessler (2013) further stated that children from such families most often become depressed and would want to compensate themselves in acts of unrest and might go astray and loose academic focus. This is because the atmosphere at such homes is not likely to be conducive for the children to make decisions of their own.

Fifty percent of African female-headed families live below the poverty line, which makes them the most impoverished group in Africa (James, 2008). He further observed that, children of female- headed families (single mothers) are at a greater risk of poor academic achievement, due to low income of mother and the inability to provide all the basic needs of the children. This leads to low achievement of the children. However, low achievement could also occur even when income level is controlled.

A conducive environment is necessary to enhance the academic achievement of a child. A stimulating home environment can spur up a potential mediocre into an intellectual giant while an inhibiting one could turn a genius into a mediocre (Osakinle, & Onijingin, 2013). According to Osakinle and Onijingin (2013), taking care of children and also making provision for their needs, especially educational

needs, are very important in determining the academic achievement of children. Contrary to the opinion that learning and reading begins in school, the first foundation of the child begins at home. A good and conducive home environment with adequate learning facilities helps to boost the intellectual and academic capability of the child. Small family sizes and monogamous families most often accelerate positive influence on children‟s academic achievement.

Researchers have attributed the low performance by students to certain factors within and outside of the students‟ personality. It is therefore necessary to investigate if educational background of parents influences students‟ academic achievement.

Nasir, Muhammad, & Sajjad (2020), asserts that the family plays an important role in formal and informal education. Students, teachers, institutions and parents all have their importance in the process of learning.

2.2.2 Educational background of Parents

Parental education is considered the most stable (permanent) aspect of socio-economic status. It has been well defined that family plays a vital role in a child‟s academic achievement and development. Chandra (2013) added that, the mother‟s level of education influences the adolescent‟s educational outcomes and the education of parents has significant influences on childrens‟ knowledge, skills and values.

Parents‟ education is such a motivating force for a child which paves the way for his/her future. It is an admitted fact that the children of educated parents are more confident, resourceful and experienced than the children whose parents lack education (Nasir, et al., 2020).

Parents‟ involvement in educational activities of their wards at home has a positive effect on their children‟s educational attainments. There are research based evidences that children‟s vocabulary which is the gate way for scholarship, other linguistic and social skills, have been significantly influenced by their parents at home (Kassim, 2011).

The communications of educated parents at home through strong vocabulary, good pronunciation and logical arguments in discussion contribute to children‟s language development. Educated parents can also provide proper guidance to their children as they have already gone through the process of education and they are aware of the heights and falls of educational decisions and therefore they can also share the educational life experiences which are very powerful to motivate their children for studies. These experiences help the individual to mold their behavior and adjust him//herself to the situation properly which leads to prosperous educated life. All these interactions at home including parent‟s guidance, mutual communication, helping in the educational decisions and sharing the educational experiences with children have a significant positive relationship with students‟ academic achievement. Home arrangements made by children‟s parents are also based on their understanding and education has positive influences on students‟ educational performances (Harb & El-Shaarawi, 2016).

Students‟ proper nourishment and development is based on their home environment. Educated parents make efforts to provide enabling educational atmosphere to their children at home so that they could benefit from that enabling environment whereas uneducated parents often fail to provide learning-friendly environment to their children at home. The belief is that educated parents lead their children to make

efforts for personal development by considering education as the architect of morality and guardian of the soul. Students‟ academic attainment has close relationship with basic facilities at their home which is again linked to parents‟ education. The facilities at home and the home environment prepare them for facing the lurking challenges of the future educational, social, political and spiritual aspects of life. In addition to the home atmosphere and parents‟ educational status, the attitude of parents towards their children and their educational development infuse permanent values, such as integrity, honesty, patriotism, industriousness, sympathy, optimism, hope and positive socialization in their children (Chohan & Khan, 2014).

Research studies illustrate different factors have both positive as well as negative impacts on students‟ academic achievement. Parents‟ attitude towards education is based on their level of education and educational experiences they have experienced during their educational life. It is a fact that the higher the attainments of parents‟ education the higher they will be conscious and careful for the education of their children (Kassim, 2011). Educated parents have beliefs which are reflective in the arrangement of educational provisions for their children (Jeynes, 2017). There is evidence that students who belong to educated parents perform significantly better as compared to the students who belong to uneducated parents. The reason is that they can easily help out their children in their educational activities and can motivate them for studies. These interactions of parents have positive psychological effects on children, reducing their hesitation and further increasing their confidence and trust. On the other hand, uneducated parents are not in a position to assist their children and as parents, their influences are weak as compared to the educated parents‟ contribution because of the absence of psychological factor (Jeynes, 2017).

Among parents‟ educational status, research findings explain that the contributions of educated mother in the education of their children is more than the role of the educated father in the educational attainments of students. The reason is that the self-esteem of educated woman as a mother is higher and has significant relationship with the nourishment and preparation of their children. Mother is the core part of the life of a child and she can and does influence them in every aspect of life (Jeynes, 2017).

The parents and other guardians in a family can teach many divergent things to a child from infancy. Parents learn many things related to their occupation and teach their children the same. Children inherit parents‟ traits and develop other attributes from the activities of their parents as they grow. Parents are the first teachers for their babies. In such ways, learning is enhanced by parents, behavior, character, cognitive level, attitude and personality (Unity, Osagiobore & Edith, 2013)

Unity et. al., (2013) further assessed that having inadequate resources affect negatively, a family‟s decision for young children‟s development and learning because such homes may lack an academic environment at home and which in turn influences their academic achievement.

2.2.3 Noise pollution

Noise refers to sounds that hinder an individual's ability to listen to what they want or need to hear (Gilavand, 2016). Noise is also defined as unwanted sounds that could give negative effects to a person both physically (such as hearing loss) and psychologically (such as frustration and nuisance)

According to Buchari, Nazaruddin & Matondang (2017), classroom background noise can arise from several possible sources, including motor traffic noise, noise

from drinking spots, food selling joints, carpentry shops, funeral grounds, students running in corridors, and students‟ talking. Studies have shown that noise has direct negative effects on student learning, with language and reading development particularly affected. There are also, problems related to attention, memory and motivation. In order to compensate for the noise level in classrooms, teachers often have to speak loudly while teaching. Such a speaking habit is known to be a risk factor that might lead to voice disorders in teachers. Noise influences not only learning outcomes, but also the health of the occupants who experience the noise. In the case of young children, they have not yet developed enough executive skill in activities involving communication channels, like speech comprehension, use of language, written and oral skills and so on. The social atmosphere of a school is a potential and important contributing factor to the academic outcomes of students. Therefore, the educational zone requires a serene atmosphere instead of disturbances from the traffic noise and drinking bars or a teacher‟s loud shout.

According to Gilavand (2016), the effect of noise in the classroom can bring about several disorders in students hearing, communication and intelligence. Traffic noise is not a new problem, but a persistent one. Noise pollution is a major environmental problem and its main impact in urban areas is endured by students, especially schools that are located near busy roads, community centers and drinking spots.

Exposure to noise from machines and vehicles leads to noise pollution and may cause interference and work stress or learning stress. The negative impact of noise is worse at school with an open classroom design or located close to external noise sources. In modern cities, noise becomes a global problem which has been examined extensively around the world. Today, urban noise is considered as a public health and

environmental problem. It was estimated that millions of people in Europe were exposed to the excessive traffic noise, which may cause stress, illness and even fatal impact. Noise undermines intelligence; reading, writing and comprehension skills, as well as overall academic performance, as noise makes it hard to focus on the task as well as getting tired easily, leading to lower efficiency; increased heart rate; dyspepsia; poor appetite; insomnia; headache; tinnitus; and facial pallor (Gilavand, 2016). Gilavand, Fakhri & Amir (2016) added that noise pollution in recent years, has been well recognized as one of the major trepidations that affect the quality of life that should be solved together, since 54 % of the world‟s population live in urban areas, a proportion that is expected to rise to 66 % by 2050. The main impact of noise in urban areas is endured by students, especially those whose schools are located near busy roads. Long term and repeated noise exposure can lead to psychological health problems as well as reduce the students‟ learning motivation when they are at school. The noise of various vehicles can disturb the mood of students in the class. Noise as a chronic stressor has the potential to disrupt executive functioning in children. Basically, noise in the school environment negatively affects the teaching and learning process in urban areas worldwide (Buchari et al., 2017).

2.2.4 Classroom lighting

Generally, about 83 percent of learning takes place by the sense of sight in the learning process. Therefore, if seeing action faces problem, learning will reduce (Gilavand et al., 2016). Gilavand et al., (2016), further asserted that the purpose of school lighting is to create an environment in which the act of seeing is done in best way with minimal discomfort and effort so that energy of students to be spent on information and learning process, rather than to combat problems with vision. Lighting is a fundamental feature of designing building environment. Good lighting

should be comfortable for all building users. With modern technology designing a lighting system to meet all requirements of an environment is possible (Soodeh, 2012). Environment illumination is very important for determining the users' well-being and productivity. Illumination is a critical area that needs more attention from educators, administrators, designers and maintenance teams. Illumination is not only about electric light, it also consists of direct natural light, indirect natural light, and indirect artificial light and reflected light, as well as the control of all light resources.

The quality and quantity of light (illumination) undoubtedly influences the perception of comfort in a particular space. Illumination has strong and well-documented effects, but less obvious is the case of light quality. Gilanvand (2016) undertook a study to evaluate how different types of lighting (warm white, cool white, and full-spectrum fluorescent) affect various dependent variables, including: cognitive performance, room attractiveness, judged room size, and pleasure of room. He found out that it is essential to improve lighting in learning environments to enhance students‟ learning and performance, and also motivate them to learn more. Students‟ cognitive skills were also crucially correlated with classrooms‟ daylight conditions.

In any case, the amount, direction and quality of light must be considered. Class lighting is provided through natural light (windows, valves and doors) or artificial light (lamps and bulbs). The light must be desirable in terms of distribution and it should be distributed uniformly so that it does not cause eye discomfort. In addition, the amount of light should be sufficient to avoid annoying shadows. For this reason direct and bubbled fluorescent light is very best for producing normal light brightness on the blackboard (Hendrix, 2019).

2.2.5 Learning environment

The learning environment refers to the space allocated for classrooms, science laboratories, open spaces and offices. Learning environment is also defined as the social context, psychological and pedagogical which can affect learning, achievement and attitudes of the students (Chism, 2016).

According to Chism (2016), learning environment and features that are in it plays a major role in improving learning in schools and is identified as a major determinant of student learning. Learning environment is capable of stimulating students to engage in the learning process and to influence the behavior of students as well as to assist in the development of their skills or cognitive perception.

The two major components of the learning environment are physical component and psychosocial component (Kilgour, 2016). Physical component includes all physical aspects such as teaching materials, classrooms, air quality and space in classroom, furniture and other learning facilities, both inside and outside the classroom. Psychosocial component is related to the interaction that occurs between students and students, students with teachers and students with the environment. These components complement each other in creating and shaping the learning environment and affect the learning process that occurs in it.

Tessmer and Harris (2019), stated that there are three kinds of physical factors of learning environment necessary to develop effective teaching. Firstly, learning facilities include state of the furniture and learning location. The location may be a classroom, a computer laboratory, a science laboratory, an office or any place where learning occurs. Secondly, is the instructional materials related to objects used in the environment by teachers and students. Teaching materials include attachments, video

tapes, computer compact discs and books. Factors that should be considered when designing teaching that is related to teaching materials is whether the teaching materials can be customized, easy to use, can be reproduced and can be replaced. Thirdly, is the equipment and materials for teaching and learning that are frequently used.

In an attractive learning environment, the way furniture is arranged, the lighting used, the ability of wall to absorb sound and floor properties have been identified to affect student achievement (Tanner, 2012). In addition, the physical environment can also affect learning, ideas, values, attitudes and culture and if properly planned, positive learning environment will affect the learning process. According to Matai and Matai (2017), the design of the physical environment has a significant effect on the behavior and in turn, can form a particular social organization.

In the learning environment, particularly in schools, furniture, equipment and learning facilities are basic elements that should be available. The type of furniture used, pattern of arrangement and facilities should reflect the emphasis on learning pedagogy to be implemented. To enable proper learning process, basic elements provided should be appropriate, adequate and functioning properly. Lack of completeness of educational equipment will lower motivation and creativity of teachers and students as well as limiting learning and teaching activities (Amirul, Ahmed, Yahya, Adnan, & Noh, 2015). Thus, the element of flexibility may be included as a criterion in the selection and design of furniture and educational equipment. For example, in a learning environment, flexibility element can be adapted in the use of tables and chairs that can be moved (has wheels) and the middle wall that can be shifted when needed. The use of portable tables and chairs will allow teachers and students to

organize the furniture according to their needs and learning activities that will be implemented. The element of flexibility in the classroom will be able to promote cooperation, interaction and collaboration between students (Amirul et al., 2015).

Space is also an important aspect of the learning environment. Floor area should be adapted to the number of students and activities to be accomplished. One element that should be incorporated in the learning space is a multifunctional element. Multifunctional learning space means the space can be used for various functions either to the learning of science subjects, biology, chemistry or physics or for other disciplines. This learning space can be adapted to individual learning, group, computer, discussion and collaboration activities, traditional learning, discussion involving the entire class, conduct experiments and demonstrations. This can encourage the use of various strategies for teaching and interactive learning with an easier transition and thus integrate theory and practice more effectively (Amirul et al., 2015).

