UNIVERSITY OF CAPE COAST

EXPLORING THE PERCEPTION OF JUNIOR HIGH SCHOOL TEACHERS AND STUDENTSON TOPICS IN THE INTEGRATED SCIENCE SYLLABUS

DANIELSAKPAKU

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BY

DANIELSAKPAKU

Thesis submitted to the Department of Basic Education, of the College of Education Studies, University of Cape Coast, in partial fulfilment of the requirements for award of Master of Philosophy Degree, in Basic Education.

FEBRUARY 2016

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the results of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature: …................................... Date: …………………

Name: Daniel Sakpaku

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisors' Signature: ………………….Date: ………………..

Name: Dr FiifiMensah

Co-Supervisors' Signature: ………….………………Date: ………………

Name: Dr Christian Anthony-Krueger

ABSTRACT

This study explored students' and teachers' perceptions of integrated science topics in the JHS (1-3)integrated science syllabus. It compared the perception of students' with that of their teachers' with the hope of ascertaining whether the perceptions do exist.The study also explore if gender and school location had any bearing on the performance of the students in relation to integrated science topics. The survey method was employed where questionnaires was administered to 300 Form Three (3) Junior High School students and their 30 Integrated science teachers. Students' perception of the integrated science syllabus topics questionnaires and teachers' perception of integrated science syllabus questionnaires were administered to the participants. Sample was drawn out of 56 public Junior High Schools in Ketu-North District of Volta Region where schools that had treated or completed topics in the integrated science syllabus were those selected for the study.The study showed that the JHS 3 students' perceived 8 out of the 43 integrated science topics to be relatively difficult to learn. Further, Integrated science teachers perceived 8 out of 43 topics to be relatively difficult to teach by about 20%. It is therefore recommended among others that, in-service training and workshops should be organized for teachers regularly by educational authorities so that teachers can teach concept such as basic electronics, chemical compound, acids, base and salt, electrical energy among others with ease.

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DEDICATION

To my wife, Jennifer Cutadoo and my mother Madam Aku Dordi.

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CHAPTER ONE

INTRODUCTION

This chapter entails the background to the study, statement of the problem, purpose of the study, research questions and hypothesis. It also discusses the significance of the study, delimitations of the study, limitations of the study, and the organisation of the rest of the study.

Background to the Study

The role of science in the life of humanity cannot be over looked or even pushed under the carpet. This is because the development and growth of any country depend on the skills that the citizens have acquired in science and how meaningfully the citizens apply the scientific skills that they have acquired in finding solution to their societal problems. These suggested that these skills cannot be acquired from isolated discipline but rather from masses of disciplines put together known as integrated science. Integrated science is a combination of all the sciences with the fusion of technology, taught and learnt as a single subject to ensure that the individual acquired the basicscientific skills needed in solving the problem of the society (Leliveld, 2002; Abbeyet al., 2008). This is because problems of the world is not from one source but from several sources, so issues and realities need to be addressed beyond one discipline, that is, the gathering of knowledge, skills, abilities and patterns required such interdisciplinary mental schemes and actions, which also goes beyond just learning of one discipline (Draghicescu, Petrescu, Gorghiu&Gorghiu 2014). It was this reason that is why Abbott (1980), revealed that the hopping of a frog has inspired Alexandra Volta to conduct a research why frog hops. Abbott said Alexandra Volta used his findings from the research to develop electricity, which is now the engine of growth for every country this is because electricity is a vital source of energy used for powering industries, lighting homes and even used to warmth and cooled rooms in temperate and tropical regions during winter and summer. These significant successes of science mean that when learned with much attention it could help solve Ghana'ssocio-economic and political problems such as inadequate electricity supply, poor sanitation; post-harvest loses in agriculture and electoral challenges that we are currently facing (Ongowo, 2013). Globally, such impressive successes of science are seen on how the deadly disease called Ebola which nearly brings about human extinctions has been managed and brought under control particularly in the endemic countries (Guinea, Liberia and Sierra Leone) and how genetically modified seeds are being introduced among farmers to enhance better yield during unfavourable weather conditions. It was thisreasons that is why Roberts suggested that all students' needs scientific literacy to become fully- fledged citizens and to be able to work with science and science related matters in their professional and private spheres (as cited in Astrom, 2008). Therefore, the teaching and learning of integrated science in our schools can equip students with the requisite skills and ideas to rise up to societal needs.

In light of these, Owo (as cited in Edu&Edu, 2013) was of the opinion that nations depend on the qualities of their scientists andtechnologists to make life more comfortable for their citizens in this competitive global scientific environment. Based on this it can be concluded that Western countries have transformed rapidly due to the strong foundation that they laid for students in both science and technology, which had a practical application on their societies. Ogunkola and Samuel (2011) were also of the view that the economic development of the Caribbean regions such as Cuba, Mexico and Nicaragua was due to their citizens' skills inclination in science and technology. For example, Cuba sends her medical doctors to countries that need them, of which Ghana is of no exception because citizens of Cuba practice and do science and channel their scientific skills acquired in finding solution to their problems. Noticing the benefit that Cuba derived from her citizens scientific acquisition, the Ghana Association of Science Teachers (GAST) has also been holding annual and biennial conferences with her members in order to introduced and sensitized members to the rudiments in the teaching and learning of science, for societal transformation. In Nigeria, Science Teachers Association of Nigeria (STAN) also ensures that the development of science and technology foundation is laid on the child formative years. That is teachers are encouraged to teach Integrated Science according to the philosophy outlined by the Science Teachers Association (Aworanti, 1991). However, results from researches on the teaching and learning of Integrated Science revealed that teachers' lecture and give notes when teaching Integrated Science lessons (Aworanti, 1991). Despite the various interventions from those concerns in education, the situation remains the same. It is indeed a tragedy that, the number of students (young people) who select science and science related subjects keep on decreasing day in day out (Astrom, 2008). This is due to candidates' poor performance at the Basic Education Certificate Examination (BECE) which Aworanti, (1991) attributed to poor teaching and learning in our High Schools. Jenkins and Pell; Osborne et al; and Schmidt (as cited in Ogunkola and Samuel, 2011) stated that studies worldwide have revealed that interest and attitudes in science has declined during students' secondary years. Krapp (2002) also alluded to this fact by saying that there is a significant decline in interest in physics, chemistry and mathematics as student progress through secondary school. He noted that the decline is common among girls. In another development Relevance for Science Education Project (ROSE) has conducted a research throughout Europe from 2003-2008 which revealed that the number of students regarding science subjects, particularly physics and chemistry, as difficult have increased (Gedrovics, Mozelka&Cedere, 2010). There has also been a persistent decline in post-compulsory high school science enrolment worldwide over the last two decades (Trumper, 2006).

Meanwhile the goal of integrated science education in Ghana is to prepare students to acquire scientific skills and scientific principles and used what they have acquired in a logical and coherent manner to the benefit of their society (Ministry of Education, Science and Sports, 2007 and Ministry of Education, Science and Sports, 2012). Critical analysis of the goals of integrated science suggests that students' poor performance in the subject would make the achievement of the goals difficult, which would eventually retard Ghana's growth and development. Abbey, et al., (2008); Davis, (2010) and Adeyemo, (2011) opined that nations that want to advance in science and technology development for their societal growth needs to invest adequately on resources that can enhance its effective teaching and learning in the various schools. This assertion is undisputable because countries that we now called the superpowers such as China, Russia, Germany, Japan and United State of America owns their allegiance to how adequately they have invested into the sciences (integrated science). Which the researcher would call the 'mother' of all the sciences simply because it combined all the sciences such as physics, chemistry, biology, agriculture and geology that has to be learn as a single discipline. In addition, integrated sciencehelps non-science students to acquire high level scientific skills before branching on to non-science field of study. This suggests that our world is not composed of one discipline but rather several interconnected discipline hence it needs to be learn as a single discipline. As a result, the Ministry of Education, Science and Sports (2007) and Ministry of Education, Science and Sports (2012) have introduced the integrated science as a compulsory subject to all Junior High Schools (JHS) and Senior High Schools (SHS) throughout Ghana.

The subject integrated science refers to the approach or pedagogy that unveil the principles and concepts of science to convey the fundamental unity of scientific thought and processes in order to avoid undue stress on the distinctions between the various scientific fields. That is learning integrated science provide students with fair ideas on the various branches of science and how to use those ideas acquired from the various branches of the science in solving problems in the society. For instance students who learnt about ecosystem can practically determine a particular predator that can keep a particular prey under control without using chemicals, (Anthony-Krueger, 2012) for example using fish to a control population of mosquitoes in a fishpong. Abbey, et al., (2008) defined integrated science as the study of the basic natural sciences such as chemistry, physics, biology, astronomy, agronomy, etc. and the ways they overlap. Thismeans that the various branches of sciences need be presented as a unified whole by the teacherso that the learner cannot notice the various branches by which science has existed. That is the knowledge acquired in integrated science should empower the student to solve problem of the society. Based on this deduction, Lagowski (2013) theorized that the subjects we know as “chemistry” which is a branch of integrated science and “society” has coexisted in a symbiotic relationship. That is the art of chemistry was capable of providing society with things perceived to be important such as pigments, materials (glass, metals, etc.), energy, and medicinal. Lagowki said for society to get her desired benefit, it (society) supported the practitioners of the chemical arts to improve the processes and materials that the chemical artisans engaged in, this processes and arts are what we call today research. Thus, the cycle of research and development was created out of this symbiotic relationship. Realising this inter-connectedness the Ministry of Education, Science and Sports (2007) has the belief that the integrated science could enhance Ghana socio-economic and political advancement since it would make students acquire scientific and technological skills, which they would use to develop the country (Ghana). As a result, the integrated science syllabus for the Junior High School and Senior High School was designed as a compulsory subject with the following aims:

1. developing understanding of scientific concepts and principles;
2. developing an appreciation for the application of science to life;

3. thinking and acting scientifically and developing scientific attitudes towards life.

That is, integrated science teaching and learning in basic and secondary schools levels expose and equip students with this vital knowledge, because as students pursue their educational ladder they move towards their areas speciality such as science and humanities. To achieve the objectives of the integrated science curriculum, Leliveld (2002) said,

> The Ministry of Education has set up 110 Science Resource Centre in all the districts in Ghana. These SRC have laboratory facilities with modern facilities. The centres serve as teaching centres and promote practical work among teachers and students. Other schools in the neighbourhood can use the facilities by using the SRC bus, (p. v).

This was done by the Education Ministry with the aim of equipping students with scientific skills and principles at their formative years of schooling so that as they branch towards non- science subject they can solve their daily problems scientifically. Studying all the various branches of the science as a single discipline is unquestionable because it exposes the student to variety of skills and principles, which could be adopted in solving societal problems that could leads to growth and development. (Abbey et al, 2008). According to Davis (2010) nations are classified as develop and developing country based on the number of agronomists, geologists, science educators, doctors, soil scientists, astronomies, biologists, chemists, engineers, physician and zoologists that a country has to mount her various productive sectors of the economy. It is against this background that the learning of integrated science at the basic and secondary school levels can enable the student to fully study and understudy the basic science doctrines and procedures in scientific discovery. It also makes students to make informed decision by adopting systematic procedures that can sustain the environment and to what extent that they can interact with the factors (biotic and abiotic factors) in environment. Therefore, any obstacle that would impede the successful implementation of integrated science syllabus through its teaching and learning must be rooted with all the seriousness that it deserves. Since this is the only way Ghana can derive her scientist (agronomists, chemists, doctors and astronaut) to mount the various sectors of the economy. In line with this the Ministry of Education, Science and Sports (2007) said,

> We are confronted daily with situations that require us to use scientific information to make informed choices and decisions at every turn. Modern life also requires general scientific literacy for every Ghanaian citizen. This is the only way by which the country can create a scientific culture toward achieving the country's strategic programme of scientific and technological literacy in the shortest possible time. Every citizen of the country needs training in science to be able to develop a scientific mind and a scientific culture (p. ii-iii).

That is why the various educational reforms such as Accelerated Development Plan of Education, (1951); Kwapong Review Committee, (1966); Dzobo Review Committee, (1974) and the Committee on Review of Education Reforms in Ghana, (2002) by the Ministry of Education, Youth and Sports, (2004) all aimed at equipping Ghanaian students with the necessary scientific skills. These educational reforms have resulted in to the integration of some subjects, dropping and adding of new subjects. Notable among them was the integrated science which was formally called General Science. As human needs are infinite it is only scientific skills and processes that can be used in nourishing these desires. As a result of these desires, the integrated science syllabus was drawn and implemented throughout all junior high schools in Ghana with the view of equipping Ghanaian students scientifically through teaching and learning in our school. As Ghana continuous toseek for development by instituting educational reformsthat could empower her citizens scientifically. So as it has been recognized by international and non-governmental organizations and agencies who have the concern for quality teaching and learning in basic schools in Ghana. They do these by providing assistance and intervention to improve education in basic schools. Some of these international organizations include the European Union. Domestically, the Ministry of Education, Science and Sports and the Ghana Education Service were not relenting in theirefforts in the provision of textbooks to schools, and strengthening themonitoring and supervision of teaching and learning in the basic schools. Some of such measures are the provision free exercise books and recommended textbooks for students and the introduction of Performance Monitoring Test (PMT) and School Performance Appraisal Meeting (SPAM) by the various communities and educational authorities (Mensah&Somuah, 2013).

The junior high school students were taken through so many science concepts from primary level through junior high up to senior high schools. According to Mensah and Somuah (2013), revealed that teachers perceived some integrated science topics difficult. Table 1, shows the summary of teachers' perception of the difficulty of integrated science syllabus.

Table 1:Topics in the Integrated Science Syllabus Teachers Perceive Difficult to Teach

Topics	Difficulty level (%)
Basic electronics	43.3
Chemical compound	21.7
Electrical energy	20.0
Acids, base and salt	11.7
Respiratory system	11.7
Technology and development	11.7
Metals and non-metals	8.3
Carbon cycle	8.3
Fish culture	8.3
Machinery	6.7
Magnetism	3.3

Source: Mensah and Somuah (2013)

In Table 1, JHS integrated science teachers perceived 43.3% of basic electronics, 21.7% of chemical compounds and 20.0% of electrical energy to be difficult to teach. Meanwhile the Integrated Science Chief Examiners' for Basic Education Certificate Examination (BECE) of West African Examination Council [WAEC], (2008) revealed that emphasis should be laid on the teaching of items in Physics and Chemistry of the integrated science syllabus because students performed poorly in these areas. This clearly shows that students' poor performance in the subject was as result of teachers perceived difficulty with physics and chemistry concepts of which basic electronics, chemical compound and electrical energy falls within according to the themes of the JHS (1-3) integrate science syllabus of the Ministry of Education, Science and Sports (2007). Therefore, teachers' perception of topic difficulty would have a negative effect on the student performance, because teachers would teach topics that they could effectively handle for students to understand.

In line with the problem identified above solution needs to be sort to make BECE candidates to do well in their exams.

Statement of the Problem

Junior High School Students' poor performance in the integrated science at the BECE has been a great concern to science educators. According to WAEC (2012), the Chief examiner for Integrated Science has reported that students failed to apply theoretical knowledge in the Integrated Science and therefore find it difficult to apply scientific knowledge to physical phenomenon. This is because candidates could not apply theoretical knowledge to physical phenomenon like balancing of chemical equations that make them to perform poorly in the integrate science during their BECE Chiefexaminer for integrated science (WAEC) have reported. Meanwhile, Ampiah (2004) says, "Learning by doing is best for acquiring process skills" (p.1). This means learners perfect their skills if they do practical alongside the theory. Failure of students to do practical during teaching and learning process could leads to exam failure. Mensah and Somuah (2013) revealed that for three consecutive years (2009-2011), 42% of the students, could not gain admission in to the Senior High Schools because students do not understand integrated science concept before writing their BECE which make them to failed the integrated science. The goals of integrated science teaching and learning as indicated in 2007 and 2012 teaching syllabus is to inculcate scientific skills and principles in to the students because modern life requires scientific literacy. Therefore, students who cannot apply scientific principles to real life situation cannot contribute meaningfully to the development processes of Ghana.

Again, Bonney (2009) reported that a little over 50% of the candidates who sat for the Basic Education Certificate Examination (BECE) in 2009 could not gain admission into Senior High Schools and Technical Institutes. This is because candidates could not get passes in these subjects (English language, mathematics, integrated science and social studies) which are used in placing candidates in to SHS. The Chief Examiners' report for BECE of West African Examination Council [WAEC, 2010; 2011; 2012; 2013; and 2014] confirmed this by reiterating the poor performances of students in the integrated Science. Since the Chief examiner's comments represent the summary performance of candidates across all districts in the country, of which Ketu-North District was not an exception from this sad phenomenon. To confirm this, data was collected from the Ketu-North District Education Office on the performance of BECE candidates in the integrated science subject from (2010; 2011; 2012; 2013 and 2014).

As shown in Table 2, 1386 candidates were presented for the Basic Education Certificate Examination (BECE) in the 2010, of which 818 (58%) failed (that is, candidates who had above grade 5) in the integrated Science. out of 1388 candidates wrote the BECE in 2011, 861 (62%) failed out of the total number of candidates presented by the District Education Office. 1345 candidates were presented in (2012) of which 993(74%) failed in the Integrated Science. In 2013, candidates' performances have improved to 43% passes and 57% failures. The rest of the information was depicted in Table 2.