2.3 Science Teaching and Learning Materials

Teaching and learning materials have been described in many ways by different authors, educators and curriculum planners. Teaching and learning materials (TLMs) are alternatively known as instructional media, instructional resources, teaching aids or learning aids in various contexts in several educational materials or documents (Akuamoah, 2004). Instructional aids are what the teacher uses in presenting a lesson while learning aids are used by the pupils. This is a very fine distinction and it often happens that in one period the same teaching aid can be used both as an instructional and a learning aid (Akuamoah, 2004).

Teaching learning materials (TLMs), also known as instructional aids, facilitate a teacher in achieving the formulated learning objectives. These are concrete objects (relia) and other materials that the teacher and pupils should use in the course of the lesson to facilitate the teaching and learning process. Materials may include text books, charts, posters, models, overhead projector, PowerPoint slides, audio materials, audio visual medium, pictures, mode or diagrams which the teacher might exhibit and refer to during lessons.

Amissah and Sam-Tagoe (2009) assert that in the classroom, teachers must use Teaching and Learning Materials (TLMs) to boost children‟s intellectual development. This is because student learning takes place primarily in the course of interactions with people (such as teachers and peers) and instructional materials that include textbooks, workbooks, instructional software, web-based content, homework, projects, quizzes and tests (Matthew & Grover, 2014). For this reason, the involvement of TLMs in the teaching-learning process continues to prove relevant. From the lowest through to the highest levels of the educational ladder, the impact of teaching and learning materials continues to prove significantly vibrant. To a large extent, the teaching and learning process depends on the variety of materials made available in the learning environment. According to Amissah and Sam-Tagoe (2009), the educational implications of Skinner‟s theory of human development mean that a conducive classroom atmosphere with relevant and ample materials enables students to have healthy and active interactions. They indicated that materials to be learned should be arranged in systematic and sequential steps from known to unknown, easy to difficult, and simple to complex.

The kind of TLM used affects the learning. For example, same content can be taught using different TLM and the retention will vary according to TLM used (Amissah & Sam-Tagoe, 2009). If you want to teach parts of a plant, you can provide a continuum of direct to indirect experience to learners. You can provide real experience of a plant, which a student can see, smell, touch, and handle in class. You may also bring a model or chart of a plant to show its parts. You may also explain the parts of plants verbally with the help of diagram on a chalkboard. Not all the learning experiences of same content „parts of plant" are similar and therefore, learning will not be similar as well. Therefore, learning outcomes are highly dependent on the learning experience given in classroom using teaching learning materials.

Below are some of the reasons why TLMs are used in the classroom:

- Teaching and learning materials attract the attention of pupils in what is being taught.
- Teaching and learning materials such as pictures, specimens of flowers and the likes, attract the interest of pupils. This helps children to pay attention to what is being taught (Ayoti & Poipoi, 2013).
- Help in longer retention of information – The more the number of sensory channels involved in interacting with TLMs, the longer will be the retention of information. Therefore, the learning will be effective and will last long.
- Facilitate holistic learning - Learning objectives to be achieved through classroom teaching are in all domains- cognitive, affective and psychomotor. Therefore, to achieve varied objectives, varied learning experiences need to be provided, which can be done through the use of TLMs.

Aina and Adeyemo (2018), believe that one major reason for poor performance among students or learners might not be separated from the abstract nature of the courses taught them. Both Aina and Adeyemo are of the view that the absence of teaching and learning materials such as real objects, or pictures makes it difficult for learners to understand communicated information. This is because young learners usually lack the ability to assimilate concept abstractly making it imperative to adopt the use of interactive materials.

2.4 Methods used in the teaching and learning of science

The teaching methods used by a teacher depend on a number of factors such as the developmental level of students, goals, intent and objectives of the teacher, content and environment including time, physical setting and resources. A single method cannot meet all of our goals nor can a single method accommodate all learning styles at once. The way in which a lesson is presented determines its effectiveness and the level of understanding by the learners who are being taught (Mwenda, Gitaari, Nyaga, Muthaa, & Reche, 2016). For the purpose of this study three (3) of the Integrated Science teaching and learning methods shall be discussed.

2.4.1 Active learning

Active learning is a teaching method that focuses on student engagement and interaction. According to Nguyen, Husman, Borrego, Shekhar, Prince, Demonbrun, Finelli, Henderson, & Waters (2016), it allows students to take their education into their own hands and enables them to "learn how to learn". This method often involves student-led classes, where group discussion, presentations, research techniques, and problem-solving exercises are predominant. When active learning is employed in the classroom, there is less focus placed on the teacher, who acts as a facilitator of

learning rather than the sole determinant of course content and structure. Multiple scientific studies have found a statistically significant relationship between active learning and student success. Freeman, et al., (2014), performed a meta-analysis examining 225 scientific studies with the goal to compare traditional (lecture) teaching to active learning methods in science courses and see if there was a difference in examination scores and failure rates between the two teaching techniques. They found that, across all science courses, active learning increased overall examination performance and decreased failure rates substantially.

Akinoglu and Tandogan (2016) found similar results when they compared the impact of traditional teaching methods to problem-based learning (a form of active learning). The active learning classes resulted in students having an increased understanding of material (determined through a series of open-ended questions and multiple achievement tests); they also found that students in the active learning treatment felt more confident facing future science courses. Cater, Norbert and Verela (2011) assert that through active learning, learners learn more information, retain the information longer and enjoy the lesson more as compared with those in a traditional class. Sciences can therefore be best taught by involving learners as science requires hands-on activities.

There are however, some challenges in practicing active learning. For example, active learning was developed with small class sizes in mind; however, science classes often have large enrollment and so active learning strategies are not always practical (Allen & Tanner, 2015). Additionally, because science classes generally have a strict curriculum, implementing new teaching methods can create extra work for the instructor, including creating new curricula, choosing new textbooks, and dedicating

more time to course organization and grading (Allen &Tanner, 2015). Finally, some instructors may be reluctant to try new teaching strategies because they fear a negative response from their students (Nguyen, et. al., 2016). Incorporating active learning in the classroom can be a daunting task, but it is entirely worth it for the benefit of so many students from all learning backgrounds. In the sciences, active learning can improve students‟ academic performance and has potential to enhance students‟ confidence when facing future science courses.

2.4.3 Lecture method

The word lecture comes from the Latin word lectus, in the 14th century, which translates roughly into “to read.” The term lecture, in Latin, means “that which is read.” It was not until the 16th century that the word was used to describe oral instruction given by a teacher in front of an audience of learners (Exley & Dennick, 2014). Today, lecturing is a teaching method that involves, primarily, an oral presentation given by an instructor to a body of students. Many lectures are accompanied by some sort of visual aid, such as a slideshow, a word document, an image, or a film. Some teachers may even use a whiteboard or a chalkboard to emphasize important points in their lecture, but a lecture does not require any of these things in order to qualify as a lecture. As long as there is an authoritative figure (in any given context) at the front of a room, delivering a speech to a crowd of listeners, this is a lecture (Paris, 2014).

The lecture method is just one of several teaching methods, though in schools it is usually considered the primary one because it is convenient and usually makes the most sense, especially with larger classroom sizes. Evidences from a number of disciplines suggest that oral presentation to a large group of passive students

contributes very little to real learning. In physics, standard oral-lecture does not help most students develop conceptual understanding of fundamental processes in electricity and in mechanics. Similarly, student grades in a large general chemistry oral lecture course do not correlate with the lecturing skills and experience of the instructor (Havice, 2019).

Bligh (2000), conducted an extensive meta-review of the lecture literature in which he reviewed over one hundred studies comparing the lecture against other teaching methods (e.g., discussion, independent reading and inquiry projects). His main criterion for comparison was acquisition of information by students. The evidence supported Bligh‟s assertion that the lecture is effective as any other method for transmitting information but not more effective. Handelsman (2004), also pointed out that large lecture courses often do not contribute to fostering students‟ scientific curiosity, analytic thinking and reasoning, key skills for future scientists.

Nwagbo and Chukelu (2011), also observed that such teacher-centred approach which places the teacher as the sole possessor of knowledge and the students as passive recipients of knowledge may not enhance achievement or promote positive attitudes to science. The search for a more effective approach for the teaching and learning of science that will enhance the achievement has persisted over the years. This is because, the achievement is the basis for scientific enquiry and the development of intellectual skills that is needed to learn concepts, but there is little empirical evidence so far, on effects of investigative laboratory activity.

Although most educationists consider lecture as not the best teaching method, it may be very advantageous to both learners and teachers in various ways (Paris, 2014). Some advantages of the lecture method include the following:

- The lecture is delivered by one authoritative figure (a teacher), he or she has full reign of the direction of the lesson and the tone of the classroom. They alone are able to shape the course, and so lectures remain highly consistent when it comes to what kind of information is delivered, and how it is delivered.
- Lectures are literally just long-winded explanations of information, deemed important by the lecturer. As such, students can absorb large quantities of new material.
- The lecture method makes the learning process mostly effortless on the part of the students, who need to only pay attention during the lecture and take notes where they see fit. Because so little input is required from students, it is the clearest, straightforward and uncomplicated way to expose students to large quantities of information and in a way that is controlled and time sensitive. Students just need to know how to take good notes.

2.4.5 The enquiry approach in the teaching and learning of science

Teaching science by enquiry involves teaching students the science processes and skills used by scientists to learn about the world and helping the students apply these skills involved with learning science concepts. Students are helped to learn and apply these processes through conducting problem-centred investigations designed for learning specific science concepts. The teachers help students generate questions to guide these investigations.

The enquiry learning takes the form of investigation or practical work amongst learners. It involves learners investigating, asking authentic questions and constructing reasonable explanations for the questions formulated through an enquiry approach in science teaching and learning so that they understand the world around

them and become scientifically literate. Also, scientific instruction in biology enables learners to formulate their own questions, devise ways to answer questions through data collection, analyze and determine the reliability of the knowledge acquired. It deals with the understanding of the nature of science. It requires the constant asking of questions about how and why things happen the way they do. Scientific enquiry is crucial for defining the characteristics of scientifically literate persons (Ogunmade, 2005). And the understanding of the nature of scientific enquiry is an important goal of science education as it enables teachers to be creative and enrich learners‟ abilities in understanding science concepts and processes.

Ogunmade (2005), further indicates that through enquiry-oriented teaching, teachers could help learners to build their interest in the materials and activities. It can encourage their thinking and discussion for a variety of investigatory paths which fits the lesson content and learners‟ intellectual level with everyday social application problems. Students can also be taught to utilize enquiry in order to add to the body of science knowledge that is understood. Students must be taught to reason from what they know and apply this reasoning in order to investigate phenomena observed in the world around them.

When scientists engage in enquiry they generate new knowledge not created in a vacuum. Scientists reason from the information that they have. Newton expressed this idea when he stated that if he had seen farther than others, it was because he had stood on the shoulders of giants (Hewitt, Suchoki, & Hewitt, 2019). When students learn science by enquiry, the process of enquiry becomes the means by which the currently accepted scientific knowledge is better understood. Through learning science as enquiry, students also better understand how scientists developed the currently

accepted body of science knowledge. Hence students learn to apply these processes in order to go beyond the information needed to discover new knowledge. According to Schwartz (2011), teaching students the process of science by enquiry is more important than teaching science by enquiry.

Literature in science education describes three levels of enquiry-based teaching and learning. These include: structured enquiry, guided enquiry and open enquiry (Colburn 2010). Colburn (2010) describes structured enquiry as one that involves the teacher engaging learners in problem-solving activities and provides them with procedures and materials to discover and generalize on their own from data collected. Essentially, the approach prescribes what learners are to observe and which data they are to collect. Guided enquiry on the other hand involves the teacher providing only the materials and problems to investigate while learners manufacture the material and solve the problems on their own.

Open enquiry is similar to guided enquiry but there is the addition that learners also formulate their own problems to investigate. Open enquiry, in many ways, is analogous to doing science and a typical example of learners‟ open enquiry could be the science fair or science talent search project (Hackling, 2018).

Over the years, research in science education has compared enquiry-based and traditional teaching and learning approaches in science (Bell, Blair, Crowford, & Lederman, 2013). A typical example is that of Lott (2015), conducted an analysis of 39 studies involving exposing and enquiry-oriented approaches in science; it was found that teachers who encouraged enquiry approaches in their teaching have learners who perform better than those taught using traditional approaches when higher-level cognitive processes were emphasized, but perform equally well on low-

level cognitive processes. Thus, the enquiry-based approach helps to develop a high level of cognitive skills in learners and improves learning outcomes among learners.

2.5 The content of the JHS syllabus

The JHS Integrated Science syllabus being used in Ghana now is an improvement and a reorganization of the one that was introduced in 1987 as a result of the New Educational Reforms. According to the Curriculum Research and Development Division (CRDD, 2012), the focus of the study of Science is to understand the natural world. There are generally two main goals of Science education (CRDD, 2012). First, it inculcates scientific literacy and culture for all, so that people can make informed choices in their personal lives and approach challenges in the workplace in a systematic and logical order. Second, it aims to produce competent professionals in the various scientific disciplines who can carry out research and development at the highest level.

For meaningful scientific education, it is important for pupils to be trained in the investigative process of seeking answers to problems. This requires pupils to physically explore and discover knowledge within their environment and in the laboratory to be able to contribute new scientific principles and ideas to the body of knowledge already existing in their culture (CRDD, 2012).

The JHS Integrated Science syllabus is based on a conscious effort to raise the level of scientific literacy of all students and equip them with the relevant basic integrated scientific knowledge needed for their own survival and for the development of the country. It is also expected that scientific experiences in Junior High School will cultivate in pupils an interest and love for science that will urge some of them to seek further studies in science as preparation for careers in science. The study of science

will also provide excellent opportunities for the development of positive attitudes and values such as curiosity to explore their environment and question what they find, keenness to identify and answer questions through investigations, creativity in suggesting new and relevant ways to solve problems and open-mindedness to accept all knowledge as tentative and to change their view if the evidence is convincing.

The content of the Junior High School Integrated Science covers the basic sciences and includes topics in health, agriculture and industry. The approach in the syllabus is based on scientific themes that pupils can relate to in their everyday experiences, and related also to commonly observed phenomena in nature. The basic aim is to enable pupils to appreciate the links between seemingly different topics and thus allow the eventual integration of scientific ideas. The six themes include:

- Introduction to Science
- Diversity of matter (the Living and Non Living things)
- Cycles
- Systems
- Energy
- Interactions of matter

Although the content of the syllabus is organized into themes, the units under each theme are not to be viewed as separate blocks of knowledge. In general, there are no clear boundaries between the themes since there are some common topics between the different themes.

Another feature of the syllabus is the Spiral Approach. This is characterized by revisiting concepts and skills at different levels with increasing degrees of depth at each stage. The spiral approach has the benefit of matching scientific concepts and

skills to pupils‟ cognitive development. It therefore helps pupils to build a gradual mastery of scientific skills

The syllabus covers three years of Junior High School education. Each year‟s work is organized under the six themes or sections. The titles of the sections are the same for each class level. However, the knowledge, understanding as well as the activities and range of process skills presented have been extended at the different class levels. The syllabus has been planned on the basis of Years and Units. Each year's work is covered in a number of units sequentially arranged and in a meaningful manner such that each unit‟s work will provide the necessary and enabling skills for the next unit. The units are the major topics of the year. The order in which the topics appear should not necessarily be the teaching order. There should however, be a linkage in the order in which the units and specific objectives are treated. The teacher will have to study the syllabus carefully and plan ahead the activities the pupils will carry out during a particular period. According to CRDD (2012), a total of six periods a week, each period consisting of forty minutes, is allocated to the teaching of Integrated Science at the Junior High School level. It is recommended that the teaching periods be divided as follows: Theory: 4 periods per week (two 40-minute periods). Practical: 2 periods per week (one double-period).

For effective teaching and learning in the Integrated Science course, it is recommended that schools should have science equipment and materials. As much as possible, the social relevance of all science concepts taught must be made clear e.g. their application to agriculture and industry. Schools must adopt the integrated and team teaching approach for teaching the course. It is also recommended that teachers must ensure that they give equal attention to all pupils in their class to provide each of

them with equal opportunities for learning irrespective of different physical problems and mental abilities of the pupils. During lessons, the teacher should serve as a facilitator and motivate the pupils in various ways to sustain their interest. The teacher should pay particular attention to children‟s questions and should also ask questions that will guide them to other areas of useful investigation.

Challenges faced by pupils and teachers during the teaching and learning of science

Whereas the need for scientific advances is at its peak globally, adolescent learning about science in school is facing critical challenges. Science educators in the early 21st century are facing a myriad of issues. Some of the complex issues in the field of science education include the availability of appropriate textbooks and classroom resources, the preparation and training of science teachers (including both pre-service training and in-service professional development), political and religious opposition to cutting-edge science instruction, the need to meet standards and to prepare students for standardized examinations and the dramatically increasing use of the internet as a source of information (National Center for Education Statistics of The United State of America, 2007).

Challenges faced by both students and teachers in the teaching and learning of science militate against effective teaching and learning and serve as a major disincentive to good academic achievement in science by students. More often than not some of these challenges are student - related, teacher - related or school management - related. Singh, Granville, & Dika, (2012), examined the effects of school-related constructs, motivation, attitude, and academic engagement on 8th grade students‟ science achievement in Turkey. Academic time was found to have the strongest effect on

science learning so students who spent more time on science homework had higher achievement. The attitude toward science had the next largest effect and the other factors also had positive effects on science learning. Attitude has been considered as an important factor affecting science achievement.

The use of outdated teaching methods which result in passive learning which denies students a chance to develop scientific skills are still employed in the teaching of sciences. Makgato and Mji (2016), indicated that application of outdated teaching methods contributes directly to the poor performance of learners in the science subjects in South Africa. Muzah (2011), also asserts that the teaching methods used by some science teachers in South Africa reduces science teaching to preparation for examinations and tests rather than enhancing the learner's abilities to explore ideas by means of hands-on activities. He further emphasizes that science learning is still done by means of parrot learning which results in the subject being uninteresting.

Mwenda, et al., (2016), state that teachers play a central role in the effective dispensation of the curriculum. This requires them to be well-trained in order to dispense the curriculum effectively. Research in Lesotho showed that learners taught by unqualified teachers or qualified teachers who did not understand the nature of science that has to be taught produced poor results (Lebata, 2014). Research in South Africa also shows that there are still large numbers of under-qualified or unqualified teachers who teach science subjects (Modisaotsile, 2018). Under-qualified teachers are not able to use the scientific equipment and therefore cannot do science practical investigations with learners because they are deficient in practical investigation skills. Also teachers who did not specialize in science during their training lack the scientific knowledge. This level of education results in the teachers being unable to expose

learners to efficient scientific content because they only teach what they know (Muwanga-Zake, 2012).

The challenge of lack of resources in schools is a matter of concern worldwide. The lack of resources, such as textbooks, physical infrastructure and laboratory equipment in South Africa has led to the learners losing interest in the subject, and hence poor performance (Amukowa, 2013). He compared schools with resources with schools with no resources, and found that schools that lacked resources performed poorly. The lack of resources leads to a failure to enhance effective learning, as the subject then only remains taught in theory (Dhurumraj, 2016).

Science is a subject that requires one to grasp the concepts and to be able to communicate them in writing. This has been a challenge to second language learners as they are not proficient in English, which is the medium of instruction (Zisanhi, 2013). The lack of proficiency in the medium of instruction results in the learners developing anxiety and a negative attitude towards people who speak the language; in this case it is the teachers (Zisanhi, 2013). The lack of proficiency in English also results in the learners being unable to communicate their ideas and this further leads to poor performance because the learners have to understand the concepts in order to apply them in solving problems (Hlabane, 2017).

Another challenge affecting the teaching and learning of science is absenteeism of both teachers and students. Weideman, et al., (2017) categorized the causes of absenteeism into the following three, namely personal factors, socio-economic factors and school factors. No matter the nature of the cause, absenteeism negatively affects the learners‟ performances. The absenteeism of a teacher from school or class may be the cause of the learner's poor performance, as teachers do not cover the syllabus.

Consistent absenteeism of the teachers may also increase the learner's absenteeism as they believe that when a teacher is absent no learning will take place (Lebata, 2014). The teacher's absenteeism results in their inability to mark students‟ assignments and exercises. This may demotivate the learners, and their demotivation in turn, may affect their academic achievements.

2.6 Theoretical Framework

Walberg‟s theory of educational productivity (2020) posits that learners do not reach their full potential, partly due to inert characteristics and certain factors in the individual students‟ immediate environments.

According to Walberg (2020) educational productivity seeks to explain student performance. The fundamental objective of the theory is to determine what factors influence students‟ academic achievement and how they do so. The backbone of the theory rests on four fundamental pillars: (1) Student‟s aptitude to progress and perform adequately well in their academic pursuit. This depends on student prior performance, cognitive variables, motivation and maturity stage.

- Prior performance. The knowledge the student has already acquired. Many teachers give a test before starting a subject to find out the level of the students and, thus, adapt to it.
- Cognitive variables. Students with an above-average IQ or the opposite will potentially perform differently. They need activities that are specially designed for their characteristics.
- Motivation. This is the intention of each student to conduct activities, solve problems, and get actively involved in their classes. There‟s a clear lack of motivation nowadays and many students wonder why they need to study at all.

- The maturity stage. This has a strong influence on student performance and the assimilation of new concepts. Likewise, it has an influence on what goes on in the classroom.

(2) The environment in which learning takes place; for example, one should test the climate in their classroom. Are there many students? Do they continuously talk? He also, mentioned other types of environments, such as the library or the home. This is because these spaces can also affect performance. For example, the student‟s performance is likely to suffer if there are problems or arguments between parents at home.

According to Walberg (2020), the commitment of parents is a key factor to good academic performance of students. Parents who attend meetings and take an interest in improving their children‟s performance are an important point of support. However, work, relationship problems, and a range of other concerns can distract them. The consequences are clear and unmotivated students may even take a few days off school.

(3) Long hours of classes. According to Walberg (2020) it is mostly theoretical; generate boredom and weariness in students. This is why educators are beginning to incorporate new educational methods such as Montessori to avoid this. However, public education is still based on a model that does not promote the diversity of students. Walberg (2020) pointed to cooperative learning as an underappreciated and valuable source of access to knowledge.

(4) Teaching

Both quality and quantity come into play in this last element. Thus, the quality of teaching is important to build on everything mentioned about learning. Once you have the right tools, you must focus on quantity. Quantity and quality can improve the performance of a student who requires motivation and actively participates in learning.

CHAPTER THREE

METHODOLOGY

3.1 Overview

This section represents a comprehensive description of the methods and techniques that were used in carrying out the study. These are the research design, target population, sample size, sampling techniques, research instruments, data collection and methods which were used to analyze the data.

3.2 Research Design

The research design that was used in the study was the descriptive survey. The purpose of descriptive survey, according to Merriam (2009), is to collect detailed and factual information that describes an existing phenomenon. Descriptive survey involves collecting data in order to test hypothesis or to answer questions concerning the current status of the subject under study.

The research adopted methodological triangulation for the study because the problems from multiple perspectives were considered so as to enhance and enrich the meaning of a singular perspective. It also helped the researcher to contextualize the information, to take a larger picture of a system and put the data into a more comprehensive explanatory framework.

Methodological triangulation involves using more than one research method or data collection technique to collect data. This is to ensure that the deficiencies of any one method can be overcome by combining methods and thus capitalizing on their individual strengths to verify one another, which reduces the impact of bias. Triangulation is among the methods that qualitative researchers use to ensure that they

are not being misinformed. The validity is enhanced if a conclusion is supported by data collected from a number of different instruments (Stake, 2010).

3.3 Area of the study

The study was conducted in the Agona East District of Central Region of Ghana. Agona East can be found in the western portion of the Central Region. Farming is the main source of livelihood of majority of the people in the area. It shares a boundary with the Eastern Region of Ghana to the west and to the east of Agona West District also in the Central Region. It was carved out the then Agona District in December 2012. The district administrative capital is Agona Nsaba. The district has 86 Junior High Schools in twelve educational circuits of which 60 are public schools and 26 are private schools.

3.4 Population

The target population was all the pupils and integrated science teachers in Junior High Schools in the Agona East District. Fifteen out of the 86 Junior High Schools in the districts were used for the study comprising two private and thirteen public schools. All the schools were co-educational. Van Daalen (2012) indicated that a survey should contain at least 10% to 15% of the accessible population and so 17% of the population was sampled.

3.5 Sample and sampling technique

In all, a total of 315 respondents consisting of 15 teachers and 300 pupils were collected. Out of the 15 teachers, 11 were males and 4 were females. Out of the 300 pupils, 132 were males and 168 were females. Stratified random sampling was used to select 20 pupils from each school involved in the study. In all the 15 schools, the pupils (forms 2-3) were assembled and 20 of them were randomly selected to

complete the questionnaire items. In each school, all the pupils were gathered and folded sheet of papers bearing the inscription "yes" or "no" were distributed among the pupils. Each pupil had the chance of picking a "yes" or "no" and only the 20 pupils who chose the "yes" sheets were considered to complete the questionnaire. In the case of the teachers, purposive sampling technique was used to select 15 integrated science teachers because they were directly involved in the teaching of science and contributed meaningfully to the data collection exercise.

3.6 Instrumentation

The main instruments employed for data gathering were questionnaires and an interview protocol. In addition, the BECE results of the pupils for past few years (2012-2020) were analyzed. The views of teachers and pupils about some of the possible causes of the poor performance of pupils in Integrated Science were collected. Data was collected through questionnaires and interviews. Separate questionnaires were designed to gather the relevant data from pupils as well as teachers. Questionnaires contained both open-ended items and closed-ended ones. The pupil questionnaire items were 25 and all were closed-ended. The teacher questionnaire items were 18 out of which 15 were closed-ended and three were open-ended. In the case of the pupil questionnaire all the items were used to obtain the reliability co-efficient. The items included 5 items on pupils‟ perceptions about Integrated Science, 3 items on the conduciveness of their school learning environment, 8 items on their home environment, 3 items on the teaching methods adopted by teachers and 6 items on challenges pupils faced with respect to the teaching and learning of Integrated Science. However, in the case of the teacher questionnaire 13 items were used. The items included 2 items on the conduciveness of their teaching environment, 2 items on the teaching methods used by teachers, 3 items

on the availability of teaching and learning materials and 6 items on challenges teachers faced in the teaching of Integrated Science. It excluded items on the teaching carrier of the teachers. During the test pilot one teacher was also interviewed and audio recorded.