Table 2: Summary of BECE Candidates' Passes in Integrated Science

Year	Number of students	Number passed	%	Number failed	%
2010	1386	575	42	811	58
2011	1388	527	38	861	62
2012	1345	352	26	993	74
2013	1429	608	43	821	57
2014	1613	661	41	952	59

Source: Field data(BECE result analysis from Ketu-North District Education Office)

Meanwhile to gain admission in to Senior High School, candidate has to pass all the compulsory subjects in the BECE of which the integrated science is one of them. The Integrated science is very important, because it allows students to gain admission into SHS and the knowledge acquired enables students to contribute meaningfully to the socio-economic development of the country. That is why governments across the globe are putting various interventions in place to equip theircitizens acquire such scientific skills which they use in resolving economic, political and social challenges of their society (Astrom, 2008; Edu, David, Edu, Grace &Kalu, 2012). To help minimized the poor performance of students in the subject; the government of Ghana has instituted some interventions in place to help curb the menace among the JHS candidates in Ghana. The interventions include math and science quizzes on Ghana Television (GTV), 60% study leave with pay for teachers pursuing science courses at tertiary institutions and scholarship for students pursuing science at higher institutions. Despites these interventions much have not been achieved due to teachers and students perception of difficulty of integrated science syllabus topics (Edu, et al., 2012). Salau (as cited in Mensah and Somuah, 2013) have attributed these poor performance of students by stating that, the science learning at the schools tends to be rote and students still find the learning of science to be difficult. Leliveld, (2002) said that in practice, not all teachers who find themselves confident to teach the various branches of the integrated science syllabus (biology, chemistry, physics, agricultural and environmental science). As a result, the subject is apportioned among subject specialist who can teach it. This situation of splitting the integrated science only happens in SHS and despite its existence, it does not get the required number of subject specialist to teach the various branches of the integrated science.

Teaching integrated science for the past seven years it took me six good years before a candidate gets grade one in the integrated science in 2013 BECE at Tadzewu JHS. The topic such as basic electronics, chemical compound, electrical energy and acid, base and salt have beenperceived as difficult by students and teachers. According, WAEC (2004) the Chief Examiner for General science said, most candidates showed beyond doubt that they were not ready for the examination. They were stark illiterate in too many of the concept tested. Candidates were not able to express themselves properly to convey their scanty ideas in a coherent manner.

It is against this background of poor performance of students in the integrated science at the BECE was the main reason why this study was to be undertaken.

Purpose of the Study

Based upon the problem statement, the study would explore integrated science topics perceived difficult to teach by teachers and difficult tounderstand by students, whether the perception is gender related, or school located.

Research Questions

To guide the study, the following research questions were posed:

1. What is JHS 3 integrated science students' perception of the level of difficulty of integrated science topics?
2. What is JHS integrated science teachers' perception of the level of difficulty of integrated science topics?
3. Which section/topics do integrated science teachers perceive most difficult to teach and what are the reasons given by the teachers for the difficulty?

Research Hypothesis

The following null hypotheses were tested

1. There is no significant difference between male and female students perception of the difficulty level of integrated science topics.
2. There is no significant difference between rural and urban school students' perception of integrated science topics.
3. There is no significant relationship between teachers' and students' perception of the difficulty level of integratedscience topics.

Significance of the Study

The findings of this study would benefit those, who in future would pursue further studies on perceptions of students and teachers in integrated science. It would help authors of JHS integrated science textbooks to write integrated science books and in a way that would be helpful to integrated science students and teachers.

The study would also be a useful guide to integrated science teachers on students perceived difficult topics and also guide curriculum developers on how to tackle the problem from the root.

The study would also be useful to the Department of Science and Mathematics Education, Department of Basic Education of the University of Cape Coast and University of Education, Winneba, in designing their curriculum for training prospective integrated science teachers to handle the JHS students.

It would also be useful to the Ghana Association of Science Teachers (GAST) in educating integrated science teachers in particular, in effective teaching of the perceived difficult topics in the integrated science during their annual conferences or workshops.

The problem identified would inform policy formulation in the future.

Delimitation of the Study

There are a number of subject taught and learnt in JHS that could be explore but this research was confined to integrated science syllabus topics. The study also focused on JHS 3 integrated science students and their teachers, because it is assumed that by the third year in JHS, integrated science students might have had exposure to all the integrated science topics and had seven years of learning (integrated science) experience (from upper primary to JHS) to develop a positive perception about integrated science topics.

Limitation of the Study

The study should have considered all the JHS integrated science students and teachers in Ketu-North District of Volta Region of Ghana. However, the focus was on only 30 integrated science teachers and 300students because at the time the researcher was going round the various schools to find out for himself the level of the integrated science syllabus completion. It was realised that only 34 schools that had completed the integrated science syllabus, hence the selection of the 34 schools of which four were used for pilot testing.

Secondly, putting students in a classroom as if they are going to write exam during the period of the questionnaire administration might create anxiety and tension associated with testing. This may inhibit the interpretation of the perception result been assessed and wrong data entering by the researcher is of no exception in affecting the actual finding of the study.

In summary, the chapter has outlined the importance of integrated science learning and how it could revolutionize the economy of Ghana as a country and the world at large. It has also pointed out that integrated science students cannot very easily understood integrated science topics. Hence, the research is geared towards the assessment of students and teachers perception in integrated science. The purpose and significance of the study have been pointed out despite the limitation and delimitation.

Organisation of the Rest of the Study

The rest of the thesis was organised as follows: Chapter two dealt with literature review of the study. By looking at the teaching and learning ofintegrated science, perceptions, theory of perception, studies on students' perception of difficult topics, studies on the influence of students' perception on their performance, studies on teachers' perception, studies on the relationship between teachers' and students' perception as its subheadings. Chapter three dealt with the methodology, which includes research design, population, sampling and sampling procedures, instrument used for the study, data collection and data analysis. Chapter four dealt with the results and discussion of the study. Chapter five dealt with the summary of key findings, conclusions and recommendations of the study.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Literature review in research provides evidence of much commonality in the types of problems and issues confronting the successful implementation and achievement of scientific goals, especially at the primary and secondary levels. Literature was reviewed on the following headings: Teaching and learning of integrated science, perceptions, theory of perception, studies on students' perceptions, studies on the influence of students' perception on their performance, studies on teachers' perception and studies on the relationship between teachers' and students' perception.

Teaching and Learning of Integrated Science

Various subject curricula are the means by which schools endeavour to realize the hopes and aspirations of the society. This could be achieved if the basic purpose of teaching and learning does not caused students to memorize fact but to participate actively in the processes that lead to the creation of the new knowledge (Brunner, 1986). This active participation of the learner could be effective if it started from primary to high schools because these levels of science curricular materials aimed at sensitizing the primary pupils and high school students on scientific concepts and consequently, rousing their interest in the field of science and technology. As postulated by Brunner (1986) that knowing is a process not a product. Which means knowledge-getting processes in science are full of skills that the student needs in order to be proficient (Anthony-Krueger, 2001). This skill proficiency can be effective if it start from the child formative years of learning (primary and high schooling years).

Formal education commences at the primary level through junior, senior and tertiary levels. The level of education that occupies the central position in the developmental process of every nation is the primary. However, in Ghana it is at the JHS where students are examined by external examination body, which leads to an awarded of certificates. It is at this level that a Ghanaian student could be rated as scientific literate based on her performance in the integrated science subject.

Elsewhere in Nigeria, the Federal Republic of Nigeria (as cited in Edu&Edu, 2013) revealed that other educational systems (the secondary, tertiary among others) are built upon the elementary education level; hence, the primary level remains the key to the success or failure of the whole system in that country. However, in Ghana students' successes and failures depend largely on their performance at the BECE in the JHS level. This suggested that students who performed well in the integrated science and mathematics during their BECE were given the opportunity to study pure science as their elective subject in the SHS. This means one's future profession is greatly determined by the performance put up during the BECE (Adebayo &Dorcas, 2015).

Integrated Science has gained much recognition in our educational institutions especially at the junior and senior high schools and this has had substantial effect on higher educational courses in Ghana. The integrated science is a compulsory subject that students at junior high school learned and must endeavour to pass it before he or she can gain placement in to senior high schools in Ghana. Based on this assertion much emphasis has been laid on its teaching and learning so that students couldpass it with no difficulties. This can be seen in the establishment of science resource centres in all the districts in Ghana (Leliveld, 2002).

Further, Abbey et al., (2008) were of the view that learning integrated science (a) can help both science and non-science students to fit well in to the world of work, (b) offer students with reliable knowledge that can be used as a basis to cure diseases, communicate across the world, make their homes morecomfortable, produce more and better crops. This is because science uses methods that involve logical investigation, experimentation and questioning that leads to a reliable knowledge acquisition. The knowledge gained is stored and used to help further investigation and understanding. With its unique opportunities Abbey et al., (2008) suggested that:

> Nations that can afford to spend large sums of money on scientific experimentation and the gathering of knowledge (data) advance the health and comfort of their people. Such nations become more efficient and successful and are able to anticipate and effectively cope with new problem (p. 2).

This is because over the years science has developed in to a number of interconnected specialized branches, which help us better understand the usefulness of science in the world of today and the future. For people to be confidents and able to thrive in this modern world of technology, there should be an opportunities for them to acquire such knowledge about themselves, the world around them and the system that affect their lives and their environment

(Abbeyet al.,2008). This would enable them to recognize and appreciate the diversity of matter in the world, the interactions between the matter in it and the energy, the balance of the natural systems and cycle that sustain life on earth. This is because our environment was naturally interconnected, so we can only understand their connectedness if we also acquired knowledge and skills based on this connectivity through a unified method of learning. The learning of integrated science by non-science students can enable them to acquire the basic knowledge in the sciences and to function properly in the use of scientific products in this modern world. Thus, Integrated Science provides students with the opportunity for pursuing a wide range of careers and advanced degrees. That is students who major in Integrated Sciencesdevelop a deep understanding of the processes of science and are well positioned to solve scientific problems by drawing from the integrated knowledge acquired from the several scientific fields of study. Studying the various branches of sciences by students, it prepared them to engage in work that cut across disciplinary boundaries or is part of new scientific fields. Draghicescu et al., (2014) revealed that an integrated science approach:

> Allow the students' experience to be clearly involved in the process, offering more substance and relevance of learning. Topics such as Renewable Energy Sources, TheEnvironment- Do We Love It Or Destroy It?, Nutrition And Health: What Is Good To Eat?, have a great potential tobecome more accessible and interesting for students if they are considered beyond the narrow lens of disciplines, isolated from each other, and treated inter-, multi- and/or trans-disciplinary (p. 49).

Abbey et al., (2008) said knowledge acquired in pure science is often applied to other branches of science. They further argued that in the real world, knowledge and skills from six different fields of science, and even outside it are used to produce one item, the pesticide. This emphasized that all students' needs to learned integrated science during their formative years to this extent non-science students can acquire the basic knowledge in the sciences to function properly in this modern world, and also to equip students to have confident in the use of scientific product globally. Based on itssocio-economic and political importance, it was introduced as integrated science from upper primary through JHS and SHS in Ghana. Draghicescu et al., (2014) opined that acquiring scientific skills must help individuals to have a better understanding of the progress, limitations and risks of the scientific theories, of the applications of technology in the society. The integrated science syllabus was therefore written extensively to cover all aspect of human endeavour. Such areas include the primary, junior and senior high schools and tertiary levels.

Research has shown that laboratory based method, where processes of science were used; it was an effective means of improving the achievement of students in science (Ampiah, 2004). It has been observed that when students engaged in the processes of science during teaching and learning, their level of achievement in science becomes higher. The processes of science provide students with unique opportunities to study abstract concepts andgeneralisations through the medium of 'real' materials. This is because as students interact with learning materials, in addition with their teachers, classmates, and practice what scientists do, they gradually developed skill needed for future work in sciences. Ogunkola and Samual (2011) revealed that in Barbados' lower secondary schools where concepts are presented in abstract with very little efforts made to present them to the students in a concrete way learning become difficult. They said the use of models, can increased an easier understanding of abstract concepts. They further pointed out such concepts where models could be used are commonly found in physics and chemistry of science as compared to biology areas. In addition, they also said that the teaching strategies used in the science classes is also another area of concern to the perceived topics difficulty for students. According to them students refers to teachers' teaching strategies as 'boring' because students are of the view that their teachers do very little to present the materials or topics to them in an interesting and relevant way.

Further, Johnstone (1991) theorized that difficulties may be caused by complexity due to ideas and concepts existing at the three levels of learning. That is micro, macro and symbolic levels in the integrated science. He opined that these multi-level conceptual frameworks are more common in physics and chemistry topics than in biology. That is concepts at the micro and symbolic levels are very abstract, hence making it difficult for teachers to provide concrete experiences for the students to facilitate effective learning. The effectiveness of learning can be achieved if the teacher imparts the learner with the rightful knowledge or concept.

Theories and concepts in teaching and learning of science such as constructivist theory; problem-based learning and contextual learning approaches in science (Dressel& Marcus, 1982; Woods, 1995) among others are useful in the teaching-learning process in junior high school.

Constructivist theory describes learning as an active, continuous process in that leaners take information from the environment and constructpersonal interpretation and meaning based on the prior knowledge and experience (Driver & Bell, 1986). According to constructivist theory, effective learning takes place when the learner makes meaning out of the required knowledge. For new knowledge to be understood and remembered, it must be meaningful to the leaner (Bruner, 1986). That is meaningfulness of learning depends on the leaner success in finding or creating connection between the new information and the pre-existing knowledge. One way by which these connections can exist is that the learner must build their own structure, or schema, based upon their pre-existing knowledge and understanding (Bodner, 1986). Different theories of constructivism (Phillips, 1995), ranging from the individual-centred radical constructivist position of Von Glasersfeld (1993; 1995) to the group-centred social constructivist position (Palincsar, 1998). However, these theories share a common feature that is the learner occupying the central position in the sense making and in building meaningful knowledge schemata.

Scerri (2003) has revealed that vital distinction exist between a constructivist theory of learning, adopted for teaching purposes in the education community, and the philosophically constructivist theory of scientific knowledge. The former relates to students' learning process, whilst the latter posits to 'the laws of nature which was referred to as the socialconstructs–essentially the laws that scientists have agreed between themselves and do not have any fundamental significance' (Collins, as cited in Scerri 2003; p.469). It is clear that one can believe that the learning process involves knowledge construction whilst simultaneously believing that scientifically accepted laws do have physical significance.

The ability to manage information and to reason analytically, both deductively and inductively are essential requirements for a successful learning of integrated science. Students are expected to absorb, assimilate and apply the knowledge they have acquired in the integrated science concept in problem solving (Davis, 2010). The teacher believed that if one learns fundamental principles and theories one would be able to make applications as needed. Maruto and Camusso (1996) have assessed the knowledge acquired in an organic chemistry using a multiple-choice exercise. The results were used to research areas that should be reinforced in order to improve the quality of the teaching-learning process.

One approach used by science educators' to address the challenges in science teaching and learning is co-operative learning cycle. The learning cycle teach science in phases that is (a) exploration, (b) term introduction and (c) concept application that are based on the way people spontaneously learn about the world (Lawson, 1995; Lawson, Abraham, & Renner, 1989; Renner &Marek, 1988, 1990). According to Lawson (1988), exploration allows students to investigate new materials and or ideas so that patterns of regularity can be discovered and questions are raised that students then attempt toanswer. Term introduction allows the teacher to introduce terms, to label the patterns and explain the newly invented concepts. Concept application provokes students to seek the patterns elsewhere and to apply the newconcepts to additional examples, often employing abstraction or generalization techniques. Learning cycle is an effective means in teaching and learningprocesses that is it encourages students to think creatively and critically, which facilitates better understanding of scientific concepts, developed positive attitude towards science, improved science process skills and cultivate advance-reasoning skills (Lawson, 1995).

Science books are traditionally written contrary to the learning cycle approach that is term introduction precedes exploration of learning (Musheno and Lawson, 1998). Garner, Alexander, Gillingham, Kulikowich, & Brown, (1990); Driscoll, Moallem, Dick and Kirby, (1994) are of the view that science textbooks are generally of low personal interest to students and have been shown to be used mainly as dictionary, to look up definitions that must be memorized for test. Research has shown that textbook content are organized in such a way that the task of reading and integrating the information is made unduly difficult, particularly for students with low reading skills (Ciborowski, 1992). Despite these problems, many teachers erroneously believe that textbooks are accurate and up to date, present interesting information, and facilitate learning (Wright & Spiegel, 1984). Teachers who lack pedagogical content knowledge commonly paraphrase information in learners' textbooks or provide abstract explanations that are not meaningful to their students (Eggen&Kauchak, 2001). Students with negative self-concept have poor academic performance (Ford, 1985). These are likely to result in the student having negative perception about the topic under consideration. This necessitated the current study since one cannot isolate teaching from learning. Gbamanja (1999) was of the view that traditional method of teaching science was dull, unimaginative and lacking in vigour. The integrated science teachers were believed to dispensed knowledge, while their learners also learnt mostly by rote memorization. In this view, students were regarded as passive learners. These phenomena of science teaching cannot invoke the imaginative mind of the students because it discourage and demotivate interest in science learning which is a key to scientific literacy that culminated a country in to economic development.

Furthermore, a research conducted in Turkey High School, revealed that students' responses to open-ended questions and teachers' interviews in biology topics highlighted terminology, textbooks, teaching methods, curriculum, abstract and interdisciplinary nature of concepts among others were the sources of these difficulties (Tekkaya, Ozkan, &Sungur, 2001). The complexity of the science is due to the many terms and symbols especially as used in chemistry, and physics related concepts. In this vein, Ogunkola and Samuel (2011) said that many new terms and symbols used in physics and chemistry as compared to biology were some sources of the perceived difficulty in the integrated science. Behar and Polat (2007) also said that students should not be forced to memorize these terms and symbols, but the terms and symbols should be used in the students' everyday lives and even studied in other subject areas. In addition, Behar and Polat (2007) were of the view that this may be a source of misconceptions for students adding to the difficulty of the subject. Further, the difficulty of the integrated science syllabus topics according to Mensah and Somuah (2013) opined that lack of appropriate and adequate teaching and learning resources such as science equipment and science workshops were the main challenges making the understanding of the integrated science syllabus topics very difficult for the students.

Verhagen and Collis (as cited in Alake and Ogunseemi, 2013) suggested that teaching and learning difficulties could be reduced by scaffolding. Scaffolding is a communication process where presentation and demonstration by the teacher is contextualized for the learner. The performance of the study is coached, articulated and elucidated by the learner as the teachers' support is gradually being removed. Verhagen& Collis (as cited in Alake &Ogunseemi, 2013) have observed that Scaffolding is therefore a temporary support made available for students' learning until the students can perform independently without the teacher support. It is therefore temporary frameworks that enable learners to achieve higher learning skills (Summers, 1995). The integrated science teacher saves as the scaffolds in supporting the student during teaching and learning activities and simultaneously retreat their support while student continuous to workindependently to achieve mastery.

Perceptions

Perception, according to Longman Dictionary of Contemporary English is

1. The way you regard something and your belief about what it is like.
2. The way that you notice things with your senses,
3. The natural ability to understand or notice something quickly (Summers 1995, p. 1048).

Perception According to Cambridge International Dictionary of English is

1. A belief or opinion, often held by many people and based on appearances

2. An awareness of things through the physical sense, esp. sight (Procter, 1995; p. 1047).

In order to receive information from the environment we are equipped with sense organs e.g. eye, ear, and nose. Each sense organ is part of a sensory system, which receives sensory inputs and transmits sensoryinformation to the brain. A particular problem that confronts psychologists is how to explain the process by which the physical energy received by sense organs forms the basis of perceptual experience. Sensory inputs are somehow converted into perceptions of desks and computers, flowers and buildings, cars and planes; into sights, sounds, smells, taste and touch experiences (MacLoed, 2007).

Student perception is an accepted means of reviewing teaching methods and developing effective teaching methodologies around the world. Therefore, student perception is used to identify which teaching strategies students perceive to be the most effective means to facilitate the learning in the classroom (Abdulghani& Al-Nagger, 2015). They said students' feedback has been considered an effective methodology for modification ofundergraduate curriculum and making pharmacology more interesting and practicable. They also revealed that several studies on students' perceptions regarding learning of pharmacology documented students' improvements in performance through improved teaching and learning processes. Student feedback is thus considered an invaluable tool for improving students'performances when suggestions obtained from students are implemented. They further suggested that students' feedback help to provide several useful inputs for educational improvements. To which they said provide valuableinputs into the curriculum review processes, help in forming a learner-centred knowledge building process, improve on the implementation of recent teaching methods in pharmacology as well as enhance the quality of learning environment (Abdulghani& Al-Nagger, 2015).

A person perception's is their ability to notice and understand things that are not obvious to other people. Perception may define from physical, psychological and physiological perspectives. However, for the purpose of this study, it would be limited within the scope postulated by Allport (1996), which is the way we judge or evaluate others. Meaning individuals evaluate people with whom they are familiar in everyday life.

Eggen and Kauchak (2001) gave cognitive dimension of perception; they see perception as the process by which people attach meaning to experiences. They explained that after people attend certain stimuli in their sensorymemories, processing continues with perception. According to Davis (2010), perception is valuable because it influences the information that enters a working memory. Background knowledge in the form of schemas affectsperception and subsequent learning. Glover, Ronning and Bruning (1990), were of the view that research findings have corroborated this claim that background knowledge resulting from experience strongly influence perception. Baron and Byrne (1997) called it "social perception" which is the process through which we attempt to understand other people.

The term "apperception" can also be used for the term under study. Apperception is an extremely useful word in pedagogy, and offers a convenient name for a process to which every teacher must frequently refer. It means the act of taking things into the mind (Adediwura&Tayo, 2007). The relatedness of this view of perception to the present study is further explained. That is every impression that comes in, be it a sentence, what we hear, an object of vision, no sooner enters our consciousness than it is drafted off in some determinate directions or others, making connection with other materials already there and finally producing what we call our reaction. From this, it is clear that perception is the reaction elicited when an impression is perceived from without after making connection with other materials in the consciousness (memory). From this point of view, one can deduce that, perceptioncannot be done in vacuum; it depends on some background information that would trigger a reaction. This is consistent with the views of researchers (Allport, 1996; Glover et al, 1990) and the overall research problem of this study.

Thus, perception in humans describes the process whereby sensory stimulation is translated into organized experience. That experience, or percept, is the joint product of the stimulation and of the process itself. Relations found between various types of stimulation (e.g., light waves and sound waves) and their associated percept suggests inferences that can be made about the properties of the perceptual process (Davis, 2010).

Theory of Perceptions

The sense datum theory holds that when a person has a sensory experience, there is something that the person is aware off either willingly or unwillingly and has the sense of doing something about it (Crane, 2005). Perception involves making inferences about what we see and try to make the best hypothesis. What the subject is aware of is the object of experience. When we look at something, we develop a perceptual hypothesis, which is based on prior knowledge. The hypotheses we develop are nearly always correct. However, on rare occasions, perceptual hypotheses can be disconfirmed by the data we perceive.

The object of experience is that which is given to the senses, or the sense datum: The theory takes its argument from illusion to show that a sense datum, whatever else it may be, cannot be an ordinary physical object. The early sense datum theorists like Moore (cited in Crane, 2005) considered sense data to be minds independent, but non-physical objects. Later theories treat sense data as mind-dependent entities.

The conception of perception that most sense data theories proposed is as a relation to a non-physical object. This relation is the relation of "being given" or "sensing". The relational conception of perception is sometimes called an "act-object" conception, since it posits a distinction between the mental "act" of sensing, and the object that is sensed. It is straightforward to show how this theory deals with the arguments from illusion and hallucination. The sense-datum theory treats all phenomenal properties that determine the phenomenal character of an experience as properties of the immediate object of experience. So, when in the case of an illusion, an external object appears to have a property which it does not have in reality, the theory says that some other object, a sense-datum, really does have this property. An analogous move is made in the case of hallucination. Perceptions and subjectively indistinguishable phantasms share their phenomenal character. This means that they share their phenomenal properties: the properties that determine what it is like to have an experience of this character. Based on the phenomenal principle, the conclusion is drawn that theseproperties must be instantiated in an object of the same kind: a sense datum. Therefore, the sense-datum theory retains the claim, that experiences depend on their objects; but it denies that these objects are the ordinary, mind-independent objects we normally take ourselves to be experiencing.

The sense-datum theory need not deny that we are presented with objects as if they were ordinary, public, mind-independent objects. Nevertheless, it will insist that this is an error. The things we take ourselves to be aware of are actually sense data, although this may only be apparent on philosophical reflection. This is an important point, since it shows that the sense datum theories are not simply refuted as Harman (as cited in Crane, 2005) seems to argue, by pointing to the phenomenological fact that the objects of experience seem to be the ordinary things around us. A consistent sense-data theorist can accept this fact, but insist that the objects of experience are really sense data.

The sense datum theory can say, however, that we are indirectly aware of ordinary objects: that is, aware of them by being aware of sense data. A sense-datum theorist will term this as an indirect realist or representative realist, or as someone who holds a representative theory of perception. A theorist who denies that we are aware of mind-independent objects at all, directly or indirectly, but only of sense data, is known as a phenomena list or an idealist about perception.

The difference between indirect realism and idealism is not over any specific thesis about perception. The difference between them is over the metaphysical issue of whether there are any mind-independent material objects at all. Idealists, in general, hold that all objects and properties are mental or mind-dependent. There are many forms of idealism, and manyarguments for these different forms, but what is important in this context is that idealists and indirect realists can agree about the nature of perception considered in itself, but will normally disagree on grounds independent of the philosophy of perception about whether the mind-dependent sense-data are all there is. Thus, Foster (as cited in Davis, 2010) argues for his idealism first by arguing for sense-data as the immediate or direct objects of perceptual experience, and then arguing that idealism gives a better explanation of the reality underlying this appearance, and of our knowledge of it. Hence, idealism and indirect realism are grouped together here as "the sense datum theory" since they agree about the fundamental issue in the philosophy of perception.

Studies on Students' Perceptions of Difficult Topics

Studies by Abdullahi and Aninyie; Akinmade and Adisa (as cited in Davis 2010), have shown that certain topics were perceived to be difficult by students in Nigeria and their perception of the topics showed a reasonable correlation with their performance in their examinations.

There are varieties of reasons why students, especially at the JHS level, may perceive integrated science as difficult in comparison to other subject areas. Findings by Anamuah-Mensah (as cited in Davis, 2010) have suggested that students' perceptions of the topics in the syllabus strongly reflected their actual performance on those topics as indicated by the grades obtained at the GCE 'O' level examinations. This According to Ogunkola and Samual (2011) may be due to how the students perceive the subject based on their experiences or even from information about the subject from other persons.

They also suggested that most students generally found difficulty in physics and chemistry concepts such as components of the air, energy, physical and chemical changes. Whiles in the biology concepts such as healthy lifestyles, light, the eye, sound and the air were found to be comparably easier. In their opinion, the focus group they interview supported their findings because the students generally thought that biology concepts were more interesting and easier to study than physics and chemistry concepts. They said students' further pointed out that biology concepts were more realistic and relevant to them compared to many concepts in physics and chemistry, which tended to be very abstract.

Ogunkola and Samual (2011) studied science teachers' and students' perceived difficult topics in the integrated science curriculum. Their purpose was to identify integrated science concepts or topics that lower secondary school students and teachers perceived to be difficult. To find out if there is a significant difference between the teachers and students perception; significant difference in students' perceptions of difficult topics based on their gender, interest in science, study habits and school location and to make suggestions that are potentially viable for improving the teaching and learning ofintegrated science.

The result of the study showed that topic difficulty for students ranged from a low of 6.67% to a high of 38.7%. The topics that indicated the highest levels of difficulty were in the areas of physics and chemistry. That is the role of sound in food laboratory (38.7%); role of gases in food preparation and preservation (37.9%), planning and designing experiments on physical and chemical changes (35.3%), Physical and chemical changes in the home

(25.7%), Components of the air (25.3%), Energy transformation (23.4%), Uses of gases in the atmosphere (23.1%) Energy conservation (21.5%) Types of chemical reactions (20%) chemical tests for gases (19%), heat transfer (15.4%) and forms of energy (15.3%), and characteristics of acids and bases (14.3%) and properties of sound (13.7 %). Topics with relatively low measures of difficulty indices were in a variety of subject areas but mainly biology and environmental science. Biology topics such as nutrients, food groups, diet, structure of the eye, eye diseases and structure of the ear had topic difficulty indices ranging from 6.67 % to 12.5 %. Also with low measures of topic difficulty were the environmental science topics of recycling and pollution. However the chemistry topics of neutralization (11.8 %), pH and indicators (13.5%), reflection and refraction (11.9 %), also had relatively low indices of topic difficulty. Analysis of the focus group interview indicated similar findings. There was general agreement among the students thatalthough science was an interesting subject, it could be quite difficult at times especially because of the teaching strategies used. Biology was comparably less difficult than physics or chemistry. It was more interesting and easier to study because it mainly involved studying the human body while many of the concepts taught in physics and chemistry were abstract and not experienced in everyday life. Unlike the students, the teachers generally indicated littledifficulty in teaching most of the listed topics. Most of the topics had a 0% difficulty level and the others ranged from 6.7% to 14.3%. For most of the topics, the students had a significantly higher level of difficulty compared to their teachers excluding neutralization, pH indicators, and reflection and refraction. In addition, minority of teachers indicated difficulty with acids and bases, light and the eye, sound and the ear, energy, and physical and chemical changes. They said the only significant difference observed was in students' perception of difficult topics based on their interest in science with students with high interest having a significantly lower perception of topic difficulty compared to those with low interest. Their finding regarding the perceived difficult topics in the integrated science of students and teachers based on the location of school was observed with students in urban schools recording the lowest perception with rural schools recording the highest perception. This tends to agree with the report finding by Churchill (as cited in Etsey, 2005), who found a positive relationship between the location of a school and the student and teacher performance.

Adeyemo (2011) also viewed learning environment and the availability of infrastructural facilities as a contributing factor to a positive learning outcome. He said students' perception of physics classroom environment affects the quality or learning effectiveness. He further argued that academic achievements of physics students depend on both the teachers and students perception of physics classroom environment. Ogunkola and Samual (2011) opined that the only significant relationship observed is that of gender and study habits where it was observed that 45% of females had a high interest in science compared to 24.5 % males.

Johnstone (1991), commenting on the perceived difficulty of the subject indicated that this difficulty may be due to problems in perception and thinking of students. His analysis of the nature of perceived difficult topics led him to propose that this difficulty may be caused by complexity due to ideas and concepts existing at three different levels: macro and tangible, micro, and representational or symbolic. He uses the concept 'water' to explain these levels. He said the concept could be taught at the macro level where students are able to observe the properties of water. It can also be taught at the micro level where, for example, students are taught that water consists of molecules of hydrogen and oxygen. At the representational level, these molecules can be represented as a symbol H_2O. These multiples ways of representing, the same concept is common in secondary level science courses, especially chemistry and physics. Johnstone (1991) proposed that the interaction of these three levels may cause overworking memory hencecausing difficulty in conceptualizing various areas in science. Although the spiral nature of the curriculum have allowed the gradual progress of learning concepts from concrete (macro level) to abstract (micro and representational), very often in science he suggested that teachers have to use all three levels in a single lesson.

Behar and Polat (2007) also point to misconceptions about science phenomena possessed by students as contributing to the difficulty of certain science topics. Chiappetta and Koballa (2006) defined misconceptions or alternative conceptions as ideas about phenomena that students bring to the classroom that does not correspond well with the scientific knowledge to be taught and learnt.They added that these alternative conceptions are tenacious and resistant to change by conventional teaching strategies. Therefore, these misconceptions may, according to Behar and Polat (2007) causes misunderstandings in certain science topics. This may especially be the case if the teaching strategies used by teachers are not adequate to allow for conceptual change. A related argument put forward by Behar and Polat (2007) concerned the many terms and symbols used in the teaching of various science concepts. Many such terms are new to the students and so cannot be linked to their cognitive structures, which according to Behar &Polat (2007) also causes information overload in the working memory. In addition, some terms are known by students, but in a different context and with a different meaning to that used in science. An example is the concept of 'work'. Confusion may result which adds to the perception of difficulty of the area of content. Key factors in facilitating an effective learning environment in the science class are the teaching strategies used by teachers. As early as 1910, John Dewey criticized science teaching of the day as giving too much emphasis to the accumulation of information rather than to an effective method of inquiry (Bybee, Trowbridge & Powell, 2008). Unfortunately, this argument appears to be as relevant today as it was then. Many times, teachers use the excuse of overloaded science curricula to explain their reliance on strictly didactic methods of teaching. Though these claims may have some merit, the teaching strategies may in effect, portray the subject as difficult to many students. Behar and Polat (2007) alluded to this when they identified the passive roles of students in the classroom and their perception of the teacher as the only source of knowledge, as contributing to the perceived difficulty of integrated science topics.

Maharaj-Sharma (2012) said there has been growing concern inTrinidad and Tobago about the declining number of students who opt to pursue science in secondary school. He said even though there is limited literature on the topic in the local context, several international researchers such as Jenkins; Murphy and Beggs, (as cited in Maharaj-Sharma, 2012) have pointed out that part of the reason for this is that children are "turned-off" by science at school when they are quite young. Hadden and Johnstone; Murphy, Ambusaidi, and Beggs; Schibeci (as cited in Maharaj-Sharma 2012) agree that the waning of students' interest in science occurs between the ages of 9 and 14. During the last decade or so, the role of the primary school teacher in the delivery of science in the classroom has come into focus. Studies by Murphy, Beggs, Hickey, Meara, and Sweeney; Murphy, Neil, and Beggs (as cited in Maharaj-Sharma 2012) have criticized the level of the content covered in some areas of primary science, suggesting that it may be above the appropriate level of cognitive development for the students and therefore overly challenging.

Ogunkola and Samuel (2011) studied about lower secondary school teachers' and students' perceptions of integrated science topics has revealed that, almost all the topics in chemistry were found to be difficult. Wood (cited in Davis, 2010) also studied students' and teachers' perceptions of SSS chemistry topics and found out that, students had difficulty in learning organic chemistry generally.