3.7 Validity of the Instrument

The validity of the instrument represents the extent to which the instruments measures, what it purports to measure. Validity encompasses the entire experimental concept and establishes whether the results obtained meet all the requirements of the scientific research method (Moskal & Leydens, 2000). Questionnaire items were developed for both pupils and teachers. Content validity of the two instruments was determined with the help of the supervisor. After the examination of the instruments by the supervisor, changes were effected as a result of comments and suggestions from him. These changes were in the form of deletion of incorrect items, addition of new items and modification of existing ones. This helped to improve the content validity of both interview and questionnaires. Credibility was measured with the study revealing what it sought to find. Applicability was checked with a pilot test in Agona West District with 20 pupils with one integrated teacher. Neutrality was ensured by selecting adequate sample size of more than 15% (17%) of the total population. That is 15 Junior High Schools out of 86 Junior High Schools.

3.8 Reliability of Instrument

Reliability is the degree to which an assessment tool produces stable and constant results. Other researchers must be able to perform exactly the same experiment under the same conditions and generate the same results (Moskal & Leydens, 2000). With regard to the reliability of the questionnaire and interview protocol, a pilot test of

instrument was carried out with 20 pupils in one of the schools in Agona West Municipality. This was done before the instruments were administered to sample that was to participate in the actual study. Reliabilities of both the pupil"s questionnaire and teacher"s questionnaire were determined using Cronbach"s-Alpha to be 0.72 and 0.68 respectively. To ensure data reliability of the interview, the transcriptions of the audio recordings of the interviews were given to various teachers that were interviewed by the researcher to confirm whether the transcriptions represented what they actually said during the interview.

3.9 Data Collection Procedure

An official introduction letter from the Science Education Department of the University of Education, Winneba (UEW), was obtained to introduce the researcher to the various schools (Appendix E). A letter was also written to parents for their permission to collect data on their wards (Appendix E). The researcher was given access to both the pupils and teachers. The pupils were first assured of their confidentiality and the questionnaires were administered to them. Pupils were given a standardized time of 30 minutes to complete the questionnaire. The pupils were given the needed assistance and clarifications where necessary. In the next phase of data gathering, the Integrated Science teachers in each school were given the teachers questionnaire to complete.

Interview sessions with the teachers followed the filling of questionnaire on another occasion. Arrangement with 5 teachers out of the 15 teachers who filled the questionnaire was made at their convenient time for the interview session. The 5 teachers were randomly selected by writing the names of the 15 schools on pieces of papers after which 5 sheets were randomly picked. The teachers of the randomly

sampled schools formed the sample for the interview session. The duration of interview session was approximately 45 minutes and the interview was audio recorded with permission from the teachers and also took short hand notes of the salient points and themes stressed by the interviewees. The interview session afforded the opportunity to get an in- depth knowledge into the real situation in relation to some of the causes of poor academic performance of pupils in Integrated Science.

3.10 Data Analysis

All statistical analyses were made using the Statistical Package for the Social Sciences (SPSS version 16) and multiple regression analysis. Data for answering some of the research questions were analyzed using multiple regression analysis and descriptive statistics i.e. percentages, percentage frequencies and means of the responses by the sample. The researcher also annotated, transcribed and summarized the responses of teachers to the interview items based on recurring themes.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Overview

This chapter presents the results of the study obtained through the analysis of data. Results from data analysis of questionnaire are presented first followed by interview results. It also goes further to discuss the research findings.

4.2 Background Data on the Research Subjects

Gender of pupils

Out of the 300 pupils, sampled 56% were females and 44% were males as shown in Fig.1.

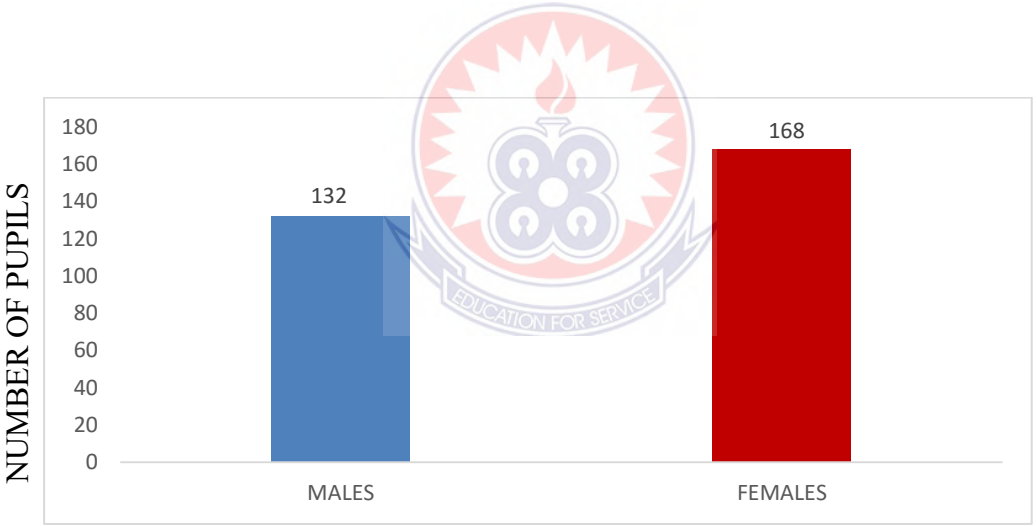

Figure 1: Gender distribution of pupils

Age of pupils

Majority of the sampled pupils were between the ages of 14 to 16 years as pupils from that age range constituted 75.7% of the total sample. About 21.6% of the pupils were between the ages of 17 and 18 years and the remaining 2.7% were 19 years. The modal age of respondents was 15 years (Fig. 2).

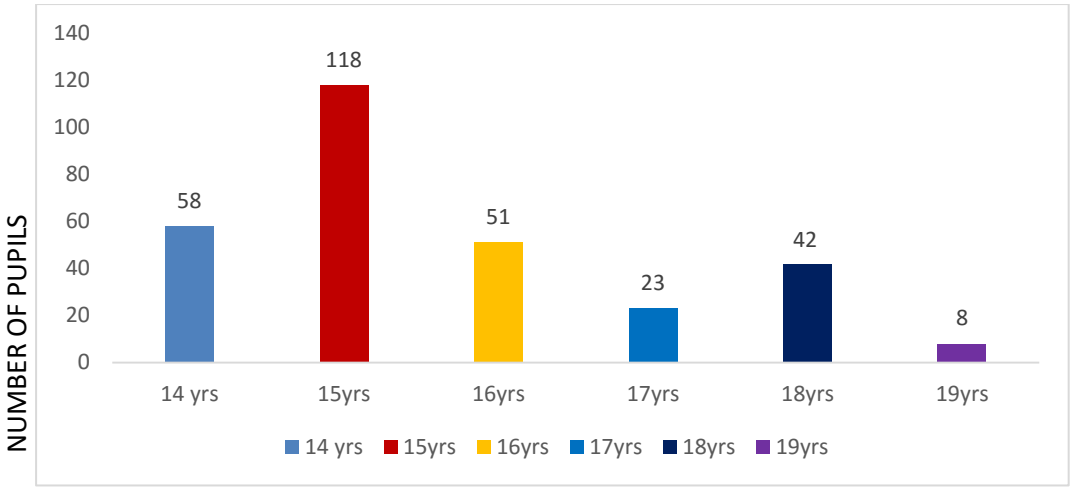

Figure 2: Age distribution of pupils

Gender of teachers

Eleven teacher respondents representing 73.3% were males and four representing 26.7% were females (Fig.3).

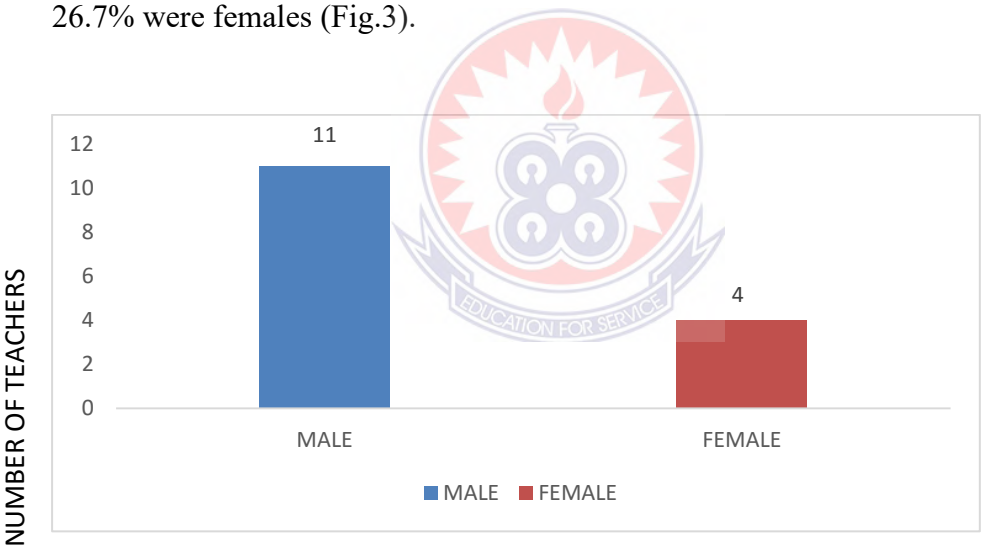

Figure 3: Gender distribution of teachers

Age of teachers

The ages of teachers ranged from 21 to 60 years (Fig. 4). Most of them were between 41 and 50 years. Two teachers were between 21 and 30 years. Five teachers were between of 31and 40 years and only one was between 51 and 60 years.

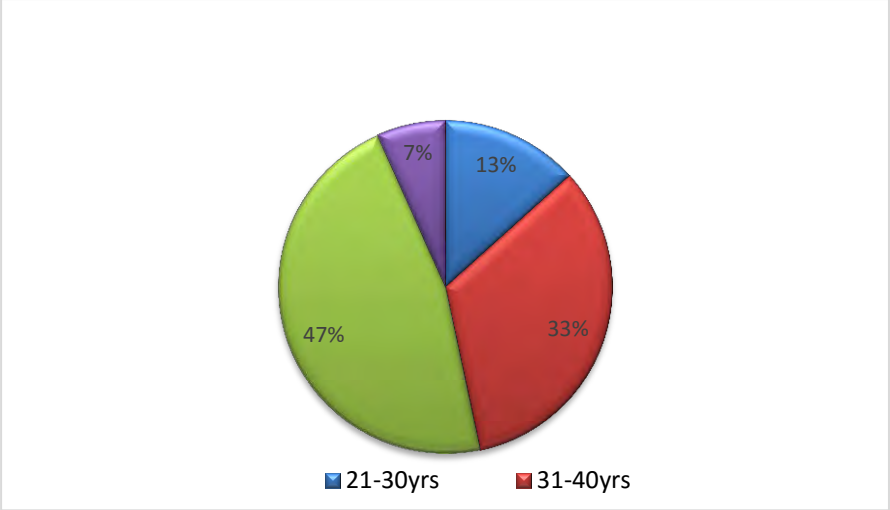

Figure 4: Age distribution of teachers

Teachers' working experience

The majority of teachers had less than 21 years of work experience. Three out of the 15 teachers representing 20% of the teachers had taught for fifteen years or less. Eleven (73.3%) had taught for a period ranging from 16 to 20 years. Only one teacher (6.7%) had been in the field for between 51 and 60 years (Fig. 5).

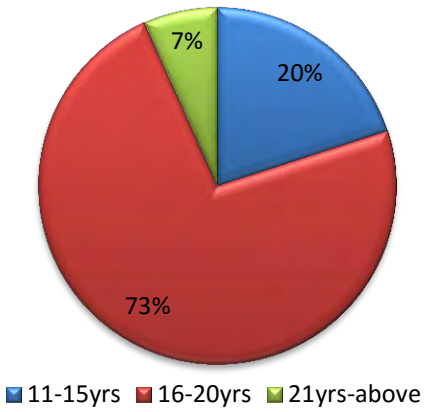

Figure 5: Teachers' years of working experience

Academic Qualification

Majority of the respondents forming 66.7% had acquired SSSCE/WASSCE as their highest academic qualification. Four teachers representing 26.6% were Bachelor of Science degree holders and one teacher was a Higher National Diploma holder (Fig. 6).