Tajudeen (2005), in his study on students' perception of difficult topics in chemistry curriculum in Nigerian secondary schools found that students perceived 13 topics out of 20 major topics in the secondary school chemistry curriculum as difficult topics of which organic chemistry was part . Findings, from his study revealed that chemistry students perceived more than half (65%) of the senior secondary chemistry topics as difficult to learn. Perhaps the low performance of chemistry students at the SSSCE level may not be surprising since they found most of the topic in the curriculum difficult to comprehend (Tajudeen, 2005). The study revealed that the influence of school location on students' perception of Chemistry concepts have no influence on students perception of genetics concepts (Tajudeen, 2005).

Adebayo and Dorcas (2015) conducted a research in to comparative analysis of students' scores in social studies and integrated science at junior secondary school certificate examination in Edu local government area of Kwara state, Nigeria. It was revealed that students' performance in Social Studies was slightly better than that of integrated science. The multiple comparisons showed that the scores of the students in social studies were significantly different between these years 2011, 2012 and 2013. However, there was no significant difference in the performance of students in integrated science between years 2012 and 2013.There existed significant differences in the performances of male and female students in both Social Studies and Integrated Science in 2011 with female students out performing their male counterparts. However, there are no significant differences in male and female students' performance in the two subjects during 2012 and 2013 academic years. In view of the students' performance in both social studies andintegrated science which were credits (average), it was recommended that the teaching of both subjects which serves as basis for any career be improved, this could be achieved through the use of teachers who are specialists in the subjects Adebayo &Dorcas (2015).

Aworanti (1991) explored students' perception of integrated science teaching in Nigeria and summarized students' perception under the following:

1. Students do not carry out suggested science activities in Integrated Science lessons.

2. The teacher teaches Integrated Science lesson without performing experiments.
3. Project work is not done in Integrated Science
4. Observing or measuring things, reporting activities, predicting the result of activities are not carried out in Integrated Science lesson.

This suggests that teachers do not vary their teaching methods from time to time. It may also be suggested that activities carried out are not stimulating enough. The key concepts in the process of science, i.e. observing things, reporting activities, measuring things were not adequately carried out. This may not help in laying a good foundation for scientific knowledge and advancement. The implications of this study is that the philosophy of Integrated Science teaching as put forward by Science Teachers' Association of Nigeria is not adhere to by practising teachers. This may go a long way of influencing the interest and the attitude of students in learning science generally (Aworanti, 1991).

Koul and Fisher (2004) studied students' perceptions of science learning environment and teacher-student interaction in Jammu. The main aim of their study was to investigate how perception of learning environment and teacher-student interaction in science classroom varies with student's cultural background. For the purpose of the study, cultural background was determined by asking students what language they and their parents normally spoke at home. Jammu city is understood to be a melting pot of various cultures, because of the migration from neighbouring provinces into the city due to the various political reasons of the past five to six decades. It was amazing to know that students covered in this study, who underwent the same core curriculum at school, came from 13 different cultural subgroups. Thelanguages spoken at home, is a clear indication of their cultural backgrounds, were Hindi, Kashmiri, Dogri, Punjabi, Balti, Pahari, English, Badarwahi, Muzfarabadi, Punchy, Telgu, Urdu and Kistwari. However, only four of these groups contained sufficient numbers for the analyses. These are Hindi, Kashmiri, Dogri and Punjabi, which constituted 98% of the sample.

The results from their study indicated that there were differences in the student's perceptions of their learning environment and teacher-student interactions that are associated with students' cultural background (the indicator variable taken as language spoken at home). For both the instruments namely the WIHIC (what is happening in classrooms) and the QTI (questionnaire on teachers interaction), the Kashmiri group of students had more positive perception of their classroom environment and teacher interactions than other three groups in the study. The result of the study demonstrated that students in Jammu come from a range of different cultural backgrounds and this influenced how the students perceive their learning environments (Koul& Fisher, 2004).

Agogo and Onda (2014) studied identification of students' perceived difficult concepts in senior secondary school chemistry and found out that 76.80% of the male chemistry students said that gender is a factor in the chemistry concept that SS II students perceive difficult to learn while 23.20% of the female said no. However, from the statistical analysis of the hypothesis, it was established that there is no significant difference between male and female chemistry students in their perception of difficult concepts in SS II chemistry. The findings revealed that 64.70% of the respondents agreed that lack of qualified chemistry teachers influence their perception of conceptdifficulty in chemistry. The analysis suggested that there is no significant relationship between teachers' qualification and students' perceived difficulty in SS II chemistry. It is however, important for the chemistry teachers to be professionally qualified to teach the subject, to positively affect the students. Mallam (2004) opined that teachers are said to be knowledgeable and are expected to transfer useful knowledge and skills to the learners during teaching. This suggested that the professional competency of the teacher is the key to students understanding of science concepts.

Studies on the Influence of Students'Perception on their Performance

During the past decades, various researchers have been making the effort to look into learners' understanding of scientific concepts. "Much of this research concerns about learners inability to understand scientific concepts or to develop conceptual understanding about mental models that are in accord with scientific or model of teaching" (Klutse, 2015, p.1).

Igwebuike and Ikponmwosa (2013); andTajudeen, (2005) examined the Influence of School Location and Achievement Level on Integrated Science Students' Perception of their Classroom Environment. It was revealed that school location did not significantly influence the students' perception of their classroom environment. This means, since perception of psychosocial classroom environment by the students was used as a criterion variable for assessment of qualitative integrated science education in the two locations, that integrated science classrooms in urban areas are not superior to those in the rural areas. It was also concluded that secondary school integrated science students that are low achievers had more positive perception of their classroom environment.

Dunne and Rennie (1994) sought to examine Fijian students' attitudes and perceptions about science, science-related careers and the career advice they received. Using a one sixth representative sample of Form 5 students, the survey has contributed some of the first information available in Fiji about these variables. Perhaps contrary to the findings in many other countries, the results of this study suggest that females do not regard science less positively than males and do not have different patterns of attribution of their performance in science. Further, and again perhaps contrary to what might be expected in a country whose politics are strongly related to ethnic issues, ethnicity is not a significant correlate of these attitudes. These studentsperceive Science positively, and those preferring a science-related career were significantly more positive in their attitudes than those preferring other careers.

Dunne and Rennie (1994) have reported both male and female, and both ethnics (Fijian and Indo-Fijian) students consider science difficult compared to other school subjects and second to English in usefulness of getting a job. The similarity between males and females in their attitudes and perceptions about science suggests that these attitudes cannot account for the different rates of participation of males and females in the science-related workforce and in higher education in Fiji. Part of a more likely explanation is associated with the strong sex stereotyping of science-related careers found among the students, stereotyping which is, not surprisingly, consistent with the composition of the workforce in Fiji.

Although females are less stereotyped than males in their views, only 10% of them are likely to choose a science-related occupation that is not associated with service to health, compared to about 30% of males. Importantly, the material and economic realities in developing countries limit the availability of certain careers. If there are few science-related careers available, this may directly impede the level of aspiration for such careers. Most students, particularly ethnic Fijians, were reasonably confident about obtaining their preferred job choice. Males, particularly ethnic Fijian males, were more likely to prefer and expect to get a masculine job than females were likely to prefer and expect to get a job they perceived to be feminine.

The finding that parents and teachers are the people who give most advice about careers is consistent with Eccles (1989) view that they are the main socializers in developing students' views about science and mathematics. Males more than females, and Indo-Fijians more than ethnic Fijians, are likely to receive specific, job-related information rather than general advice to work hard. The emphasis on "working hard," both in the nature of career advice and students' attribution of their performance to effort, was an interesting finding (Dunne &Rennie, 1994). It may be a reflection of the uncertainty in theaftermath of the military coups, which resulted in increased unemployment and government strategies to restrain wages (Narsey, 1988). The issue of "working hard" may be a reflection of labour market possibilities, where there is pressure for families to produce rather than consume, especially in a subsistence farming economy like Fiji's. The farmers are ethnic, rather than Indo-Fijians, so it is not surprising that advice to work hard was given more often to ethnic Fijian students, particularly as some reported being requested by their parents to return something to their village. The finding that the fixed variables of gender and ethnicity have no consistent relationship with students' perceptions and attitudes about science suggests that schools potentially can have a major role in the formation of students' attitudes.

Data about public examination results are not recorded by sex in Fiji, so it is not possible to link performance on examinations with career selection. However, it is reported that males and females have similar pass rates but females are less likely to continue with further education (Bolabola, 1989). It seems most likely that differences in participation in science are determined by socioeconomic and cultural factors, not innate ones, just as they seem to be elsewhere.

Bolabola, (1989) has described the strong gender and culturalstereotyping of the workforce in Fiji. Even if redrafting of the Government's Development Plan opened up the possibility of increased participation by women in a variety of non-traditional occupations, the social, cultural, and economic barriers are still significant. Examples include the strongly held views by students of the stereotyping of the domestic and nursing sphere as female which, because it is consistent with the reality in Fiji, will take time to change. Similarly, the cultural demands on women, such as those which limit the range of careers considered suitable for Indo-Fijian women, the pressure to marry (Lateef, as cited in Dunne &Rennie, 1994) and the pressure on ethnic Fijian women to continue working on the farm (Bolabola, 1989) provide barriers to their involvement in other careers. Further, in a country where monetary resources are limited and there are economic and political pressures, the fees to be paid for higher education are unlikely to be distributed equally among sons and daughters. All of these factors act against the rapid expansion of women into the workforce, even if that is what Fijian women themselves, irrespective of their ethnicity, desire.

The outcomes of an essentially quantitative survey such as this are important in an area where there is little documented information about the variables of interest.

Dunne and Rennie (1994) concluded that the study gathered a wider information base by using a number of open-ended questions rather than a simple check-the-box approach that may otherwise have been possible. The next step was to use a focused qualitative study with a smaller, carefully chosen sample of students and their families to examine ways in which the social and cultural barriers to females' participation in science operate.Moreover, to find out how can monetary resources are limited, there areeconomic, and political pressures, the fees to be paid for higher education are unlikely to be distributed equally among sons and daughters. All of these factors act against the rapid expansion of women into the workforce, even if that is what Fijian women themselves, irrespective of their ethnicity, desire.
The outcomes of an essentially quantitative survey such as this are important in an area where there is little documented information about the variables of interest.

Studies on Teachers' Perception

The survival of Ghana in relation to the training of efficient andqualified scientific citizens through the school system depends not only upon the educational policy decisions that were taken lately, but also upon the measures in which the teachers can effectively achieve the profound and so necessary curricular reforms. That implies a pragmatic orientation of thecurriculum, a connection to the problems of the contemporary society, an educational paradigm change and a flexible pedagogical conception,dissociated from the principles of the traditional, conservatory and out-dated pedagogy. In this context, the curriculum integrated approach, the alignment with the competences represent - both for the conceivers of educational policy, of scholar curriculum etc., and for the education practitioners - the reference that can move the school out of its old patterns / routine (Draghicescu, et al., 2014).

Perception is the result of one's attitude. For example, two people with different perceptions look at the same thing and thus think about it differently, and end up with different attitudes. By which they all think they are right.

According to Adediwura and Tayo (2007), attitude could be defined as a consistent tendency to react in a particular style often positively ornegatively toward any matter. Attitude possesses both cognitive and emotional components. Fazio and Roskes, (as cited in Davis, 2010) Attitudes areimportant to educational psychology because they strongly influence social thought, the way an individual thinks about and process social information. Eggen and Kauchak (2001) opined that positive teachers' attitudes arefundamental to effective teaching. The teacher must work students into such a state of interest about what the teacher is going to teach the students so that every other object of interest is banished from the students mind. The teacher should also fill the students with devouring curiosity to know what the next steps in connection with the topic are.

Eggen and Kauchak (2001) identified a number of teachers' attitudes that will facilitate a caring and supportive classroom environment. They summarized them as enthusiasm, caring, being firm, democratic practices to promote students responsibility, use of time for lesson effectively, freeinteraction with students and providing motivation for them. Manyresearchers, psychologists and educators alike, have identified the variables that have effects on students' academic performances. Academic performance is an individual's inherent potentials in terms of intelligence combined with other sociological factors (Davis, 2010). Ojerinde (as cited in Davis, 2010) identified personality factors such as anxiety, achievement, motivation and level of interest as factors that affect academic performance. The consistence of these claims was asserted by Ford (1985), which claimed that student with high self-efficacy received higher grades than those with low self-efficacy and that student with negative self-concept have poor academic performance.

Teacher variables as noted have effect on students'academic performances. These include teachers' knowledge of subject matter, teaching skills, attitude in the classroom, teachers' qualification and teaching experience. Ehindero and Ajibade (as cited in Davis, 2010) asserted that,

> Students, who are curious stakeholders in educationalenterprise, have long suspected and speculated that some of their teachers (lecturers in the university) lack the necessary professional (not academic) qualification (that is, skills,techniques, strategies, temperament and others) required

to communicate concepts, ideas principles and so on, in away that would facilitate effective learning (p. 4).

They also believed that these deficiencies contribute significantly to the growing rate of failure and subsequent drop out of students in tertiary institutions. Similarly, the same significant growth rate of failure and subsequent drop out of students in the Nigeria higher institutions did occur in Nigerian secondary schools (Adediwura&Tayo 2007). The growing failure rate could essentially be noticed in the yearly decline in students' performance in the Senior Secondary School Certificate Examination. This thus, is making many students to abandon schooling at the end of senior secondary school years. Adediwura and Tayo therefore investigated whether teachers in the secondary schools possessed the necessary professional qualification (such as skills, techniques, temperament etc.) that is required to communicate concepts, ideas, principles etc. in ways that would facilitate effective learning in Nigerian secondary schools.

Mensah and Somuah (2013) studied teachers' perceptions on the teaching of science: challenges and prescription. The study showed that the Integrated Science teachers felt that the scope of the subject was broad and diverse and teachers needed to have good content knowledge in pure sciences and technology related areas before considering themselves fit to handle the subject effectively. It also revealed that science teachers faced difficulty in handling topics such as basic electronics, electrical energy and chemical compounds. The study also showed that teachers held varied perspectives about students' learning. As some teachers felt students showed interest in learning science others said otherwise. However, most teachers confirmed that students showed difficulty in dealing with scientific terms and concepts.Finally, the results brought to light that, the science teachers were doing their best in assessment and instructional processes in science lessons and took advantage of activities and facilities available to develop professionally in order to maintain their effectiveness. They concluded that science teachers in the Kwahu West Municipality faced some challenges in the teaching of Integrated Science in the Junior High Schools. They said the challenges were related to the understanding of the content and disciplines in science,which they linked to lack of appropriate and adequate teaching and learning resources such as science equipment and science workshops. They revealed that the challenges seemed compounded with pupils' inability to grasp scientific terms and concepts (Mensah&Somuah).

A study conducted by Warnick, Thompson and Gummer (2004), on perception of science teachers regarding the integration of science in to the agricultural education curriculum has revealed that many Oregon science teachers hold positive attitudes toward the integration of science in the agricultural education curriculum. Science teachers believed agriculture is an applied science and people involved in agriculture must have a greater understanding of science than ten years ago. Science teachers responded positively toward student benefits when science is integrated into the agricultural education curriculum. It is recommended that agriculture teachers be made aware that science teachers, in general, hold positive attitudes toward integrating science and agriculture and may be interested in working with the agriculture program in their schools.

Science teachers identified specific barriers to integrating science concepts into the agricultural education curriculum. The five barriers that over half of the science teachers agreed upon included the science teacher's lack of an agricultural background, lack of funding and equipment, lack of anintegrated science curriculum, and lack of agricultural science workshops.

Therefore, it is recommended that science teachers and agriculture teachers team up to seek external funding sources for grants that emphasize integrating academics. Teacher education programs and the State Department of Education should provide in-service and workshops on how to integrate and develop collaborative efforts in writing grants to support integration of science and agriculture. Collaborative workshops may bring agriculture and science teachers together to not only learn how to integrate, but to develop technical skills in science and agriculture and build successful teaching teams. A majority of the teachers indicated that teacher preparation programs should provide instruction on how to integrate science both at the pre service andin-service levels, and those student teachers should be placed with a cooperating teacher that integrates science.

Moreover, science teachers felt teacher education programs in science and agriculture should model collaboration by teaching a course that helps future teachers in science and agriculture learn how to team-teach. A majority of the science teachers agreed that agriculture teachers should take more basic science courses in science at the undergraduate level. It is recommended that teacher preparation programs in agriculture review the amount of science offerings in the undergraduate level to determine if there are appropriate science classes that can be added to the undergraduate program. Science teachers were unsure how some stakeholders would respond as a result of integrating science into agricultural education programs. However, almost three fourths of the science teachers were in agreement that science teacher support will increase by increased integration of science into the agricultural education program. Over half of the respondents were unsure if community and counsellor support will increase from more integration of science into the curriculum. Although science teachers were unsure of administrator support, an earlier study of high school principals in Oregon (Thompson, 2001) indicated almost 70% agreed administrator support would increase by integrating more science into agriculture programs. Oregon science teachers felt that integrating science is an important component in helping agriculture programs align with state standards and help students meet requirements for initial and advanced mastery of Oregon's state standards.