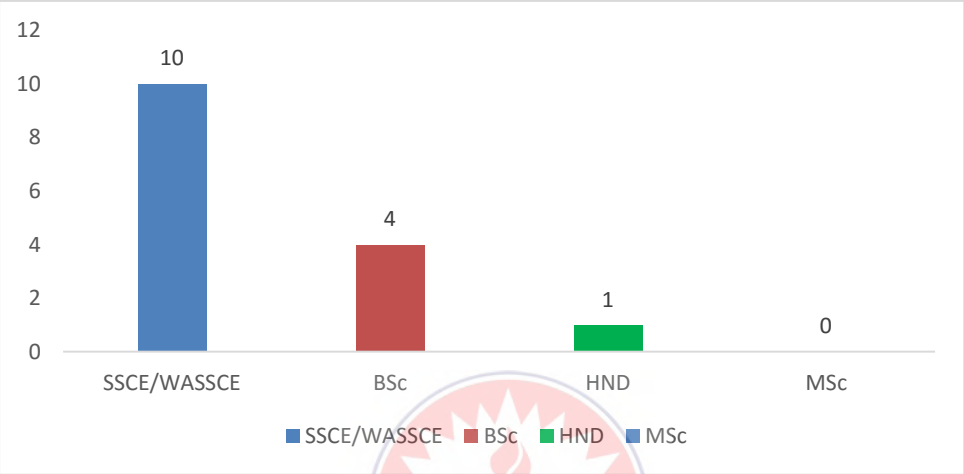

Figure 6: Academic qualification of teachers

Professional Qualification

Thirteen out of the 15 teacher respondents representing 86.7% had professional training while the remaining 13.3% of the teachers did not have any form of professional training (Fig.7).

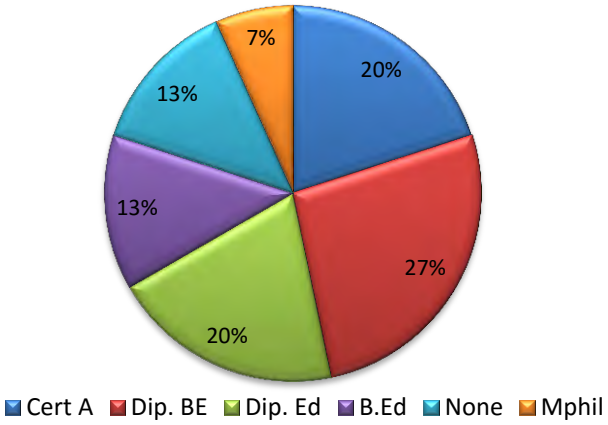

Figure 7: Professional Qualification of Teachers

4.3 Presentation of results based on research questions

Pupil's perception of Integrated Science

Questionnaire items (1-5) were designed to find out the perceptions of pupils about Integrated Science as shown in Table.

A large percentage (96%) of the pupils said that it was important to study Integrated Science while only 4% thought it was not important to study Integrated Science (Table 4). Fifty-eight percent of pupils sampled were of the view that Integrated Science had unrealistic nature while 42% of the pupils thought otherwise. Fifty-five percent of the pupils said it was boring to learn Integrated Science whereas 45% of the pupils said that it was not boring to learn Integrated Science. About seventy-five percent of the pupils were of the view that it was difficult to score high marks in Integrated Science but the remaining 25% had a contrary view. Most of the pupils (61%) were of the opinion that Integrated Science was difficult compared to the other subjects and 39% of the pupils were of the opinion that Integrated Science was not difficult compared to the other subjects.

Table 4: Pupils' perception of integrated science

Item number	Response	Frequency	Percentage
Item 1: Is it important to study integrated science?	Yes	288	96
	No	12	04
Item 2: Does integrated science has unrealistic nature?	Yes	174	58
	No	128	42
Item 3: Is integrated science boring to learn?	Yes	165	55
	No	135	45
Item 4: Is it difficult to score high marks in Integrated Science?	Yes	224	74.7
	No	76	25.3
Item 5: Is integrated science more difficult than the other subject?	Yes	183	61
	No	117	39

Result of Teachers' interview

Do you think Integrated Science is difficult to teach compared with other subjects?

All the teachers interviewed were of the opinion that it was more difficult to teach Integrated Science than other subjects. One of the reasons some of the teachers gave was that some of the scientific concepts were difficult to explain to pupils to understand without the appropriate teaching learning materials. Again, teachers said Integrated Science was a difficult subject to teach because most of the pupils generally had poor attitudes towards the subject, one female teacher said "*TLMs for some topics like chemical compounds and Atoms are not readily available and difficult to construct/design".* Another male teacher said that *"pupils had poor foundation in science at the primary level due to the fact that some primary teachers*

are not much knowledgeable in teaching the subject which might have resulted in pupils poor interest in science".

The fact that most of the pupils (61%) held the perception that Integrated Science was difficult compared to the other subjects and that it was difficult to score high marks in Integrated Science is a probable recipe for pupils" poor academic performance.

What are some of the topics you find difficult or challenging to teach?

The teachers mentioned the following topics as challenging topics to teach; chemical compounds, basic electronics, diffusion, osmosis and the carbon cycle. In order to address this challenge, teachers said that they went for further explanation and discussion of the difficult topics with other Integrated Science teachers from other schools. Some also said they got more information from the internet and sometimes brought in colleague science teachers to teach those topics.

Teacher"s responses from the interview also indicated that most of the teachers (80%) had challenges teaching certain topics because they thought those topics were difficult or challenging to teach; this could result in the teachers not teaching those topics well or avoiding them completely.

Adeyemi (2010) found out that there was a decline in learners" performance in science in the Senior Secondary Certificate Examinations (SSCE). He reported that in topics where teachers found it difficult to teach, learners tended to perform below expectations. According to Adeyemo (2011), the perception of teachers to a large extent determine the level of understanding reached by his/her students at the same time, the teachers" perception is the most important educational input predicting students" achievement.

Research Question 1: Does school environment influence academic achievement of pupils?

This research question was answered using responses of pupils‟ questionnaire items (items 6-8) and teacher‟s questionnaire. The responses from teachers through the interview schedule were also used to find out the influence of school environment on pupils‟ academic achievement.

Pupils' Responses

About 57% of the pupil respondents said their school environment did not support effective teaching and learning while about 43% stated that their school environment did support effective teaching and learning (Table 5).

Table 5: Effects of school environment on teaching and learning

Item number	Responses	Frequency	Percentage
Item 6: Does your school environment support effective teaching and learning?	Yes	128	42.7
	No	172	57.3

An analysis of the reasons given by the pupils to support their claim that their school environment did not support effective teaching and learning showed that about 48% of the students said their classrooms were overcrowded with too many students (Table 6). About 8% of them indicated that a source of pollution around their schools was responsible for ineffective teaching and learning while about 13% of the students said poor lighting in their classrooms did not support effective teaching and learning. Another 8% of the students claimed that overcrowded classrooms together with poor lighting in the classrooms did not support effective learning. Another 11% claimed that classrooms crowded with too many students and a source of pollution around

their school contributed to ineffective teaching and learning and 12% of the students said a combination classrooms crowded with too many students, poor lighting in classroom and a source of pollution around the school was the reason for ineffective teaching and learning.

Table 6: Reasons for school environment not supporting effective teaching and learning

Item 7: Reason for school environment not supporting effective teaching and learning	**Frequency**	**Percentage**
Classroom crowded with too many pupils	82	47.7
A source of pollution around the school	14	8.1
Poor lighting in the classroom	22	12.8
Classroom crowded with too many pupils and poor lighting in classroom	14	8.1
Classroom crowded with too many pupils and a source of pollution around the school	19	11.1
Classroom crowded with too many pupils, poor lighting in classroom and a source of pollution around the school	21	12.2
Total	**172**	**100**

The study further estimated the effect of school environment on teaching and learning in terms of academic achievement or performance using linear regression model. However, this study first used Person's Correlation Coefficient to determine

- The nature and degree of direction between school environments in terms of a source of pollution around the school.
- Classrooms crowded with too many pupils and poor lighting in classrooms.

- Classrooms crowded with too many pupils and a source of pollution around the school.
- Classrooms crowded with too many pupils, poor lighting in classrooms and a source of pollution around the school and academic performance as shown in Table 7.

Table 7: Correlation coefficient Matrix

	CCMP	SPAS	PLC	CCMPLC	CCMSPAS	CCMSPLC	ACAPERF
CCMP	1.000	0.569	0.212	0.278	0.369	0.330	-0.795***
SPAS		1.000	0.312	0.396	0.459	0.636	-0.658***
PLC			1.000	0.254	0.426	0.826	-0.758***
CCMPLC				1.000	0.258	0.840	-0.589
CCMSPAS					1.000	0.235	-0.459
CCMSPLC						1.000	-0.468
ACAPERF							1.000

Source: Field Data (2021) ***significant 1%, CCMP= classroom crowded with too many pupils; SPAS= source of pollution around the school; PLC= poor lighting in the classroom; CCMPLC= classroom crowded with too many pupils and poor lighting in classroom; CCMSPAS= classroom crowded with too many pupils and a source of pollution around; CCMSPLC= classroom crowded with too many pupils, poor lighting in classroom and a source of pollution around the school, ACAPERF= academic performance

From Table 7, there is a strong negative relationship between classrooms crowded with too many pupils and a source of pollution around the school, poor lighting in

classroom and teaching and learning measured as academic performance at 1% significant level. Thus, higher number of pupils in a classroom reduces effective teaching and learning and hence reduces academic performance. Also, the more the schools are being surrounded by sources of pollution, the lower the performance of the pupils since the environments might not favour continuous flow of teaching and learning. Furthermore, an increase in poor lighting in classroom decreases academic performance of pupils and a decrease poor in lighting in classroom leads to significant increase in academic performance of the pupils.

Additionally, classrooms crowded with too many pupils and poor lighting in classroom, classrooms crowded with too many pupils and a source of pollution around the school, classrooms crowded with too many pupils, poor lighting in classroom and a source of pollution around the school have negative relationship with academic performance of the pupils but their relationship is not significant.

Table 8 reveals that, school environment measured as classrooms crowded with too many pupils, poor lighting in the classroom and a source of pollution around the school have significant negative effect on academic performance of the students in the selected schools at 1% significant level. Also, classrooms crowded with too many pupils and poor lighting in classroom, classrooms crowded with too many pupils and a source of pollution around the school and classrooms crowded with too many pupils, poor lighting in classroom and a source of pollution around the school have significant by negative effect on academic performance of the pupils in the selected schools at 5% significant level. This might have resulted in low academic performance of the pupils. However, schools that do not have their classrooms crowded with too many pupils, poor lighting in the classroom, a source of pollution around the school, classrooms crowded with too many pupils and poor lighting in

classroom, classrooms crowded with too many pupils and a source of pollution around the school and classrooms crowded with too many pupils, poor lighting in classroom and a source of pollution around result in high academic performance of the pupils. From the analysis, it was observed that schools in Agona East District have less conducive school environment and this affected their effective teaching and learning and as a result led to low academic performance of the pupils. This confirms the study by Gilavand (2016), that school environments enhance students‟ learning performance and also motivate them to learn more.

Table 8: OLS Estimation of Effects of school environment support and academic performance

Variable		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
Academic performance	(Constant)	0.156	0.141		3.827	0.000***
	CCMP	-0.745	0.032	-0.197	-13.940	0.000***
	SPAS	-0.638	0.041	-0.560	-5.794	0.000***
	PLC	-0.574	0.037	-0.170	-12.983	0.000***
	CCMPLC	-0.277	0.052	-0.122	-4.046	0.030**
	CCMSPAS	-0.197	0.078	-0.321	-9.128	0.019**
	CCMSPLC	-0.379	0.097	-0.125	-16.258	0.048**

Number of Obs.	172
R	0.894
R-square	0.745
Adj. R-square	0.764
F-stats	789.135
P-value	0.000

Source: Field Data (2021) ***significant 1%, **significant 5%; CCMP= classroom crowded with too many pupils; SPAS= source of pollution around the school; PLC= poor lighting in the classroom; CCMPLC= classroom crowded with too many pupils and poor lighting in classroom; CCMSPAS= classroom crowded with too many pupils and a source of pollution around; CCMSPLC= classroom crowded with too many pupils, poor lighting in classroom and a source of pollution around the school.

Out of the 300 pupils sampled about 61% of them were of the view that there was good teacher-pupils relationship in their schools while about 39% were of the view that the relationship between teachers and pupils was poor (Table 9).

Table 9: Teacher-pupils' relationship in the school

Item 8: How would you describe teacher-pupils relationship in your school?	Frequency	Percentage
Good	182	60.7
Poor	118	39.3
Total	300	100

Teachers' response

About 27% of the teacher respondents said that their classrooms were overcrowded with too many pupils and around 73% stated otherwise. Concerning the adequacy of furniture for both pupils and teachers, 6 teachers representing 40% indicated that they had enough furniture for pupils and teachers while 60% said that available furniture were not enough for both pupils and teachers. Lack of completeness of educational equipment lowers motivation and creativity of teachers and students as well as limiting learning and teaching activities (Amirul, et al., 2013).

Responses from both teachers and pupils attested to the fact that there was a considerable level of pupils overcrowding in the classrooms. Studies have shown the significance of teacher- student ratio to cognitive learning in the school (Fabunmi & Okere, 2000). There is a relationship between factors like class size or population, teachers‟ strength, students‟ attitude and performance in examination. Roe, Stoodt, & Burns (2001), discovered that in reading scores on individual test, the smallest classes were significantly higher and largest classes were lowest of all. Teachers in many parts of the country have been advocating for smaller class sizes for years because they believe that students can learn better in smaller classes.

Table 10: Conditions in classrooms

Item number	Response	Frequency	Percentage
Item 1: Are the classrooms overcrowded with too many pupils?	Yes	04	26.7
	No	11	73.3
Item 2: Do you have enough furniture for both pupils and teachers?	Yes	06	40
	No	09	60

Result of Teachers' interview

What are some of the effects of poor learning environment on the academic achievement of your pupils?