Edu and Edu (2013) studied attitude and experience as influencing variables of teachers' perception of difficult concepts in primary science in ikom educational zone. Their result reveals that significant difference exists between perception of difficult topics in Primary Science curriculum by teachers who are positive and others who are negative in their attitude towards the subject. Ma (as cited in Edu&Edu, 2013) theorized that attitudes are relatively enduring orientations that individuals develop towards the various objects and issues encountered in life. Of which they attributed to the fact that attitude influences ones perceptual cognition. They said according to the Cognitive dissonance theory, every individual is motivated to escape any uncomfortable situation and they do this by putting up an attitude that will be consistent with the unpleasant state. This helps to ease up the discomfort associated with the state. However, the results of their analysis showed that teachers with years of experience between 11 and 15 years have more perceived difficulty. Wokocha (as cited in Edu and Edu, 2013) confirmed this by saying the complex nature of Integrated Science teaching in primary and Junior Secondary School classes requires that very competent professionals should guide the learning activities at these levels. The author further observes that the curricular at these levels are academic, vocational and comprehensive and so teachers with sufficient exposure and training in both content andpedagogy are required. This is an indication that teachers' demographicvariables are important to effective teaching of Integrated Science.

On the issue of teachers' license renewal, they observed that the perceived difficulty was much pronounced among teachers with 11-15 years of teaching experience may be attributed to the fact that, the teachers who have long years of experience may have become obsolete and may have lost touch with new innovations and new introductions in the Science curriculum. At this level, probably the satisfaction and pride that they have come a long way in experience may have caused them to relax, without actually seeking to know more than they do. On the other hand, teachers with fewer years ofexperience who may be regarded as young graduates from their various training programmes may have been prepared in the use of current innovations in the teaching of concepts in Primary Science. Esu and Ntukidem (as cited in Edu and Edu, 2013) pointed out that expired certificates should no longer be accepted for teaching purpose just because teachers' occupational requirements are very dynamic. They affirmed this by saying that most qualified and practicing teachers need to up-date their knowledge very regularly through compulsory in-service training programmes.

Snow (2002) conducted a study to examine the perceptions held by senior secondary school teachers about their use of classroom space. Six participants (Georgia teachers with National Board certification) were interviewed and asked to describe their teaching experiences related to: orientation issues (the individual's perception of space); operation issues (intentions and attempts to shape and use the environment); and evaluation issues (judgments made about the environment). The findings of her study indicated three major themes concerning teachers' perceptions of classroom space: 1. the adequacy of the amount and arrangement of space for teachers' need, 2. the physical condition of the classroom in relation to teacher performance and morale, and 3. the effects of the classroom's physicalcondition on student behaviour. The amount or arrangement of space was inadequate for the teachers' needs, particularly in the areas of student mobility and storage. However, teachers found numerous ways to modify and shape their setting to make it support their instructional program. Newer facilities and smaller class sizes contributed to teachers' sense of well-being and effectiveness while poor maintenance and overcrowding were associated with feelings of frustration. Teachers believed that the physical environment sent positive or negative messages. Students in trailers and older, poorly maintained buildings seemed to be more destructive and less appreciative of their facility than students in newer schools. Based on teachers' perception in her study, seven classroom design recommendations were identified.

1. Construct adequate storage to house materials for instructional programs, particularly in laboratory sciences.
2. Planed for flexible arrangements of people, furnishings and equipment by limiting built-ins and immobile fixtures.
3. Locate all technology resources together and away from windows.
4. Provide classroom space in secondary schools that will support instructional programs and accommodate student mobility.
5. Construct additional space for computer workstations located in classrooms.
6. Build separate workspaces for teachers to use for planning and conferencing with parents, students, and colleagues.
7. Create professional classroom environments that include computers with Internet access and telephones with outside lines. As these interventions are put in place, it enhances academic performance among students. Therefore, grow-up with critical thinking skills and knowledge that they can use to turn or solve any problem that may confront them in their society in general.

Adeyanju (2003) studied Teachers' Perception of the effects and use of learning aids in teaching in Winneba basic and secondary schools. The purpose of the study was to find out the level of agreement or disagreement to a fourteen-item questionnaire on the relevance, the quality and types of teaching aids that teachers used in teaching their lessons. Teachers specifically were asked to indicate the types of teaching materials they want to use in their teaching. Results showed that six teachers would like to use projectors to teach their lessons. Thirty-four other teachers also prefer to use nonprojectedmaterials to teach their lessons. Nineteen teachers prefer to use other methods, the rest numbering 21 prefer to use improvised materials such as charts and other visual materials. The results pointed out that the positive effect of teaching with various teaching and learning aids were approved as acceptable to over 90% of the teachers. That is teachers claimed that learners understood the lesson better as they teach using visual aids. The teachers also improvised for the teaching aids that are not readily available and that they used teaching aids to explain the various concepts that required explanation. Adeyanju (2003) further stated that teachers go to the extent of borrowing teaching aids from Ghana Education Service and from some other schools that have them, and teachers claim that they do not need further training on how to prepare and use teaching aids to teach their lessons. The inference that one can made from the analysed observations is that teachers use teaching aids to teach their lessons.

Conclusion drawn from his survey was that teachers, whether those on training or those that have qualified, perceive the use of learning aids in teaching as advantageous to the teachers and to the students. Their use reduces the talk and chalk method of teaching.

Studies on achievement in science by Soyibo; Eke; and Ato (cited in Davis, 2010) have all attributed failure or underachievement, on the part of students to such factors as teachers' qualifications, experience, interest and resourcefulness of teachers and socio-cultural factors. The teacher is a very important factor in curriculum implementation. His or her knowledge levels and teaching practices are very crucial and important in determining students' performance. The teachers' knowledge of the subject matter greatly affects the students' comprehension of science, integrated science inclusive. The teacher often determines the topics to be learnt, the order in which the topics and the concepts are to be learnt the nature of assignments and the times to be allotted to teaching. Teachers are the final brokers when it comes to educational policy (James, 2000).

Shwartz, Ben-Zvi, and Hofstein (2005) defined science literacy as having scientific attitudes and scientific reasoning skills. A scientifically literate citizen should be able to evaluate the quality of scientific information based on its source and the methods used to generate it. Scientific literacy also implies the capacity to pose and evaluate arguments based on evidence and to apply conclusions from such arguments appropriately. In this scenario, the pedagogical strategies for promoting scientific reasoning skills, such as higher level of thinking skills and critical thinking skills should be emphasized in science education. However, it is not easy as it sounds to promote this kind of science literacy because the teaching practice for promoting it requires science teachers to have deep understanding of pedagogy as well as discipline. What is more, there are practical barriers for a change to promote science literacy for the public in teaching science at high school. In this sense, the studyconducted by Shwartz, et al; (2005), offered a valuable opportunity to reflect on the teaching of chemistry in high school classroom. The 'chemistry' in context was particularly considered by the teachers. They learned that the second dimension of 'chemical literacy' was the ability to see the relevance and usability of chemistry in everyday life. Students should be able to useunderstanding of chemistry in decision-making, and in participating in a social debate regarding chemistry-related issues. A scientific literate student should understand the relation between innovations that the various branches of science holds and be in position to apply the various skills acquired on other applications such as medicine, agriculture, and environmental engineering.

Studies on the Relationship between Teachers' and Students' Perception

The essence of science education is to have students construct a deep conceptual understanding of any scientific topic studied. This cannot be achieved if students do not acquire the skills that make possible the instruction especially cognitive, affective and psychomotor oriented learning. Science curriculum that emphasizes science process skills (SPS) would help students acquire and understand information, as well as improve skills in critical thinking and decision-making. Consequently, the SPS should besystematically taught to the students from as early as at primary school. To produce students who acquire the science process skills, the teacher should be competent in Science Process Skills theoretically and practically (Hafizan, Halim&Meerah, 2012). Based on this fact, teachers and students orientation has to be changed to make the best use of skills embedded in any givenscientific activities since they are closely associated with habit formation. These skills are related to a logical sequence and any omission of performance skills in a chain can be catastrophic to the development of essential abilities in real life situation (Adeyemo, 2011).

Woolfolk (2007) opined that teacher–student relationship in kindergarten predicted a number of academic and behavioural outcomes through the 8th grade, particularly for students with high level of behavioural problems. Results of studies on the relationship between students and teachers'perception in science have been equivocal. According to Davis (2010) literature has indicated that evaluation of perceived difficulties of participants in a given area of study makes use of test and non- test methods. The test may be

1. Multiple choice test items (objectives)
2. Short answer test items (subjective)
3. Use of internal and external examination outcomes

The non-test methods include

1. Observations
2. Interviews
3. Questionnaires

The non-test method was used by Leece (1976) to obtain students' and teachers' perception of the level of difficulty of all the 19 curriculum topics of an "A" level Nuffield chemistry. The respondents had to indicate the difficulty of each of the topics on a 4-point Likert scale. [The responses ranged from "much harder than average" to "much easier than average"]. An approximate facility index was calculated for each topic resulting in high positive rank correlation between teachers and students' perception of the topics. This was contrary to the general expectation of negative correlation between teachers and students' perceived chemistry topics. Students' interest in amount of substance was lowest but highest in atomic structure and carbon chemistry. Topics in physical chemistry listed as difficult included equilibrium and free energy, and equilibrium involving redox and acid base systems as well as gaseous and ionic systems, energy changes and bonding. Amount of substance and periodicity were among the easiest. These difficult topics even though are treated in SHS they have basis at the JHS therefore its teaching and learning require a wide range of mathematical skills and knowledge of many basic chemical concepts including molarity of solutions, mole concept, and ionic equation and balancing of chemical equations.

Hafizan, Halim and Meerah (2012) used non-test method to investigate perception, conceptual knowledge and competency level of integrated science process skill towards planning a professional enhancement programme in SainsMalaysiana. Their findings showed that majority of teachers perceived that they have a high level of understanding on each of the sub-component of integrated science process skills (SPS). However, teachers' perception on their level of understanding of the integrated SPS was found to be inconsistent with the actual level of understanding (conceptual knowledge). Teachers did not have sufficient conceptual knowledge of integrated SPS to teach their students to understand it in a meaningful way. Primary teachers' competency in the integrated SPS is good at the practical stage but not theoretically.Therefore, they suggested that emphasis should be given to integrated SPS both conceptual and operational knowledge in pre and in-service training to ensure that the teachers understand, acquire and are able to implement the skills meaningfully for students understanding.

Furniss (1977) used a combination of tests non-test method toinvestigate difficulties encountered in chemistry. Two sets of students were involved in the study – sixth formers and first year chemistry undergraduates. Both groups took two sets of tests. The sixth formers had a test before the final examination and another test a month after the final examination. A section of the paper inquired about topics they had found difficult, easy or enjoyable while their teachers' problems and attitudes towards the 'A' level chemistry were also investigated.

The undergraduates had one test before and the other after the year ended. Only their perception of organic chemistry was tested. The perceptions of teachers and students in the sixth form group were at variance. Thus while students indicated that carbon chemistry, energy changes and bonding were difficult to learn, teachers indicated that these were easy to teach. Two other areas which students had difficulty with were reaction rates, equilibrium and free energy. Teachers also regarded periodicity and atomic structure as easy to teach. This study recommended the necessity to consign certain topics with the caution that the harm that may be done by material that is incorrectly learnt and misunderstood does not hinder subsequent learning. Further, some of the teachers involved in the survey admitted their lack of knowledge in certain aspects of chemistry.

In this study, the non-test method based on respondents' reaction to the topics of the syllabus was adopted. Its advantage over the test method is its time and cost effectiveness. Its limitation is that, it cannot unlike the test method, isolate either the causes or the exact problems causing arespondents difficulty on specific topics. A much simplified non-test method, which does not even relate to topics in science was used by Dunne and Rennie (1994) to obtain students' perceived difficulty in science as part of a broader survey on gender, ethnicity and science.

The statements; "Science is too difficult for me" "I find science easy to understand" had to be completed with responses ranging from "very difficult" to “very easy”. The simplicity of the study on perception gives evidence that when afforded the opportunity, students’ readily provide their perceptions of a given topic.

According to Adediwura and Tayo (2007), students’ perception of teachers’ knowledge of subject matter, attitudes to work and teaching skills is dependent on the fact that they have been taught by the teachers under evaluation and are familiar with them. They therefore, have minds already pre-occupied with memories and reactions that inventory for data collection would measure. Perception may be energized by both the present and past experience, individual attitude at a particular moment, the physical state of the sense organ, the interest of the person, the level of attention, and theinterpretation given to the perception.

Lang, Wong and Fraser (as cited in Davis, 2010) investigated the chemistry laboratory classroom environment, teacher–student interactions and student attitudes towards chemistry among 497 gifted and non-gifted secondary-school students in Singapore. 35-items were constructed for datacollection on Chemistry Laboratory Environment Inventory (CLEI), the48-item Questionnaire on Teacher Interaction (QTI) and the 30-itemQuestionnaire on Chemistry-Related Attitudes (QOCRA).

Results supported the validity and reliability of the CLEI and QTI for the sample. Stream (gifted versus non-gifted) and gender differences were found in actual and preferred chemistry laboratory classroom environments and teacher–student interactions. Their study was to, validate the Chemistry Laboratory Environment Inventory (CLEI) and Questionnaire on Teacher Interaction (QTI) among Grade 10 students in Singapore; investigate stream (gifted versus non-gifted) and gender differences in classroom environment perceptions on (a) the actual and preferred forms of the CLEI, (b) the actual form of the QTI. In addition of investigating the relationships betweenstudents' attitude to chemistry and students' perceptions on CLEI and QTI.

Lang et al said this was the first study conducted in Singapore's gifted chemistry classrooms, the findings of the study could provide useful information for the teaching of the gifted and about the psychosocial aspects of the chemistry laboratory learning environment for the gifted (as cited in Davis 2010). Based on the students' perceptions, the findings related to thechemistry laboratory-learning environment and to teacher–student interactions are particularly useful to the administrators, teachers and other stakeholders. Lang et al (cited in Davis, 2010) theorized that teachers' perspective could help chemistry teachers to reflect on the various aspects of the chemistrylaboratory, their interactions with students and their teaching approaches in the environment. For the students, it provided them with a better understanding of the students' perceptions and the ideal chemistry laboratory classroom learning environment and the teacher–student interactions that could help the gifted, as well as the non-gifted, to learn better in the future. They also found out that associations between student attitudes and open-endedness suggested that it could be desirable for educators to consider creating a more open-ended learning environment for the teaching and learning of chemistry in secondary schools. A further implication would be that we might restructure ourintegrated science curriculum by adapting instruction to meet the learning needs of learners, incorporating more lively and practical approaches and infusing scientific inquiry, creative and critical thinking skills into both the theoretical and the laboratory work Lang et al, (cited in Davis, 2010).

Lang et al (as cited in Davis, 2010) opined that open-endedness and material environment were significant predictors of gifted students' attitudes to chemistry. Open-endedness could be beneficial in establishing a unique and an enjoyable learning environment for the gifted. The first practical implication of this finding is that teachers might attempt to adopt more open-ended approaches in their teaching and improve the quality of thematerial environment in the chemistry laboratory in order to meet the learning needs of gifted students. The findings based on using the CLEI showed a preference by the gifted for a more open-ended and a better-equippedlaboratory class. These findings suggest that teachers might adopt a more creative teaching and learning approach in the gifted classroom as a necessary move. The teachers concerned ideally would establish an intellectually-stimulating environment and design an appropriate chemistry curriculum for the gifted. Students could be asked to and expected to be thinking critically and creatively across all curriculum areas. Further, teachers might use a variety of resources and materials to create divergent learning tasks or situations. Since the findings revealed that the open-endednesspositively correlated with students' integrated science-related attitudes, the use of such divergent approaches to teach the gifted is likely to help them do better in the future.

The findings with the QTI showed that we need to be more aware of dynamic teacher–student interactions taking place in the classroom with an understanding of the dynamics of the communication process; we can learn to manage the learning environment more effectively. This study also showed that the interpersonal behaviour of teachers had an impact on the students' attitudes towards integrated science.

This study like those reviewed in the literature (Woods, 1995; Davis, 2010 and Hafizan, Halim&Meerah, 2012) also made use of non-test method to evaluate the perceptions of students and teachers on difficult topics of the teaching learning syllabus. In this study, the questionnaire survey was used to collect data from a cross section of teachers and students on their perception about the integrated science syllabus.

CHAPTER THREE

METHODOLOGY

In this chapter, the research design, population, sample, sampling procedure and instruments that were used to collect data are discussed. The chapter also provides information on how the reliability and validity of the instruments were determined, the procedure for the collection of data and the method used for the analysis of the data.

Research Design

This study used the descriptive survey design to determine JHS 3 students' and teachers' perception of the level of difficulty of integrated science topics. A survey attempts to collect data from members of a population in order to determine the current status of the population with respect to one or more variables (Gay, 1992).

The design involved both integrated science students' and teachers' groups from 30 Junior High Schools in Ketu-North District of Volta Region, Ghana. This design has an advantage of producing good amount of responses from a whole range of people (Best and Khan, 1995).

Surveys include studies that use questionnaires or standard interviews for data collection with the intent of generalizing from a sample to a population (Babbie, 1990). The questionnaire designed included both closed-ended and open-ended questions. This was administered to both JHS integrated science students in their final year and their integrated science teachers.

The study elicited information from JHS integrated science students and their teachers about their perception of integrated science syllabus topics. The independent variables were gender, type of respondents and school location, whilst the level of perception for the students and teachers group was the dependent variable. The rationale for the choice, for a descriptive survey design (only questionnaire) was because it is economical and turnover in data collection is rapid (Fowler, 1988).

Population

The study targeted JHS 3 students offering integrated science and their integrated science teachers in the public Junior High Schools in Ketu-North District of Volta Region. There were 73 JHS in Ketu-North District during the 2014/2015 academic year. Out of these 56 were public and 17 private JHS (Ketu-North District Education Office, 2014/2015). All the schools offer integrated science. The schools used for the study werecoeducational (boys and girls). Ketu-North District was chosen for the study due to proximity and researcher's familiarity with the area. There were about 1,617 JHS 3 students and 73 integrated science teachers in all the 73 Junior High Schools in Ketu-

North District during 2014/2015 academic year (Ketu-North District Education Office, 2014/2015).

Sample

Ten third year students were sampled from each of the 30 public schools to make the total number of students in the sample to be 300 out of 1,617 students. According to Amedahe and Gyimah (2008, p.138), "in most quantitative studies, a sample size of 5% to 20% of the population size issufficient for generalization purposes". The table of random numbers was used to select the sample. All integrated science teachers of the schools selected formed part of the sample. In all 30 integrated science teachers and 300 JHS 3 students were sample for the study. This is because, at the time of the data collection, only 34 schools had completed the integrated science syllabus.

Sampling Procedure

All the 56 public JHS were visited to determine whether they had completed the integrated science syllabus topics. This was done by asking teachers if they had completed all the integrated science syllabus topics. At the time of the visit, 22 schools were still treating integrated science topics and 34 schools had completed the topics in the Integrated Science Syllabus. The 30 out of the 34 JHS that had completed the Integrated Science Syllabus topics were therefore selected as sample for the study. This is because four of schools were used for pilot testing of instruments. The simple random technique was adopted to select a class from each of the selected schools having more than one stream. All the Integrated Science teachers in the selected JHS also formed part of the study.

Ten (10) integrated science students were sampled from each class of school. Stratified random sampling procedure was used to select students. Each of the two sexes formed a stratum from which the table of random numbers was used to select the required number of students (ie.5 boys and 5 girls). This procedure made it possible for both female and male students to be fairly represented. This gave all students of the selected JHS an equal chance of being included in the sample. The sample was made up of 300 integrated science students of which 150 were boys and 150 were girls. The average age of the students was about 16 years. There were also 30 JHS 3 integrated science teachers involved in the study. This was made up of three female (constituting 10%) and 27 males (constituting 90%) teachers. The average age of the teachers was between 26-31years. The academic qualification of most of the teachers was diploma. In addition, majority of the teachers specialized in science at their tertiary level. Finally, the teaching experience of the teachers in teaching the integrated science was between 1-5 years (Appendix G gives summary bio data for teachers).

Instrument

Despite its limitations such as limited to literate population,questionnaire was used as the main instrument for this study because therespondents can read (Amedahe&Gyimah, 2008). Further, questionnaire was chosen because it is an effective means of obtaining information from a larger number of respondents (Macmillan, 1996). The questionnaire was completed at the respondent's own convenience. Moreover, it offers assurance of anonymity.

According to Wallen and Fraenkel, (1991) designing one's own instrument is time consuming, and do not recommend for those without a considerable amount of time, energy and money to invest in the endeavour. Choosing an instrument that has already been developed takes far less time than it does to develop a new instrument to measure the same thing, therefore, selecting an already developed instrument when appropriate, is preferred. Since experts who possess the necessary skills usually develop such instruments. Based on that, the structure of the instruments were crafted from previous studies in the area of perceptions Ampiah, (2001) and Davis (2010) and was modified to suit the current study.

Students' Perception of Integrated Science Syllabus Questionnaire (SPISSQ)

Students' Perception of Integrated Science Syllabus Questionnaire (SPISSQ) was used to obtain the necessary information from the JHS3 students on their perception of the difficulty of integrated science syllabus topics. The SPISSQ (Appendix B) was based on the Ministry of Education, Science and Sports (2012) teaching syllabus for Integrated Science JHS (1-3) and it included only closed-ended items.

The JHS 3 students' instrument had 45 items. Items 1 and 2 were used to gather background information on age and gender. Items 3-45 covered topics under the integrated science syllabus. To respond to an item, the respondent was required to indicate his or her perception of difficulty of each of the topics listed on a five point likert scale. Thus, 5 was assigned if the respondent had a high perception toward the topic, that is, if the respondent found the topic very easy to understand; 4 was assigned to topics found easy to understand; 3 corresponded to topics understood only after a lot of effort; 2 also corresponded to topics found difficult to understand and 1 was assigned to topics not taught.

The validity emphasizes the results of the assessment which you would interpret and not the instrument or procedure itself (Amedahe&Gyimah, 2008). Supervisors, integrated science teachers and postgraduate colleagues in the area of science education went through the items to determine if the items measure the intended content area (face validity) and whether they cover the whole content area (content validity). The comments and suggestions from the experts were helpful in the modification of items in the questionnaires. Furthermore, factors that may contribute to the low validity of the questionnaires such as unclear directions, reading vocabulary and sentence structures, poor item construction and ambiguities in language were eliminated.

The reliability of the instrument is the consistency of the scores obtained over time on a population of individuals irrespective of time differences and the scorers (Amedahe&Gyimah, 2008).

The SPISSQ was trial tested in the third term in four schools (unknown to other schools) that had completed most of the topics in the integrated science syllabus.The SPISSQ was trial tested using 40 JHS integrated science students, 10 students from each of the four schools. Their responses were analysed to test for the reliability of the SPISSQ. This was found to be high enough to make the SPISSQ items reliable.

The selection of the schools used for the pilot testing was based on simple random numbers. The selection of integrated science students was by table of random sampling. The reliability coefficient of the SPISSQ was determined using the Cronbach's alpha. The value of the reliability coefficient was found to be 0.88. Pallant (2001) said that the internal consistency suggest the degree to which how the items that make up the scale are all measuring the same underlying attribute (that is, the extent to which the items hangs together). That is the test is likely to correlate with alternative forms (a desirable characteristics). Therefore, the reliability coefficient of 0.88 obtained in the study confirmed that the questionnaire used in the main study was within the acceptable benchmark of instrument being reliable.

Teachers' Perception of Integrated Science Syllabus Questionnaire (TPISSQ)

Teachers' perception of Integrated Science Syllabus questionnaire (TPISSQ) was used in the survey to obtained information from the JHS integrated science teachers on their perception of topics in the integrated sciences syllabus. The TPISSQ (Appendix C) was based on the Ministry of Education, Science and Sports (2012) teaching syllabus for integrated science JHS (1-3). The TPISSQ included both closed-ended and open-ended questions.

The teachers' instrument had a total of 50 items. The first five items asked for background information on gender, age, academic qualification, area of speciality and teaching experience. Items 6-48 covered all the topics under the integrated science syllabus. To respond to the items, the respondent was required to indicate his or her perception on the teaching of each topic listed on a four (4) point likert scale. Thus, 4 was assigned if the respondent had a high perception toward the topic, that is, if the respondent found the topic very easy to teach; 3 corresponded to topics found easy to teach, 2 corresponded to topic found difficult to teach and 1 was assigned to topics found very difficult to teach. Items 49-50 solicited free responses on topics teachers found most difficult to teach and reasons that accounted for the difficulty.

Expert judgment of senior members in the field of integrated science education was sought on the content and face validities of the instrument (Wallen&Fraenkel, 1991). The comments and suggestions from the experts were used in restructuring the items. To ensure the validity of the instrument, the factors that contribute to low validity such as unclear directions, and ambiguities in language were eliminated. The TPISSQ was also trial tested in the third term in the same school where the SPISSQ was also trial tested. The TPISSQ was trial tested using four integrated science teachers. Their responses was analysed to test for the reliability of the TPISSQ. This was found to be high enough to make the TPISSQ items reliable.

The reliability coefficient of the TPISSQ was determined using the Cronbach's alpha. The value of the reliability coefficient was found to be 0.94.

Data Collection Procedure

An introductory letter was obtained from the Department of Basic Education, University of Cape Coast, which was used to seek permission from the District Director of Education, Ketu-North, who is in charge of the schools selected for the study, in order to seek approval to have access to the schools. The researcher sent the introductory letter to the schools that have been sample for the study. I used six days to visit the various schools to meet the integrated science teachers to arrange the time that would be convenient for the questionnaire to be administered. The selection of respondents was done a day prior to the administration of the instrument. The purpose and relevance of the study were explained to all the respondents involved in the study immediately after the selection of the respondents.

The instruments were hand-delivered to each of the schools involved in the study on the day of administration of the instrument. The administration of TPISSQ was done to the teachers at the school compound. In all cases, the teachers were asked to read carefully through the instructions and the items before responding. Each item had four levels of the Likert scale. The instruction required teachers to tick only one of the four levels to reflect their perceptions of the topics from the following: very easy to teach; easy to teach; difficult to teach and very difficult to teach. The TPISSQ was administered during normal school hours.

The administration of the SPISSQ was done immediately the teacher had completed his or her TPISSQ. This took place in students' respective classes for each school. In all cases the respondents were asked to read through the instructions and the items very carefully before responding by ticking one of the five levels of the Likert scale to reflect their perceptions of the topic; that is the degree of their understanding of the topic. The SPISSQ was also administered during normal school hours. I took nine weeks to administer and collect the TPISSQ and SPISSQ. This measure was adopted in order toretrieve the entire questionnaire administered. This development has led to a return rate of 100%.

Data Analysis

The data was analysed using the research questions as guide. This was then organised and coded with various numbers assigned to each distinctive variable such as age, gender among others for students and also gender, age range, academic qualification, teaching experience, subject offered when in training among others with respect to teachers. Data was analysed in terms of frequency count (percentages), means, bar graphs, standard deviation, t test and Pearson's correlation.

The t-test is the main statistical tool used to test the first and second hypothesis. The t-test is deemed appropriate since it is used to determine whether a significant difference exist between two groups being compared. Here male students' and female students' perceptions of the level of difficulty of integrated science topics were compared and also rural and urban school students' perceptions of the level of difficulty of integrated science topics were equally compared .

The Pearson's correlation was used to test the third hypothesis. This was used to determine whether there existed any correlation between the teachers' perception and the students' perception of difficult integrated science topics. A correlation coefficient of $-1 < r < 0$ implied the two groups being compared are inversely related. A correlation coefficient of $0 < r < 1$ also implied a direct relationship existed between the two groups being compared. A correlation coefficient of zero ($r = 0$) implied no relationship existed between the two groups being compared.

In addition to that, frequency count (percentages) was also used to discuss students and teachers perception of the integrated science syllabus topics, as well as the open-ended questions in TPISSQ. The details of the data analysis are presented in chapter four.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

In this chapter, the results of the study and the discussion of the findings are presented. The results and discussion are presented based on the research questions and hypotheses.

Research Question 1: What is JHS Integrated Science Students' Perception of the Level of Difficulty of Integrated Science Topics?

Students were asked to indicate their responses to the items on a questionnaire SPISSQ. Students' responses were scored on a five point Likertscale; the total score for students' responses for the difficulty of the integrated science topics was computed using SPSS. The minimum total score expected was 43 and maximum total score expected was 215. The result yielded a minimum total score of 93 and a maximum total score of 200 with a total mean score of 156.57. It was found that JHS 3 student perceived integrated science syllabus topics easy to understand. This suggests that JHS students understood integrated science topics easily. This is because when the number of integrated science syllabus topics divides the mean total scores, the result is the overall mean of about 3.6.Table 3, showed JHS 3 students' perception of integrated science syllabus.

Table 3:Students' Perception of the Difficulty of JHS (1-3) Integrated Science Syllabus (N = 300)

No	Topics	VEU %	EU %	ULE %	DU %	NT %	$\overline{X}$	SD
1	Matter	63.3	28.3	6.7	1.7	0.0	4.5	0.7
2	Mixtures	59.7	28.0	8.0	3.3	1.0	4.2	1.1
3	Life cycle of mosquito	51.7	29.7	8.3	7.0	3.3	4.2	1.1
4	Introduction to integrated science	46.7	32.3	13.0	6.7	1.3	4.2	1.0
5	Water	51.3	29.7	8.0	8.0	3.0	4.1	1.1
6	Air pollution	50.0	28.3	9.3	6.3	6.0	4.1	1.2
7	Sources of energy	48.7	28.3	13.7	7.0	2.3	4.1	1.1
8	Photosynthesis	46.0	30.7	13.7	7.3	2.7	4.1	1.1
9	Metal and non-metals	40.3	35.0	15.3	9.3	0.0	4.1	1.0
10	Hazards	42.0	33.0	14.7	9.7	0.7	4.1	1.0
11	The solar system	44.7	27.0	17.7	7.7	3.0	4.0	1.1
12	Acids, base and salt	39.3	28.7	17.3	14.7	0.0	3.9	1.1
13	Elements, compounds and mixtures	38.7	26.3	18.3	16.7	0.0	3.9	1.1

14	Light energy	37.3	34.7	13.7	7.3	7.0	3.9	1.2
15	Soil and water conservation	34.0	32.7	18.3	14.0	1.0	3.9	1.1
16	Nature of soil	33.3	38.3	16.7	10.0	1.7	3.9	1.0

Table 3: Continued

No	Topics	VEU %	EU %	ULE %	DU %	NT %	$\overline{X}$	SD
17	Heredity	37.3	30.7	13.0	12.3	6.7	3.8	1.3
18	Physical and chemical change	35.3	26.7	17.7	16.3	4.0	3.8	1.2
19	Food and nutrition	35.0	32.3	18.0	9.3	5.3	3.8	1.2
20	Digestion in humans	29.3	34.7	21.7	12.3	2.0	3.8	1.1
21	Reproduction in humans	29.3	33.7	19.7	16.3	1.0	3.7	1.1
22	Measurement	27.3	33.7	20.3	16.0	2.7	3.7	1.1
23	Dentition in humans	32.3	29.3	14.7	15.0	8.7	3.6	1.3
24	Carbon cycle	30.0	27.0	23.0	15.0	5.0	3.6	1.2
25	Heat energy	28.7	29.0	22.7	14.7	5.0	3.6	1.2
26	Life cycle of flowering plants	27.0	31.7	24.0	12.0	5.3	3.6	1.2
27	Diffusion and osmosis	25.0	33.3	19.0	17.3	5.3	3.6	1.2

28	Chemical compound	25.0	29.0	25.0	20.7	0.3	3.6	1.1
29	Machines	29.7	26.3	19.3	17.0	7.7	3.5	1.3
30	Pests and parasite	29.3	24.7	19.3	16.0	10.7	3.5	1.3
31	Vegetable crop production	18.7	37.0	26.0	12.3	6.0	3.5	1.1
32	Electrical energy	21.0	28.0	26.0	18.7	6.3	3.4	1.2

Table 3: Continued

No	Topics	VEU %	EU %	ULE %	DU %	NT %	$\bar{X}$	SD
33	Weather, season and climate	20.0	32.3	18.0	22.3	7.3	3.4	1.2
34	Respiratory system of humans	20.0	29.0	25.7	22.3	3.0	3.4	1.1
35	Ecosystem	26.3	22.7	19.3	17.7	14.7	3.3	1.4
36	Farming system	22.0	25.0	19.3	18.3	15.3	3.2	1.1
37	Force and pressure	21.3	21,3	22.7	25.0	9.3	3.2	1.3
38	Basic electronics	19.7	22.7	20.7	21.7	15.3	3.1	1.4
39	Conversion and conservation of energy	18.3	21.0	24.7	21.3	14.7	3.1	1.3
40	Magnetism	18.0	23.3	20.0	19.3	19.3	3.0	1.4
41	Circulatory system in humans	15.0	20.0	28.0	26.7	10.3	3.0	1.2
42	Infectious diseases of humans and plants	13.7	18.3	23.0	28.0	17.0	2.8	1.3
43	Science related industries	2.1	6.7	6.7	19.0	65.0	1.6	1.1

Note: VEU- very easy to understand; EU- easy to understand;

ULE- understand after a lot of effort; DU- difficult to understand; NT- not taught; $\overline{X}$ – means; SD - standard deviation.

Table 3, suggests that about 27 (62.8%) topics wereperceived to be easy to understand by students (i.e. had mean above 3.5); 14 (32.6%) of the topics were perceived moderate (understood after a lot of effort) (i.e. had $2.5<\overline{X} \leq 3.5$) and 1(2.3%) topic was perceived not taught

The topics perceived to be understood after a lot of effort includes electrical energy (EE) weather, seasoned and climate (WSC);respiratory system in humans (RSH); ecosystem, (E)farming system (FM); force and pressure (FP), basic electronics (BE) conversion and conservation of energy (CCE);magnetism (M); circulatory system in humans (CSH); Infectiousdiseases of humans and plants (IDHP); and science related industries(SRI).