Most of the teachers explained that overcrowding of students led to noise making especially by the pupils sitting at the back of the classroom during lessons.

One female teacher passionately complained saying "*madam, I have observed over the years during marking of pupils books and examination scripts that the pupils copy from each other during class tests and in examinations and this does not reflect pupils' true performances".* Three teachers from different schools also remarked that

"*inadequate furniture resulted in poor hand writing, bad sitting posture and created discomfort for the pupils"*.

One male teacher who has been teaching for nine years in his school expressed his frustration by saying that *"sometimes due to inadequate furniture pupils were not able to view demonstrations performed by the teacher during lessons well and so did not concentrate on the lesson because the teaching learning materials were kept on the floor during the demonstrations".* Two other teachers from different schools also mentioned that sometimes they put teaching learning materials and books on the floor because there were no tables for the teacher. They added that their pupils also put their bags, exercise books and textbooks on the floor which made them dirty and got torn easily. *Sometimes "I stand to mark pupils' exercises in my hands due to inadequate furniture which makes marking tiresome and therefore limit the number of exercises I give to the pupils"* a female teacher remarked.

Teachers whose schools were close to sources of smoke said pollution resulted in less concentration during lessons by the pupils because when the smoke comes they try to use their books to fan away the smoke. One female teacher whose school was closer to a beer bar said sometimes *"my pupils sang along and danced to music from the near-by beer bar during lessons."* She added that the noise made the pupils inattentive in class. Long term and repeated noise exposure can lead to psychological health as well as it can reduce the students learning motivation when they are at school (Gilavand, 2016).

One teacher whose school was close to a public toilet said, "*Sewage offensive smell broke off normally at noon so some pupils left school to dodge the odor especially after rain".* He intimated some of the pupils have left the school for other schools

while some pupils who absented themselves from school cited the presence of the odor as the reason for their absenteeism.

For proper learning process to occur, basic elements provided should be appropriate, adequate and functioning properly.

Research Question 2: Does home environment influence academic achievement of pupils?

This research question was answered using responses of pupils‟ questionnaire items (items 9-16) and teacher‟s interview schedule.

Pupils' responses

The analysed result indicates that, 35.7% of the pupil respondents lived with only their mothers while only 2% of the pupils lived with only their fathers. About eighteen percent of the pupils lived with their both parents while about thirty-four percent lived with their grandparents. About 10% of the pupils lived without parents or guardians (Table 11).

Table 11: Whom pupils live with in the home

Item 9: Parent or guardian	Frequency	Percentage
Mother	107	35.7
Father	06	02.0
Both parents	53	17.7
Grandparent	103	34.3
Alone	31	10.3
Total	**300**	**100**

Out of the 300 pupils sampled, the parents or guardian of 43.7% had pre-tertiary education in which case 15.7% had completed JHS, 16% had completed middle school and 12% had completed SHS. Only about ten percent said their parents had

completed tertiary institution. Forty-six percent of the pupils indicated that their parents or guardians had no formal education. Educated parents make efforts to provide enabling education atmosphere to their children at home so that they could benefit from that enabling environment whereas uneducated parents often fail to provide learning-friendly environment to their children at home (Nasir et. al., 2020).

Table 12: Level of education of parent

Item 10: Level of education	**Frequency**	**Percentage**
JHS	47	15.7
Middle school	48	16.0
SHS	36	12.0
Tertiary	31	10.3
None	138	46.0
Total	**300**	**100**

Approximately 30% of the pupil respondents claimed that they lived with between 1 and 2 siblings while a majority of about 50% said they lived with between 3 and 4 siblings. Sixteen percent of the pupils also said they lived with between 5 and 6 siblings and four percent said they lived with 6 and above siblings. Large family size creates in the upbringing of children some identified problems such as poor feeding, poor clothing, insufficient funds, and lack of proper attention for children, disciplinary problems and malnutrition, which impact negatively on children academic performance (Eristwhistle, 2011).

Table 13: Number of siblings pupils live with at home

Item 11: Number of siblings	Frequency	Percentage
1-2	89	29.7
3-4	151	50.3
5-6	48	16.0
6 and above	12	04.0
Total	**300**	**100**

The study also estimated the effect of home environment measured as educational level of parents and family size or number of siblings on academic achievement using linear regression model. However, this study first used Person's Correlation Coefficient to determine the nature and degree of direction between educational levels of parents and family size or number of siblings on academic achievement as shown in Table 14.

Table 14 shows that there is a strong positive relationship between educational level of parents and academic performance. Thus, parents with educational background with at least basic level significantly increase the academic performance of the pupils at 1% significant level. Furthermore, it was observed that there is a strong negative relationship between family size or number of siblings and academic performance of pupils at 1% significant level. Thus, pupils who come from small family size achieve high academic performance while pupils who come from large family size achieve low academic performance.

Table 14: Correlation coefficient Matrix

	EDUCAP	FAMILYS	ACAPERF
EDUCAP	1.0000	0.236	0.911***
FAMILYS		1.0000	-0.723***
ACAPERF			1.0000

Source: Filed Data (2021) ***Significant at 1%; where EDUCAP= educational level of parent; FAMILYS= family size; ACAPERF= academic performance

Table 15 reveals that, educational level of parents has positive significant effect on academic performance of the pupils in the selected schools at 1% significant level. This means that parents with educational background have wards with high academic performance and parents with no educational background have wards with low academic performance. This is due to fact that parents with high educational background will be concerned about their children‟s academic performance and monitor or supervise their learning at home. This confirms the findings of a study by Nasir, et al., (2020) that parents educational level is such a motivating force for a child which paves the way for his/her future. It is an admitted fact that, the children of educated parents are more confident, resourceful and experienced than the children whose parents are uneducated.

The analysis shows that, family size or number of sibling has significant negative effect on academic performance of the pupils at 1% significant level. This is because large family size is associated with a lot of challenges such as poor feeding, poor clothing, insufficient funds for buying learning materials, lack of proper attention for children, disciplinary problems and malnutrition, which impact negatively on children‟s academic performance (Ella, et al., 2015).

Table 15: OLS Estimation of Effects of home environment and academic performance

Variable		Unstandardized Coefficients		Standardized Coefficients		
		B	**Std. Error**	**Beta**	**T**	**Sig.**
Academic performance	(Constant)	5.181	0.018		4.162	0.000
	EDUCAP	0.914	0.024	0.911	38.067	0.000
	FAMILYS	-0.678	0.035	-0.654	-15.639	0.000
Number of Obs.	300					
R	0.911					
R-square	0.829					
Adj. R-square	0.829					
F-stats	784.52					
p-value	0.000					

Source: Field Data (2021) ***Significant at 1%; where EDUCAP= educational level of parent; FAMILYS= family size; ACAPERF= academic performance

The result indicates that only about twenty-nine percent of the pupils said they had personal time table while a vast majority of seventy-one percent said they did not have personal time table. Thirty-four percent of the pupils indicated that their parents encouraged them to study at home but sixty-six percent of them responded in the negative. Around 30% of pupils were of the view that their parents supported them in their learning at home while about 70% of the pupils were of the view that their parents did not support them in their learning at home. The result again, shows that about 49% of the pupil respondents were supplied with all their educational needs. Approximately fifty-one percent of the pupils indicated that their parents were not able to supply them with all their educational needs. One hundred and eighty-one (60.3%) out of the 300 pupils said that they engaged in a form of commercial activity to financially support their education while the remaining 119 pupils (39.7%) said

they did not engage in any form of commercial activity (Table 16). This may affect learning negatively. Parents play a very important role in the education of their children. This is because children of educated parents are provided with better learning environment at home and at times teach their children themselves.

The research findings showed that most parents (66.3%) did not help their wards in their learning at home and were unable to supply the educational needs of their wards a reason that might have compelled most of the pupils to engaged in commercial activities. This confirms the research finding of Lebata (2014), which stated that the failure of parents to participate fully in their children‟s education resulted into poor performance in biology in Lesotho. Dhurumraj (2016), also, stressed no matter how minimal the parental involvement is, it is regarded as influential in the learner's performance.

Table 16: Pupils' condition at home

Item number	Responses	Frequency	Percentage
Item 12: Do you have personal timetable for learning at home?	Yes	86	28.7
	No	214	71.3
Item 13: Do your parents encourage you to study at home?	Yes	102	34
	No	210	66
Item 14: Do your parents guide you in your studies at home?	Yes	91	30.3
	No	209	69.7
Item 15: Do your parents supply you with your educational needs regularly?	Yes	146	48.7
	No	154	51.3
Item 16: Do you engage in any commercial activity to financially support your education?	Yes	181	60.3
	No	119	39.7

Result of Teachers' interview

Do you think the home environment of your pupils has influence on their academic achievement?

All the teachers interviewed claimed that some of their pupils lacked parental control and gave instances where pupils attended wake keeping and funerals of people with whom they did not have any relationship just to go and dance to music that was played at the funeral grounds. They intimated that many of the pupils lived with either their grandparents or mothers who might be too weak to control them all alone. They added that some of the boys lived alone without any direct parental control.

Two teachers (a male and a female) said poverty was a huge challenge for many of the families in their communities which was affecting academic achievement negatively. They further mentioned that some of the male pupils in their schools have confided in them that they were into internet fraud (*sakawa*) because their parents were poor and could not take good care of their families. The male teacher added, "*I have adopted one of them who is currently staying under my roof."*

A teacher intimated that there was a Chinese game center in his community and most of the male pupils went there to play games after school, sometimes stayed there until evening, and said it was one of the reasons the pupils were not doing well academically.

One female teacher passionately contended "*I personally know some of my girls have boy or man lovers who sleep with them for money. Their parents do not know when they go to bed and such girls are very disrespectful both at home and in school".* She went further to ask, *"How can indiscipline pupils do well in their studies"?*

Research Question 3: What teaching methods are being used in the teaching and learning of integrated science? This research question was answered using

responses of pupils‟ questionnaire items (items 17-19) teacher‟s questionnaire and teacher‟s interview schedule.

Pupils' responses

With respect to the most frequently used method of teaching by teachers, a vast majority (81%) of the pupils sampled said their Integrated Science teachers taught their lessons most frequently using the theory method (Table 17). Nineteen percent (19%) of the pupils said their teachers did not teach their lessons most frequently using lecture method. All the pupil respondents indicated that they did not have periods for practical lessons appearing on their time tables. Only 27% of the pupils indicated that the lecture method made them understand the lesson well but the remaining 73% said the use of the lecture method did not help them understand the lesson well.

Table 17: Teaching methods used in teaching and learning

Item number	Responses	Frequency	Percentage
Item 17: Does your teacher use theory or lecture method frequently during lessons?	Yes	243	81
	No	81	19
Item 18: Do you have periods for practical lessons on your timetable?	Yes	00	00
	No	300	100
Item 19: Does the lecture method help you to understand the lesson well?	Yes	81	27
	No	219	73

Teachers' response

Analysis of teachers‟ questionnaire data gave an indication that 80% of the teachers used the lecture method most frequently to deliver their lessons. This confirmed the

pupils claim that the most frequently used teaching method by teachers was the lecture method. No single teacher out of the 15 teachers taught Integrated Science lessons using the activity method most frequently. The remaining 20% of the teachers used demonstration method most frequently to deliver their lessons.

The use of the lecture method in teaching results in a situation where pupils simply obtain information from the teacher without building their engagement level with the subject being taught. The approach is least practical and leads to memorization. It does not apply activity-based learning to encourage students to learn real life problems based on applied knowledge. Since the teacher controls the transmission and sharing of knowledge, he may attempt to maximize the delivery of information while minimizing time and effort. As a result, both interest and understanding of students may get lost. A study by Umar (2011) into the causes of students‟ poor academic achievement in science in Nigeria showed the most recurring factor in all the reports was; the teaching strategy employed by the teachers, which is the conventional teaching strategy (lecture).

Table 18: Most frequently used teaching methods by science teachers

Method	**Frequency**	**Percentage**
Lecture	12	80
Activity	00	00
Demonstration	03	20
Total	**15**	**100**

Can you give reasons for your chosen answer?

Some of the teachers who frequently used lecture method in their lesson delivery said it made teaching easier and faster since they were able to cover many topics in a term. One teacher said *"since I did not have laboratory equipment for practical lessons it was used as a substitute".*

Teachers who frequently used activity method said it enhanced student participation during the teaching and learning process.

Based on the responses of teachers, it became clear that no teacher always got enough teaching and learning materials they needed for their lessons (Table 19)

Table 19: Adequacy of teaching learning materials for science lesson

Item number	Response	Frequency	Percentage
Item 4: Do you always get adequate teaching learning materials for your lessons?	Yes	00	00
	No	15	100

What do you do when it is inadequate?

Most of the teachers (66.1%) explained they taught the lessons using the lecture method in the absence of teaching and learning materials. Some of them said that in situations where they did not get enough teaching learning materials, they did improvise the teaching learning materials while others said they made use of the available materials in the environment. One teacher said "*I teach most of the lessons raw in the absence of the necessary teaching and learning materials".* He further added that some teaching and learning materials cannot be improvised, for example the types of acids and alkali. Two teachers mentioned that they sometimes borrowed some of the unavailable teaching and learning materials from nearby senior high

schools. According to Addae-Mensah (2003), the results released by the West Africa Examinations Council (WAEC) in science have consistently indicated that, schools that are well equipped in terms of adequate science laboratory equipment and other requisite teaching materials tend to produce better results while poorly equipped schools perform poorly in the subject.