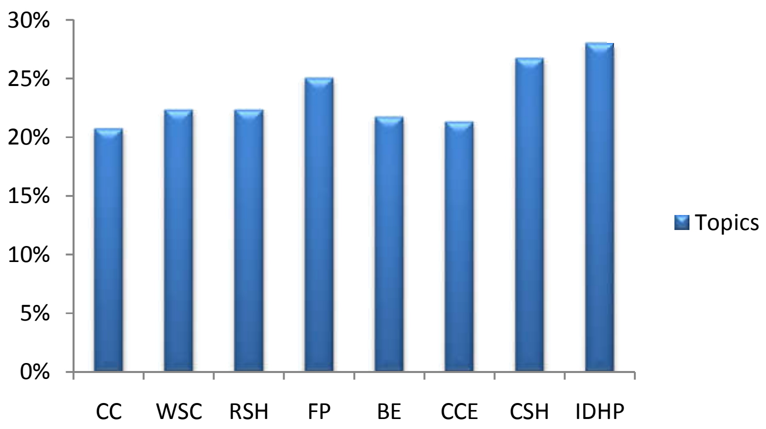


Figure 1: About 20% Topics Perceived Difficult by Students

From figure 1, topics ‘understood after a lot of effort,’ imply students spent a lot of time to or not to understand it therefore it is difficult. This because out of the perceived topics ‘understood after a lot of effort’, eight of them were found by more than 20% of the students as difficult to understand and the topics include chemical compound, weather, season and climate, respiratory system of humans, force and pressure, basic electronics, conversion and conservation of energy, circulatory system of humans, Infectious diseases of humans and plants. The topic difficulty is either due to low teachers pedagogical/content knowledge or teaching and learning materials (evident in Table 7) to drive home effective teaching and learning for students to understand. Further, 65% of the students' said they were not taught science related industries. Science related industries topic is normally taught in third term in the students' final year of schooling. Therefore, there is the likelihood that most teachers may have not been teaching the topics before the students write their BECE or just gives notes to students to copy without explanation or even without the use of models.

Students' perceived difficulty with the subject is due to low teacher pedagogical and conceptual knowledge to impart the required knowledge in to their students (Mallam, 2004). According to Hafizan, Halim and Meerah (2012) teachers'insufficient conceptual knowledge of integrated Science Processes Skill to teach their students undermined students' performance. That is teachers lack of content knowledge is the contributing factor for students difficulty. Teachers' pedagogical and conceptual knowledge is very critical in changing the behavioural patterns of learners that is a change in behaviour of the learner can only occur if the teacher has requisite knowledge to influence the learners during teaching and learning processes. Eggen and Kauchack (2001) said that where pedagogical content knowledge lacked, teachers paraphrase information in the learners' textbooks or provide abstract explanation that are not meaningful to the students.

Table 4, presents the mean summary scores of male and female students' perception of integrated science topics.

Table 4:Mean Summary Scores of Male and Female Students' Levels of Understanding Integrated Science Topics

No	Topics	Mean scores for male students (N=150)	Mean scores for female students (N=150)
1	Introduction to integrated science	4.1	4.2
2	Measurement	3.8	3.6
3	Matter	4.6	4.5
4	Nature of soil	4.0	3.8
5	Hazards	4.1	4.0
6	Life cycle of flowering plants	3.8	3.5
7	Vegetable crop production	3.5	3.5
8	Faming system	3.2	3.2
9	Respiratory system of humans	3.3	3.5
10	Sources of energy	4.2	4.1

11	Conversion and conservation of energy	3.1	3.0
12	Light energy	3.9	3.9
13	Basic electronics	3.2	3.0
14	Ecosystem	3.4	3.2
15	Air pollution	4.1	4.1
16	Physical and chemical changes	3.8	3.7

Table 4: Continued

No	Topics	Mean scores for male students (N=150)	Mean scores for female students (N=150)
17	Elements, compounds and mixtures	3.9	3.9
18	Metals	4.1	4.1
19	Chemicals	3.6	3.6
20	Mixtures	4.5	4.4
21	Water	4.3	4.1
22	Carbon cycle	3.6	3.6
23	Weather, seasoned and climate	3.5	3.2
24	Reproduction in humans	3.8	3.7
25	Heredity	3.9	3.7
26	Diffusion and osmosis	3.7	3.4
27	Circulatory system	3.1	3.0
28	Photosynthesis	4.1	4.1

29	Food and nutrition	3.8	3.9
30.	Electrical energy	3.5	3.3
31	Infectious diseases of humans and plants	2.8	2.9
32	Pests and parasites	3.5	3.4
33	Force and pressure	3.1	3.3
34	Machines	3.6	3.5
35	Acids, base and salt	4.0	3.9

Table 4: Continued

No	Topics	Mean scores for male students (N=150)	Mean scores for female students (N=150)
36	Soil and water conservation	3.9	3.8
37	Life cycle of mosquito	4.2	4.2
38	The solar system	4.1	4.0
39	Heat energy	3.6	3.6
40	Magnetism	3.1	2.9
41	Dentition in humans	3.8	3.5
42	Digestion in humans	3.8	3.7
43	Science related industries	1.7	1.6

Source: Field data (2015)

Table 4, results showed that male students’ overall mean score was 3.7 out of the 5 points on the likert scale. This showed that male studentsunderstood integrated science at a mean above 3.6. The male students found two topics such as matter and mixtures as “very easy to understand” (4.4 $<\bar{X}<$ 4.7). The female students overall mean of 3.6 also showed that female students perceived most of the topics easy to understand. Even though the overall mean score (3.6) of the female students was lower than that of their malecounterparts’ mean of 3.7, they all perceived integrated science topics easy to understand. In exception of mixtures, which the male students perceived to “understood very easily” their female counterparts perceived it as “easy to understand”.

Dunne and Rennie (1994) have reported that male and female ethnics Fijian and Indo-Fijian students consider science difficult compared to other school subject. The similarity between males and females in their attitudes and perceptions about science suggests that these attitudes cannot account for the different rates of participation of males and females in the science-related workforce and in higher education in Fiji.

This study is at variance with Davis (2010), who said females perceived organic chemistry topics less difficult to understand than their male’s counterparts, which he attributed to the institutionalization of science and technology clinic for girls (STME clinics) in 1987 coupled with thetraining workshops on gender sensitivity for teachers.

Research Question 2: What is JHS Integrated Science Teachers’ Perception of the Level of Difficulty of Integrated Science Topics?

In order to address this research question, teachers were asked to indicate their responses to the items on the questionnaire TPISSQ (Appendix C).The total score for the JHS integrated science teachers' responses of the difficulty level of integrated science topics was computed by the use of SPSS. Frequency count, mean, standard deviation and bar graph were employed in the analysis. The expected minimum total score was 43 and maximum total score expected was 172. The result yielded a minimum total score of 99 and a maximum total score of 159, with a mean total score of 135.2. This showed that integrated science teachers' perception of the level of difficulty of integrated science topics was high. This is an indication that integrated science teachers generally found integrated science topics easy to teach for students tounderstand. When the number of integrated science topics divides the mean total score, the result is the overall mean, which is about 3.1.

As shown in Table 5, about 86% (37) of the teachers have high perception about the integrated science whiles 14% (6) of thein integrated science topics were perceived low to teach by the teachers.

Table 5: Teachers Perception of the Difficulty of JHS (1-3) Integrated Science Syllabus (N = 30)

No	Topics	VET %	ET %	DT %	VDT %	$\overline{X}$	SD
1	Water	66.7	30.0	3.3	0.0	3.6	.55
2	Matter	63.3	36.7	0.0	0.0	3.6	.49
3	Nature of soil	57.7	43.3	0.0	0.0	3.6	.74
4	Introduction to integrated science	53.3	46.7	0.0	0.0	3.5	.51
5	Mixtures	53.3	43.3	3.3	0.0	3.5	.57
6	Life cycle of mosquito	53.3	40.0	6.7	0.0	3.5	.63
7	Faming system	46.7	53.3	0.0	0.0	3.5	.51

8	Sources of energy	46.7	50.0	3.3	0.0	3.4	.57
9	Photosynthesis	46.7	46.7	6.7	0.0	3.4	.62
10	Heredity	43.3	50.0	6.7	0.0	3.4	.62
11	Soil and water conservation	43.3	50.0	6.7	0.0	3.4	.62
12	Vegetable crop production	43.3	50.0	6.7	0.0	3.4	.62
13	Air pollution	40.0	60.0	0.0	0.0	3.4	.50
14	Diffusion and osmosis	40.0	56.7	3.3	0.0	3.4	.56
15	Machines	43.3	46.7	10.0	0.0	3.3	.66
16	Pests and parasites	43.3	43.3	10.0	3.3	3.3	.79
17	Dentition in humans	40.0	53.3	16.7	0.0	3.3	.61
18	Physical and chemical changes	40.0	50.0	10.0	0.0	3.3	.65

Table 5: Continued

No	Topics	VET %	ET %	DT %	VDT %	$\overline{X}$	SD
19	Weather, seasoned and climate	40.0	46.7	13.3	0.0	3.3	.69
20	Food and nutrition	40.0	46.7	13.3	0.0	3.3	.69
21	Heat energy	36.7	60.0	3.3	0.0	3.3	.68
22	Metals and non-metals	36.7	60.0	3.3	0.0	3.3	.55
23	Life cycle of flowering plants	36.7	56.7	6.7	0.0	3.3	.60
24	Ecosystem	33.3	66.7	0.0	0.0	3.3	.48
25	Digestion in humans	30.0	56.7	13.3	0.0	3.3	.55
26	Hazards	36.7	43.7	20.0	0.0	3.2	.75
27	Reproduction in humans	33.3	60.0	3.3	3.3	3.2	.68

28	Force and pressure	33.3	53.3	10.0	0.0	3.2	.75
29	Elements, compounds and mixtures	26.7	66.7	6.7	0.0	3.2	.55
30	Carbon cycle	30.0	53.3	13.3	0.0	3.1	.76
31	Magnetism	30.0	53.3	16.7	0.0	3.1	.68
32	The solar system	30.0	53.3	13.3	3.3	3.1	.76
33	Circulatory system	30.0	50.0	16.7	0.0	3.1	.79
34	Measurement	30.0	46.7	23.3	0.0	3.1	.74
35	Light energy	26.7	60.0	13.3	0.0	3.1	.63
36	Conversion and conservation of energy	20.0	73.3	6.7	0.0	3.1	.51
37	Science related industries	33.3	43.3	16.7	6.7	3.0	.89
38	Electrical energy	26.7	40.0	33.3	0.0	2.9	.79

Table 5: Continued

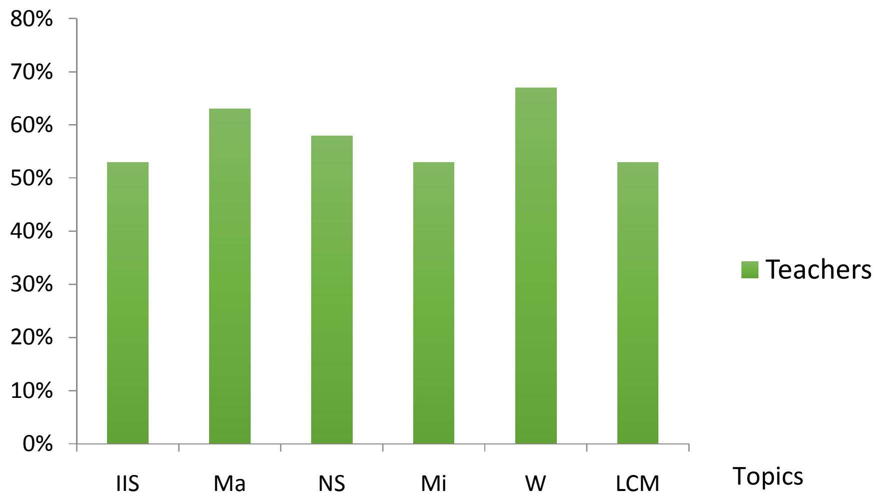
No	Topics	VET %	ET %	DT %	VDT %	$\overline{X}$	SD
39	Acids, base and salt	23.3	46.7	26.7	3.3	2.9	.80
40	Respiratory system of humans	16.7	60.0	23.3	0.0	2.9	.64
41	Infectious diseases of humans and plants	10.0	50.0	33.3	6.7	2.9	.79
42	Chemical compound	16.7	40.0	43.3	0.0	2.7	.74
43	Basic electronics	3.3	10.0	56.7	30.0	1.9	.73

Source: Field data (2015)

Note: VET: very easy to teach; ET: easy to teach; DT: difficult to teach; VDT: very difficult to teach; $\overline{X}$: mean; SD: standard deviation.

From Table 5, it was found that 8 topics were perceived difficult to teach by about 20% of the teachers. The topics are hazard (20%), measurement (23.3%), electrical energy (33.3%), acids, base and salt (26.7%) respiratory system of human (23.7%), infectious diseases of humans and plants (33.3%)%) chemical compound (43.3%), and basic electronics, (56.7%). This study agreed with the findings of Mensah and Somuah (2013), whoindicated that topic such as basic electronics, chemical compound among others were theteachers' most difficult topics to teach in the integrated science.Eggen and Kauchak (2001) opined that positive teachers' attitudes are fundamental to effective teaching. That is teachers' work students into such state of interest about what the teacher is going to teach the students so that other object of no interest is banished from the students mind. This implies that if teachers have higher perception about integrated science it means students would also have high perception. This is because teachers fill the students with devouring curiosity to know what the next steps in connection with the topic are.

Also as shown in Table 5, teachers perceived at least 50% of the integrated science topics as very easy to teachand they include, water (W), matter (Ma), nature of soil (NS)introduction to integrated science (IIS), mixtures (Mi) and life cycle of mosquito (LCM) and are presented on a bar chart as shown in Figure 2



Source: Field data (2015)

Figure 2: Topics Perceived Easy to Teach by at Least 50% of the Teachers.

Research Question 3: Which Section/Topics do Integrated Science Teachers Perceive Most Difficult to Teach and what are the Reasons Given by the Teachers for the Difficulty?

In order to answer the research question, the various topic identified by teachers as difficult have been grouped under the various section/themes of the JHS (1-3) integrated science syllabus. Teachers were asked to states five most difficult topics to teach and briefly state a reason to each topics mentioned as difficult. The results of the teachers' responses are presented in Table 6.

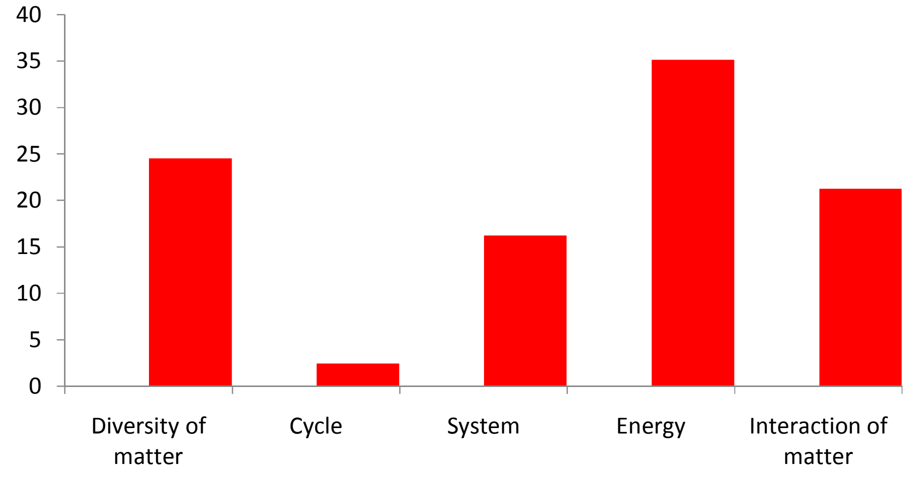
Table 6: Teachers' Perception of the Various Sections/Topics of the Integrated Science Syllabus (N= 30)

No	Section/ themes	N	%
1	Diversity of matter	30	24.6
2	Cycles	3	2.5
3	Systems	20	16.3
4	Energy	43	35.2
5	Interaction of matter	26	21.3

Source: Field data (2015)

As shown in Table 6, 2.5% of the teachers said they have difficulty in teaching topics under cycle (that is carbon cycle). Quite a proportion of the teachers (35.3%) claimed that energy topics such as basic electronics (20.5%), electrical energy (6.6%) food and nutrition (4.1%), light energy (1.6%), conversion and conservation of energy (0.8%), photosynthesis (0.8%), heat energy (0.8%) were the most difficult topics for them to teach. In respect to diversity of matter, 24.6% of the teachers' said the following topics such as chemical compound (9.0%), acids, base and salt (9.0%), measurement (3.3%), hazards (2.5%), mixtures (0.8%) were their difficult topics to teach. For interactions of matter, 21.3% of the teachers said they have difficulty in teaching it and the topics includes infectious diseases of humans and plants (7.4%), force and pressure (3.3%), magnetism (3.3%), machines (2.5%), pests and parasites (1.6%), physical and chemical changes (1.6%), science related industries (1.6%). Finally, 16.3% of the teachers had difficulties in in teaching topics under system, and such topics involves respiratory system (5.7%), circulatory system in humans (4.9%), solar system (3.3%), digestion inhumans (1.6%), and reproduction system in humans (0.8%). Typical responses of teachers' towards each section/topics of the integrated science syllabus have been presented in Appendix D.

Figure 3 depicted topic difficulty based on the themes of Ministry of Education, Science and Sports [MoE,SS] (2012) teaching syllabus for integrated science .