Which teaching learning materials do you frequently use during lessons?

The teachers mentioned that they used various teaching materials during teaching but those that were frequently used included textbooks, pictures from textbooks, chalkboard drawings, drawings on cardboards and real objects.

The questionnaire item sought to find out how often teachers conducted practical lessons in a term. Approximately 27% of the teachers sampled indicated that they conducted practical lessons monthly while a majority of the teachers (73%) said they did not conduct practical lessons at all in a term (Table 20).

The results of the study also showed that periods for practical lessons have not been allocated on the lesson timetable of all the schools. This is not in line with the recommendation made by the CRDD (2012) in the Integrated Science syllabus which stipulates that the timetable should have two periods per week for practical. The practical lesson is to guide and inculcate in the learner skills in observing and measuring, formulating hypothesis, predicting and designing, investigating, recording data and interpreting result, drawing conclusion and communicating them (CRDD,2012).

Table 20: How often do you conduct science practical lessons in a term?

Method	Frequency	Percentage
Daily	00	00.0
Weekly	00	00.0
Monthly	04	26.7
Not at all	11	73.3
Total	**15**	**100**

Result of Teachers' interview

Does your headteacher give you most of the teaching learning materials you request for teaching?

All the teachers interviewed intimated that their headteachers were unable to give them most of the teaching and learning materials they requested for teaching. When asked about the reasons given by the headteachers in situations when they were not able to supply teachers with the requested teaching and learning materials, most of the teachers stated that their headteachers told them that there was no money and that the capitation grant had not been given. Some teachers said that headteachers asked them to improvise the teaching learning materials that were not available. One male teacher who had taught for five years said "*Can you imagine my headteacher always tells me to sacrifice my money to do that".*

In the absence of funds to provide the necessary teaching learning materials, the teaching and learning of Integrated Science would not happen as expected and this may lead to poor understanding of concepts by pupils. Teachers would tend to use suppositions instead of carrying out experiments (Ochu, 2010). Therefore, the non-

availability of teaching learning materials contributes to poor performance since science is learned better through hands-on activities. Mastery of science concepts cannot be fully achieved without the use of instructional materials. Teaching and learning materials are used to supplement verbal explanation of concepts or any description so that the lesson could be real to the students (Ochu, 2010). Words alone are insufficient to explain concepts for learners to capture and retain their attention and interest. Poor capital investment in terms of provision of science learning resources contributes to students‟ low level of academic achievement (Aguisibo, 1998).

Research Question 4: What are some of the challenges teachers and pupils encounter during the process of teaching and learning of Integrated Science in the Junior High Schools?

The main aim of this research question was to find out some of the challenges that were bedeviling the teaching and learning of Integrated Science in the Junior High Schools in the district using responses from pupils‟ questionnaire, teachers‟ questionnaire and teachers‟ interview schedule.

Pupils' responses

It is evidently clear from the pupils‟ responses that most of the pupils (79%) did not always understand most of the lessons taught by their Integrated Science teachers while only 21% said they always understood most of the lessons taught by their teachers (Table 21). Twenty-two percent (21%) of the pupils indicated that they were able to reproduce most the things that they learnt during examination and a vast majority of them (78%) said they were not able to reproduce most of the things they

learned during examination. This could be one of the reasons for pupils‟ low performance in Integrated Science.

As many as 195 (65%) out of 300 pupils confirmed that they were unable to read and understand the Integrated Science textbooks on their own while the remaining 105 (35%) claimed they were able to read and understand the Integrated Science books on their own. One hundred and seventeen pupils representing 39% said they did solve Integrated Science past questions with answers regularly. Regular solving of past questions exposes the pupils to a better way of answering examination questions and since the pupils did not regularly solve past questions, they were likely not to perform well in Integrated Science.

The data also indicated that approximately 67% of the pupils read their Integrated Science notes only when they were going to be tested while about 33% of pupils indicated that they did not read their Integrated Science notes only when they were going to be tested. A good study habit would mean the ability to learn and make use of what one is reading or studying. Study skills when properly embedded help learners to develop their own potentials for intellectual growth and self-direction. It is for this reason that the strategies of study habits among learners should be emphasized; if not, learners would perform below average (Ward & Wandersee, 2002). Sixty-three pupils representing 21% of the students said that their teachers did not come to class regularly for lessons while 237 pupils representing a substantial percentage of 79% did say that their teachers came to class regularly for lessons. The results of the research also indicated that a sizeable number of the teachers did not attend class regularly to teach their lessons (see Table 21). This poor attitude to work by teachers can easily result in negative attitude on the part of the pupils towards

Integrated Science as a subject. Lebata (2014), reported that in most schools in Lesotho, poor academic achievement in biology was due to poor attendance of teachers. Most teachers missed their lessons even when they were present at work and this behavior affected academic performance negatively.

Table 21: Challenges faced by pupils and teachers during teaching and learning of integrated science

Item number	Responses	Frequency	Percentage
Item 20: Do you always understand most of the lessons your integrated science teaches?	Yes	63	21
	No	237	79
Item 21: Are you able to reproduce most of the things that you learn during examination?	Yes	66	22
	No	234	78
Item 22: Are you able to read and understand integrated science textbook on your own?	Yes	117	39
	No	183	61
Item 23: Do you solve integrated science past questions on a regular basis?	Yes	105	35
	No	195	65
Item 24: Do you read integrated science notes only when you going to be tested?	Yes	202	67.3
	No	98	32.7
Item 25: Does your integrated science teacher come for lessons regularly?	Yes	237	79
	No	63	21

Teachers' response

It is clear from the result that all the teachers were of the view that the integrated science syllabus was loaded with too many topics. Learners are being overwhelmed by information in a short period of time and this results in poor performance because the working memory can only process a few new elements and can be stored for a short period of time (Kirschner, Paas & Kirschner, 2009). Osborne et. al., (2003), also reported that students‟ diminishing interest in learning science was due to the curriculum content being overloaded and not generally related to working life, the lack of discussion of topics of interest, the absence of creative expression opportunities, the alienation of science from society and the prevalence of isolated science subjects.

Table 22: Nature of integrated science syllabus

Nature of syllabus	**Frequency**	**Percentage**
Loaded with too many topics	15	100
Few topics to be covered in three years	00	00
Total	**15**	**100**

Only one teacher representing about 7% of the teachers said their pupils participated very actively in integrated science while about 33% said their pupils‟ participation in integrated science was active. The remaining 60% were of the view that their pupils‟ participation in integrated science was not encouraging (Table 23).

Table 23: Pupils' level of participation in integrated science lesson

Pupils' level of participation	Frequency	Percentage
Very active	01	6.7
Active	05	33.3
Not encouraging	09	60.0
Total	**15**	**100**

Some five teacher respondents representing 33.3% were of the opinion that their pupils had positive attitude towards integrated science while the remaining 66.7% were of the opinion that their pupils had poor attitude towards integrated science. Many internal and external factors are known to influence students" achievements and interests in learning of science. Poor attitude towards science leads to low student academic performance not only in science classes, but also in other subjects as well. The future of our society will be determined by citizens who are able to understand and help shape the complex influences of science and technology on our world (Ungar, 2010)

Table 24: Pupils' attitude towards integrated science

Pupils' attitude	Frequency	Percentage
Positive	5	33.3
Poor	10	66.7
Total	**15**	**100**

Reasons for poor attitude of pupils towards integrated science

The teachers identified the following as some of the reasons for poor attitude of pupils towards integrated science.

1. Poor concentration during lessons.
2. Laziness in personal study of books at home by some pupils.
3. Truancy from school.
4. Some pupils also failed to do their homework and even class exercises.
5. Poor teaching methods used by some teachers in the delivery of lessons did not motivate the pupils.

Responses from the teachers indicate that about 13% of the teachers said the performance of their pupils at the BECE in the last few years was good based on the available BECE result. Forty percent said the performance of their pupils was average whereas approximately 47% of the teachers said the performance of their pupils at the BECE in the last few years was poor (Table 25).

Table 25: Performance of pupils in integrated science (BECE) in the last few years

Pupils performance	Frequency	Percentage
Good	2	13.3
Average	6	40.0
Poor	7	46.7
Total	**15**	**100**

Result of Teachers' interview

Are there any challenges that you face in the teaching and learning of integrated science?

Obviously, all the teachers said there were challenges in the teaching and learning of Integrated Science. Some of the teachers interviewed bemoaned the limited time allocation on the timetable for Integrated Science. They said there was a lot of content to be covered in a short time and it caused some of the teachers to teach mainly topics that they suspected the WAEC would set questions on during the BECE. This conforms to the findings of the study by Muzah (2011) in South Africa, which stated that the teaching methods used by some science teachers reduces science teaching to preparation for examinations and tests rather than enhancing the learner's abilities to explore ideas by means of hands-on activities. One male teacher indicated, "*Some of the pupils refused to attend classes regularly after they had been registered for the BECE. They only surfaced when there were mock examinations and during the BECE itself and these pupils got poor grades in almost of all the subjects. Even some of the pupils in forms 1 and 2 also absent themselves from school sometimes up to 6 weeks."*

Most of the teachers said that inadequate textbooks for pupils, inadequate teaching learning materials for teaching, lack of laboratories and laboratory equipment for laboratory work were some of the challenges they were facing. Yara and Otieno (2010) indicated that the availability of teaching resources enhances the effectiveness of the schools as they can bring about good academic performance in the students.

According to three of the teachers interviewed, pupils came to the Junior High School with poor background knowledge in Integrated Science from the primary school level and most pupils had low interest in Integrated Science as well as a misconception that Integrated Science is a difficult subject. *"Inability of teachers of integrated science to*

demystify science by creating an attractive classroom environment to arouse pupils' interest in science because science was not their subject area of specialization". (A male teacher who had taught for 11 years intimated).

How can the challenges you have mentioned be solved?

Most of the teachers said that their employers (GES) should as a matter of necessity provide enough teaching learning materials available to schools for effective teaching and learning.

Some teachers said the GES must make and implement a policy that would prevent pupils who absent themselves from schools for a long time after registering for BECE only to surface about a week to writing of the BECE.

A teacher intimated, **"***involving the students in practical activities is the best way to go since pupils enjoy practical lessons than the everyday theory".*

Some teachers also indicated that integrated science teachers must continuously demystify misconceptions that integrated science is a difficult subject by inviting science related professionals to share life experiences with them.

Some of the teachers also mentioned that teachers could raise the level of interest of the pupils in the subject by making their teaching more students-centred (collaborative learning) as well as organizing field trips to scientific institutions and ecological environment.

A female teacher said that the formation of science clubs and the organisation of science and mathematics quizzes from time to time at the district level could improve pupils" performance**.**

What are some of the ways the performance of pupils in integrated science (BECE) could be improved since statistics show that there has been low performance in the last few years?

Most of the teachers (about 87%) suggested regular in-service training courses for Integrated Science teachers to sharpen their pedagogical skills and content knowledge in science. One male teacher said, *"I strongly advocate the need for regular and intensive supervision of teachers from upper primary up to JHS by circuit supervisors to reduce teacher absenteeism and ensure that the teachers are performing their core mandate of imparting skills and knowledge to the pupils".* The teachers also mentioned provision of laboratories and equipment for practical lessons to whip up the interest of the pupils in the subject. Two male teachers from different school intimated that to address the issue of inadequate furniture the government should as a matter of urgency supply enough furniture or the PTA money paid by parents and part of the capitation grants be used to purchase the needed furniture. They strongly suggested the provision of adequate teaching and learning materials by headteachers and the government for efficient and effective delivery of lessons. A male teacher who doubles as school counselor for the pupils passionately said that *"I expect my colleague teachers to constantly counsel pupils on the need to take their education seriously as it may guarantee a better future for them since these pupils are our own children".* Parents must also be encouraged to support their wards" education. Adequate time allocation on the timetable for the teaching of Integrated Science to enable teachers complete the syllabus and revise the notes with pupils before they went to write the BECE was also mentioned.

Other teachers said government should provide adequate textbooks for pupils to allow the pupils read the textbooks on their own at home and improve their understanding of the subject. One female teacher with 12 years teaching experience said, *"I suggest subject teaching should be introduced at primary schools so that Integrated Science teachers would teach natural science to give pupils a good foundation and develop their interest in science and also Integrated Science teaching should be allocated to teachers with science background only"*

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Overview

This chapter presents the summary of the findings, conclusions and recommendations on how to improve upon the teaching and learning of integrated science. Also, suggestions for future research work have been made.

5.2 Summary of Findings

The study sought to find out the impacts of environmental factors on academic achievement in Integrated Science by pupils in JHS in Agona East District. Specifically, the study sought to:

- Find out the influence of school environment on pupils‟ academic achievement in the Junior High Schools.
- Determine the impact of parents‟ educational level and family size on pupils‟ academic achievement in the Junior High Schools.
- Find out the teaching methods that are being used in the teaching and learning of integrated science in the Junior High Schools.
- Find out some of the challenges teachers and pupils encounter during the process of teaching and learning of Integrated Science in the Junior High Schools.

Questionnaires, interview protocol and document analysis were used to gather data for the study. The study revealed that most of the teachers were between 41 to 50 years and had between 16 and 20 years of work experience and most of them were professionals. Also, vast majority of the pupils held the perception that Integrated Science was difficult compared to the other subjects because they thought it was

difficult to score high marks in Integrated Science. Moreover, teachers opined that Integrated Science was a difficult subject to teach because most of the pupils generally had poor attitudes towards the subject.

The research findings also revealed that, about 57% of the pupil respondents said their school environment did not support effective teaching and learning while about 43% stated that their school environment did support effective teaching and learning as a result of overcrowding of pupils in the classrooms coupled with situations of inadequate furniture for both the pupils and the teachers and poor lighting in classroom. Again, some school compounds were close to sources of pollution such as loud music from beer bars and bad odour (sewage smell) from near-by public toilets.

The school environment support has positive significant effect on academic performance of the pupils in the selected schools at 1% significant level. This means that a school with high environment support for effective teaching and learning has pupils with high academic performance and a school with low environment support for effective teaching and learning has pupils with low academic performance. From the analysis, it was observed that most of the schools in Agona East district have low environment support and this affects their effective teaching and learning and as result leads to low academic performance of the pupils.

The research findings showed that most parents (66.3%) did not help their wards in their learning at home and were unable to supply the educational needs of their wards, a reason that might have compelled most of the pupils to engaged in commercial activities. Forty-six percent (46%) of the parents or guardians had no formal education with some 43.7 % having pre-tertiary education, large family size coupled

with single parenting and some pupils living with no parents or guardians had negative effects on academic achievement of pupils.

Responses from both teachers and pupils revealed that the lecture method was the most frequently used method at the expense of practical for lesson delivery by most of the teachers since there was inadequate supply of teaching and learning materials by headteachers coupled with failure of teachers to produce some and due to large content area of the syllabus. It was also revealed that no period had been allocated for practical lessons on the timetable of all the schools.

The research findings also, indicated that most of the pupils (79%) did not understand most of the lessons taught by their science teachers and were not able to reproduce most of the things they learnt during examinations. Also, most pupils (65%) were unable to read and understand the Integrated Science textbooks on their own. Most of the pupils (67%) read Integrated Science notes only when they were going to be tested. Sizable number of the pupils (21%) said that their teachers did not come to class regularly for lessons and teachers also mentioned pupil absenteeism after WAEC registration.

5.3 Conclusions

The study has established that the school environment and home environments of the pupil exert some potent and positive influence on pupils‟ achievement in Integrated Science. Based on the findings of the study, it can be concluded that, the fact that both teachers and pupils held the perception that, Integrated Science was a difficult subject could reflect in the teaching of the subject by the teacher and in the learning process by the pupils which might result in poor performance of the pupils.

Also, overcrowding of classrooms with too many pupils couple with poor classroom lighting in some schools could lead to inattentiveness and noise on the part of some of the pupils which could produce poor academic performance of the pupils.

The use of lecture method of teaching in itself could lead to poor attitude of pupils towards Integrated Science and consequently result in poor performance of the pupils. Moreover, absenteeism on the part of both teachers and pupils could also be responsible for pupils‟ poor performance in Integrated Science. The inability of pupils to understand Integrated Science lessons and poor study habits could be a high possible cause of pupils‟ poor performance.

Additionally, no and low formal educational background of parents couple with large family size might have contributed to the low performance in Integrated Science by the pupils. Financial irresponsibility of some parents towards their wards‟ education might have also resulted in the poor performance of the pupils.

5.4 Recommendations

The following recommendations have been made based upon the findings of the study.

1. Since attitudes can be modified by experience, it is advised that effective teaching strategies such as the use of modern methods of teaching including use of computers in teaching science in order to motivate and sustain pupils‟ interest in as far as possible and in most science topics should be employed. This can encourage pupils to be more positive in their attitude and perceptual orientation towards Integrated Science.
2. Headteachers and District Directors of GES should supply all the necessary materials and resources needed for efficient implementation of the syllabus on

regular basis. Additionally, In-service training for teachers should also be carried out regularly so as to equip the teachers with modern teaching methodologies and train them on how to modify the locally available materials to be used as teaching aids.

3. Government through the GES, must increase her commitment to providing building infrastructure in the various schools to prevent overcrowding of pupils in order to encourage teacher-pupil individual interaction.
4. Government through the District Education office must intensify her effort at providing non-formal education to illiterate parents in the various communities to empower them to guide or supervise their wards at home during learning.
5. Continuous counseling services by trained school counselors must be rendered to the pupils on the need to take their studies seriously and the appropriate sanctions be meted to both absentee teachers and pupils by the school authorities.
6. Parents and guardians should be encouraged to fully support their wards‟ education morally and financially.

5.6 Suggestions for Future Research

This study focused on the impacts of environmental factors on academic achievement in Integrated Science by pupils in JHS in Agona East District and the results showed that overcrowding and financial irresponsibility of parent were some of the possible causes of poor academic achievement in Integrated Science by the pupils. For future studies, it would be worthy of consideration to look at effects of specific environmental factor like class size on the academic achievement of pupils in Integrated Science. Similar research work could also be carried out in other subject areas to confirm the findings.

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APPENDIX A

ENVIRONMENTAL FACTORS THAT MILITATE AGAINST ACADEMIC ACHIEVEMENT OF JHS PUPILS IN INTEGRATED SCIENCE IN THE AGONA EAST DISTRICT OF GHANA

PUPILS QUESTIONNAIRE

General Instructions

1. It is not a test and there is no right or wrong answer.

2. Please tick [√] your most appropriate answer.

Date: ..... Age: ..... years

Gender: Male [ ] Female [ ]

School Type: (a) Girls only [ ] (b) Boys only [ ] (c) Co-educational [ ]

Class Level: JHS 1 [ ] JHS 2 [ ] JHS 3 [ ]

1. Is it important to study integrated science? (a) Yes [ ] (b) No [ ]

2. Does integrated science have an unrealistic nature? (a) Yes [ ] (b) No [ ]

3. Is integrated science boring to learn? (a) Yes [ ] (b) No [ ]

4. Is it difficult to score high marks in Integrated Science? (a) Yes [ ] (b) No [ ]

5. Is integrated science more difficult than the other subjects? (a) Yes [ ] (b) No [ ]

6. Does your school environment support effective teaching and learning?

(a) Yes [ ] (b) No [ ]

7. If the answer to question (1) is (b), tick any of the options below

(a) Classroom overcrowded with too many students [ ]

(b) A source of pollution around the school compound [ ]

(c) Poor lighting in the classroom [ ]

8. How would you describe teacher- students‟ relationship in your school?

(a) Good [ ] (b) Poor [ ] (c) Very bad [ ]

9. Who do you live with? (a) Mother [ ] (b) father [ ] (c) both parents [ ] (d) grandparent [ ] (e) Alone [ ]

10. What is the level of education of the one you live with?

(a) JHS [ ] (b) Middle school [ ] (c) SHS [ ] (d) Tertiary [ ] (e) None [ ]

11. How many siblings do you have living in your home?

(a) 1-2 [ ] (b) 3-4 [ ] (c) 5-6 [ ] (d) 6 and above [ ]

12. Do you have personal time table for learning at home? (a) Yes [ ] (b) No [ ]

13. Do your parents/ guardian encourage you to learn at home on your own?

(a) Yes [ ] (b) No [ ]

14. Do your parents/ guardian guide you in your studies at home? (a) Yes [ ] (b) No [ ]

15. Do your parents supply you with your educational needs regularly? (a) Yes [ ] (b) No [ ]

16. Do you engage in any commercial activity to financially support your education?

(a) Yes [ ] (b) No [ ]

17. Does your integrated science teacher use theory or lecture method most frequently during lesson? (a) Yes [ ] (b) No [ ]

18. Do you have periods for practical lessons on your time table? (a)Yes [ ] (b) No [ ]

19. Does the lecture method help you to understand the lesson well? (a) Yes [ ] (b) No [ ]

20. Do you always understand most of the lessons your integrated science teacher teaches?

(a) Yes [ ] (b) No [ ]

21. Are you able to reproduce most of the things that you learn during examination?

(a) Yes [ ] (b) No [ ]

22. Are you able to read and understand integrated science textbooks on your own?

(a)Yes [ ] (b) No [ ]

23. Do you solve integrated science past questions on a regular basis? (a) Yes [ ] (b) No [ ]

24. Do you read integrated science notes only when you are going to be tested?

(a) Yes [ ] (b) No [ ]

25. Does your integrated science teacher come for lessons regularly?

(a) Yes [ ] (b) No [

APPENDIX B

TEACHERS QUESTIONNAIRE

Dear Teacher,

Kindly read through each of the items carefully and indicate the opinion that is the nearest expression of your view on each of the issue raised.

General Instruction

Please tick [√] the appropriate bracket or column or fill in the blank spaces where necessary.

Date: …….

Gender: Male [ ] Female [ ]

Age: 21-30yrs [ ] 31- 40yrs [ ] 41-50yrs [ ] 51- 60yrs [ ]

1. How long have you been teaching integrated science?

0-5yrs [ ] 6-10yrs [ ] 11-15yrs [ ] 16 20yrs [ ] 21yrs and above [ ]

2. What is your highest academic qualification? SSSCE/WASSCE [ ] HND [ ] BSc [ ]

MSc [ ] PhD [ ]

3. What is your professional qualification? Cert.„A‟ [ ] Dip. B.E. [ ] Dip Ed. [ ] B.Ed. [ ] M.Ed. [ ] MPhil. [ ]

4. What is your area of specialisation? Biology [ ] Chemistry [ ] Physics [ ]

Agricultural Science [ ] Integrated Science [ ]

Any other please (specify)……

5. Have you ever had any in-service training in the teaching of integrated science?

(a) Yes [ ] (b) No [ ]

6. Are the classrooms overcrowded with too many students? (a) Yes [ ] (b) No [ ]

7. Do you have enough furniture for both pupils and teachers? (a) Yes [ ] (b) No [ ]

8. Which of the following methods of teaching do you frequently use in teaching?

(a) Lecture [ ] (b) Activity [ ] (c) Demonstration [ ]

9. Can you give reasons for your chosen answer?

……

……

……

10. Do you always get adequate teaching learning materials for your lessons? Eg; text books, models, charts, computers, etc. (a) Yes [ ] (b) No [ ]

11. What do you do when it is inadequate?

.....

.....

.....

12. Which teaching learning materials do you frequently use during lessons**?**

……

……

……

13. How often do you conduct integrated science practical lessons in a semester?

(a) Daily [ ] (b) Weekly [ ] (c) Monthly [ ] (d) Not at all [ ]

14. How would you describe the integrated science syllabus? (a) Overloaded with too many topics (b) Few topics to be covered within three years

15. What is the level of students‟ participation in integrated science lessons?

(a) Very active (b) Active (c) Not encouraging

16. What is the attitude of your students towards integrated science? (a) Positive [ ] (b) Poor [ ]

17. Can you give reasons for poor attitude of pupils towards integrated science?

18. How do you grade your pupils‟ achievement in integrated science in the BECE in the last few years? (a) Good [ ] (b) average [ ] (c) Poor [ ]

APPENDIX C

TEACHER INTERVIEW SCHEDULE

1) Do you think integrated science is difficult to teach compared with other subjects?
2) What are some of the topics you find it difficult or challenging to teach?
3) What do you do to address the situation?
4) What are some of the effects of poor learning environment on the academic achievement of your pupils?
5) Does home environment influence academic achievement of pupils?
6) Does your head teacher give you most of the teaching learning materials you request for teaching?
7) If no, what reason does he /she give?
8) Are there any challenges that you face in the teaching and learning of integrated science?
9) How can the challenges you have mentioned be solved?
10) What are some the ways the performance of pupils in integrated science (BECE) could be improved since statistics show that there has been low performance in the last few years?

APPENDIX D

University of Education, Winneba

Faculty of Science Education

Department of Science Education

Winneba

10th August, 2021.

LETTER OF CONSENT OF PARENTS

I, ……. (parent) do agree/ do not agree to my ward giving out information about my family in connection with data collection exercise on the topic " Environmental factors that militate against academic achievement of JHS pupils in integrated science in Agona East District".

Name of Researcher- Diana Nsiah

Tel.- 0243177922

APPENDIX E

LETTER OF INTRODUCTION

UNIVERSITY OF EDUCATION, WINNEBA
FACULTY OF SCIENCE EDUCATION
DEPARTMENT OF INTERGRATED SCIENCE EDUCATION
P. O. Box 25, Winneba, Ghana
+233 (020) 2041077
ise@uew.edu.gh

Our ref. No.: ISED/PG.1/Vol.1/15
Your ref. No.:

Date: 18th May, 2021

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

LETTER OF INTRODUCTION
MISS DIANA NSIAH

We write to introduce, Miss Nsiah is a postgraduate student of the Department of Integrated Science Education, University of Education, Winneba, who is conducting a research titled:

ENVIRONMENTAL FACTORS THAT MILITATE AGAINST ACADEMIC ACHIEVEMENT OF JHS PUPILS IN INTEGRATED SCIENCE IN AGONA EAST DISTRICT

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

Thank you.

Yours faithfully,

ALEXANDRA N. DOWUONA
PRINCIPAL ADMIN. ASSISTANT
For : HEAD OF DEPARTMENT