Source: Field data, (2015).

Figure 3: Teachers' Perceived Level towards the Various Themes of the Integrated Science Syllabus

Figure 3 showed that 35.2% of teachers had difficulties with all topics under energy; 24.6% had difficulty with sub topics under diversity of matter; 21.3% of the teachers said interaction of matter was difficult for them; 16.3% teachers had difficulty in teaching topics under system and 2.5% confirmed their difficulties with topics under cycles. The analysis of the teachers'explanation to their perceived difficulty with regards to integrated science syllabus for item 50 of TPISS showed that their reasons needs to be grouped into the following sources of teaching difficulties as subheadings, shown in Table 7.

Table 7: Teachers Reasons for the Difficulty of Topics in the Integrated Science (N = 30)

No	Sources of teachers difficulties	N	%
1	Inadequate teaching and learning materials	20	40.0
2	Low teachers pedagogical and content knowledge	13	26.0
3	Topics too broad, abstract and complex	10	20.0

4	Students having learning difficulty	4	8.0
5	Other comments	2	4.0
6	No comment	1	2.0

Source: Field data (2015)

As shown in Table 7, teachers gave diverse reasons such as, the topic being complex, abstract coupled with unavailability of teaching and learning materials and students' inability to have their own private studies in their home makes it difficult for them to drive home effective teaching and learning.

It was found from Table 7 that 40% (20) of the teachers said inadequate teaching and learning materials contributed to their teaching difficulties. Whiles pedagogical and content knowledge of the teachers contributed 26% (13) of teaching difficulties for teachers. In addition, topics too broad, abstract and complex contributed 20% (10) of teaching difficulties for teachers were the three main sources of teachers' difficulties in teaching the integrated science topics. Typical responses by teachers' under each of the subheadings have been presented in Appendix E.

Anamuah-Mensah (cited in Davis, 2010); Mensah&Somuah (2013) opined that lack of reference materials, in-service training, workshop for teachers and teaching and learning materials compelled teachers' to depend on only the recommended text for teaching. The science textbook is the source of the teachers' lecture notes, examination questions and laboratory experiment for the students. Very few teachers consult other books and multimedia materials such as science video clips and slides for teaching. Science teachers need resource books from which they can get ideas on say industries, or traditional games and toys that are enriched with scientific concepts. It is possible that once teachers perceived integrated science complex, confusing and abstract, the students' are likely to have similar perceptions. One cannot isolate teaching from learning because they both go together. If the students had difficulty in learning integrated science, it is equally likely that the teachers might as well as have trouble in their instructions.

Further, Lowe as (cited in Gobert and Clement, 1998) said if diagrams are used effectively it aid in clarifying subject matters. That is subject matters that are fundamentally difficult to be explained in a text becomes explanatory if diagrams are used. Therefore, students who are made to copy teacher's notes without ample explanation are likely to face subject matter difficulties.

Research Hypothesis: HO1: There is no Significant Difference between Male and Female Students Perception of the Difficulty Level of Integrated Science Topics?

The first research hypothesis focuses on testing whether there is a significant difference between male and female students perception towards integrated science. The Independent t-test analysis was conducted withpreliminary assumption not violated.

TheLeveen's test for equality of variance was conducted on male and female students' perception to find out whether the variance between the two groups was significant. The Leveen's test at Table 8, indicated that the variance for male and female students was not statistically significant ($p > 0.05$) and hence, this study was undergirded by equal variance assumed.

Table 8: Male and Female Students' Perception of Understanding the Integrated Science Topics (N=300)

Group	Compared		Sd	Df	T	P
Male		158.5	20.04	298	1.638	0.103
Female		154.6	21.24			

Source: Field data (2015)

It was found from Table 8, that the independent sample t-test results found that there is no significant difference in the perception of male students ($\bar{X}$= 154.9; SD = 21.8) and female students ($\bar{X}$= 158.5; SD = 20.04; t(298) = 1.638; p = 0.103,(two tailed) perception of integrated science topics. The null hypothesis is therefore accepted. This study is in agreement with Tajudeen (2005) also found no significant difference between the perception of male and female students on the difficulty of chemistry topics.

This finding is, however, contrary to Ampiah (2001) who found significant difference between male and female students' perception of chemistry concepts, when he studied students' perception of the difficulty of topics in senior secondary school chemistry syllabus. He found that male students had better perception of SSS chemistry topics than their female students did. This study also disagree with Krapp (2002) that there is a significant decline in interest in physics, chemistry and mathematics as student progress through secondary school, particularly among girls.

Research Hypothesis: HO 2: There is no Significant Difference between Rural and Urban Schools Perception of Integrated Science Topics?

The second research question focuses on testing whether there is a significant difference in the perception of students from urban and rural schools towards integrated science topics. The Independent t-test analysis was conducted with preliminary assumption not violated.

As evident in the Table 9, the Leveen's test for equality of variance was conducted on rural and urban school students to investigate whether the variance between the two groups was significant. The Leveen's test indicated that the variance for the rural and urban schools was not statistically significant ($p > 0.05$) and hence, this study was undergirded by equal variance assumed.

Table 9: Rural and Urban Schools Students Perception of Understanding the Integrated Science Topics(N=300)

Group	Compared		Sd	Df	T	P
Rural		154.9	22.8	298	-1.38	0.168
Urban		158.2	19.5			

Source: Fieldwork, 2015

From Table 9, the independent sample t-test result found that there is no significant difference in the perception of rural schools ($\bar{X}$ =154.9; SD = 21.8) and urban schools ($\bar{X}$ = 158.2; SD = 19.5; t(298) = -1.382; p=0.168, two tailed). The null hypothesis on school location is therefore accepted. The findings of this study is in agreement with Tajudeen (2005), who found that school location have no influence on students perception of chemistry concepts. In addition, Igwebuike and Ikponmwosa (2013) found that school location have no influence on students perception of integrated science concepts.

Research Hypotheses 3: There is no Significant Relationship between Teachers and Students' Perception of the Difficulty Level of Integrated Science Topics?

Table 10 showed that while students understood integrated science topiceasily with overall mean of 3.6, teachers also found the topics easy to teach (overall mean = 3.1). Infectious diseases of humans and plant have been perceived by students at a mean of 2.8 and teachers at a mean of 2.9. This revealed that both teachers and students seem to have difficulty with this topic.Furthermore, students perceived science related industries at a mean of 1.6, whiles teachers perceived it at a mean of 3.0 which means it was easy for teachers to teach but difficult for students to understand.Basic electronics was easy for students to understand' (3.1) and was difficult for teachers to teach (1.9). As evident in Table 7,teachers teach practical topicswithout teaching and learning materialsthis is due to inadequate teaching aids. It is therefore, not surprising that JHS integrated science studentshad difficulty in understanding topics that their teachers teaches easily.

Table 10: Mean Distribution of Students' and Teachers' Perception of Integrated Science Topics

No	Topics	$\overline{X}$ (Students)	$\overline{X}$ (Teachers)
1	Introduction to integrated science	4.2	3.5

2	Measurement	3.7	3.1
3	Matter	4.5	3.6
4	Nature of soil	3.9	3.6
5	Hazards	4.1	3.2
6	Life cycle of flowering plants	3.6	3.3
7	Vegetable crop production	3.5	3.4
8	Faming system	3.2	3.5
9	Respiratory system of humans	3.4	2.9
10	Sources of energy	4.1	3.4
11	Conversion and conservation of energy	3.1	3.1
12	Light energy	3.9	3.1
13	Basic electronics	3.1	1.9
14	Ecosystem	3.3	3.3
15	Air pollution	4.1	3.4
16	Physical and chemical changes	3.7	3.3
18	Metals and non-metals	4.1	3.3
19	Chemical compound	3.6	2.7
20	Mixtures	4.4	3.5
21	Water	4.2	3.6
22	Carbon cycle	3.6	3.1

Table 10: Continued

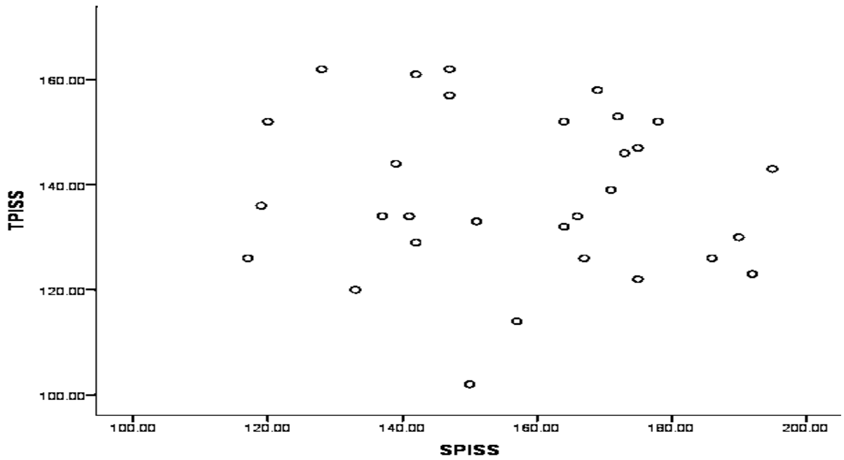
No	Topics	$\overline{X}$ (Students)	$\overline{X}$ (Teachers)
23	Weather, seasoned and climate	3.4	3.3

24	Reproduction in humans	3.7	3.2
25	Heredity	3.8	3.4
26	Diffusion and osmosis	3.6	3.4
27	Circulatory system	3.0	3.1
28	Photosynthesis	4.1	3.4
29	Food and nutrition	3.8	3.3
30	Electrical energy	3.4	2.9
31	Infectious diseases of humans and plants	2.8	2.9
32	Pests and parasites	3.5	3.2
33	Force and pressure	3.2	3.3
34	Machines	3.5	3.3
35	Acids, base and salt	3.9	2.9
36	Soil and water conservation	3.9	3.5
37	Life cycle of mosquito	4.2	3.6
38	The solar system	4.0	3.1
39	Dentition in humans	3.6	3.3
40	Digestion in humans	3.8	3.2
41	Heat energy	3.6	3.3
42	Magnetism	3.1	3.1
43	Science related industries	1.6	3.0

Source: Field data (2015)

Edu and Edu, (2013) revealed that every individual is motivated to escape any uncomfortable situation and they do this by putting up an attitude that will be consistent with the unpleasant state This suggested that teachers uses lack of basic science apparatus and other laboratory facilities needed to enhance effective teaching and learning in the schools as a justification to helps ease the discomfort associated with the teaching and learning of science. In addition, teachers' lack of content andpedagogical knowledge in the subject teaching has equally contributed to the perceived difficulties (Mensah&Somuah, 2013).

The Pearson correlation was conducted to evaluate the hypothesis that, no relationship existed between JHS integrated science students' perception and teachers' perception of the level of difficulty of integrated science topics. The correlation was significant at 0.66 levels. The correlation coefficient was-.083. This implied an extremely low negative correlation existed between JHS Integrated science students' and their teachers' perception of the level of difficulty of integrated science topics. Figure 4, shows the scatter plot.



Source: Field data (2015) Total mean scores for students

Figure 4: Scatter Plot for Teachers and Students

Figure 4, showed no correlation between teachers and students perception of integrated science topics. This is an indication that, there is a gap between teachers and students perception of integrated science topics. The null hypothesis was therefore upheld because there is almost no correlation between teacher' and students' perception of integrated science topics. The scatter plot also shows that the teachers' perception has no influence on the students' perception.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The focus of this study was to explore students' and teachers' perceptiontowards the JHS integrated science syllabus. It was also to get insight of students and teachers towards alternative conceptions of the various topics of the subject. It also presentedkey findings, conclusion and recommendations with respect to the JHS integrated science students and teachers' perception of integrated science syllabus topics, with some suggestions made for future study. The study was designed to find out whether there was a significant difference between male and female students' perception towardsthe difficulty of integrated science topics.

The study also explore whether there is any difference between rural and urban school with regards to school location b The study also tried to find answers to the three research questions and three hypotheses.

The study was carried out in the Ketu-North District of Volta Region of Ghana by the survey method.300 final year JHS integrated science students and their 30 integrated science teachers were randomlysampled. Questionnaires (SPISSQ and TPISSQ) were administered and responded to by these 300 JHS final year integrated science students' and their 30 integrated science teachers'.

The data collected was analysed by using quantitative approach. The quantitative approach included the use of percentages and descriptive statistics, such as the mean and the standard deviations. T-test statistic was used to find out whether there was any significant difference between male and female students'; and between rural and urban students perceptions based on school location Pearson's correlation was used to find out whether there was any relationshipbetween students and teachers' perception of topic difficulty in the integrated science syllabus. Frequency and percentages were used to identify students' difficult topic and teachers' most difficult topics in integrated science and the sources of topic difficulty for the teachers.

Key Findings

1. Generally, the JHS 3 students' perception of the level of difficulty of integrated science topics had overall mean of 156.57. This suggests that students perceived integrated science topics as "easy to understand". That is students perceived 2.3% of theintegrated science topics as "very easy to understand"; 62.8% topics as ''easy to understand''; 32.6% as moderate or understood after a lot of effort; and 2.3% topics as difficult to understood.
2. The male students perceived 4.6% of the integrated science topics as "very easy to understand" whiles the female students also perceived 2.3% of the integrated science topics as "very easy to understand". Further, the male students perceived 72.1% of the integrated science topics as easy to understand. However, their females perceived it at 65.1% of the topics as "easy to understand''. 16.3% of the male perceived integrated science topics as moderately difficult and 23.3% female perceived integrated science topics as moderately difficult to understood, 7.0% male perceived integrated science topics as ''difficult to understand''; whiles 9.3% of the female perceived integrated science topics as "difficult to understand".

3. JHS integrated science teachers' perception of the level of difficulty of integrated science topics was high ($\bar{X}$< 135.2). The teachers generallyperceived integrated science topics as "easy to teach". Teachers perceived 16.3% of the integrated science topics as "very easy to teach"; and 69.8% as ''easy to teach'' and 14.0% topics as "difficult to teach". Further, 8 topics were perceived difficult to teach by about 20% of the teachers. The topics are hazard (20%), measurement (23.3%), electrical energy (33.3%), acids, base and salt (26.7%) respiratory system of human (23.7%), infectious diseases of humans and plants (33.3%) %) chemical compound (43.3%), and basic electronics, (56.7%).
4. Teachers' difficulties of topics according to the sections of the integrated science syllabus are: energy 35.3%; diversity of matter 24.6%; interaction of matter 21.3%; system 16.4% and cycle as 2.5% were the perceived difficult topics for teachers to teach.
5. Teaching and learning materials, low teachers' pedagogical/content knowledge of teachers, learning difficulty of students were the three mainfactors, which accounted for the perceived difficulty in the integrated science. It also came out strongly that integrated science topics are complicated,abstract and there was lack of models or teaching aids.
6. The study found no significant difference between male and femalestudents' perception of the difficulty level of integrated science topics (p=0.103).

7. School location was found not to be significantly related to rural and urban students perception of integrated science difficulty ($p=0.168$). Perception of learning environment was subtly used as a criterion to assess if there is qualitative education in the rural areas where majority of Ghanaian population is believed to live. This study is therefore different from what was expected. It was guessed that students in urban areas have a more high perception of their school location in understanding integrated science topics than theircounterparts in the rural areas. (Igwebuike&Ikponmwosa, 2013). The data obtained in this study do not provide any supportive evidence of differential perception of school location between the integrated science students in urban and rural areas. This unexpected result is that students commute from urban to rural areas and vice versa. In effect, the students often described as those in the rural areas may after all be residing in the urban areas and may only be schooling in rural areas. The same explanation can be given for the teachers in the rural areas who organize their classroom environment on the basis of the urban experience.
8. There is an extremely low negative correlation between the integrated science students' and teachers' perception of the difficulty level of integrated science topics ($r = -.083$).

Conclusions

From the study, JHS 3 students generally found integrated science topics easy to understand however, at least 32.6% of theintegrated science topics were understood after a lot of effort. This is because if topics are understood after a lot of effort then it implies that it is difficult. Hence, it is not surprising that JHS integrated science students do not answer questions under integrated science satisfactorily in their BECE papers especially when they have to apply theory on to practical phenomenon (WAEC, 2004; 2012).

Teachers generally find integrated science topics easy to teach. One thing, which stood out, was the fact that both students and teachers perceived energy and diversity of matter topics as moderately difficult topics this depicted some degree of relationship between them. Integrated science teachers should find very good methods and approaches to reduce the wide gap between them and their students since it came out that there was almost no correlation between them.

Further, the result of this study for practice is that location of school (rural or urban) is not a factor for determining quality of instruction on the basis of personalization of instruction, participation by the students during teaching and learning.

Recommendations

1. Teachers and students should be oriented why they have to teach and learn topics they perceived difficult.by unveiling to them what science can do to our society.
2. The educational authorities should team up with the school communities to provide effective and needed teaching and learning materials for the schools to enhance effective teaching and learning in the schools.

3. Educational authorities should organize workshops and seminars for teacher on how they can use activity methods in teaching so that they can handle energy topics effectively particularly basic electronics and electrical energy.
4. Ghana Association of Science Teachers should intensify their effort to cover all schools by organizing workshops and seminars for the integrated science teachers regularly rather than annually and biannually.
5. The slogan SCIENCE MY LIFE MY FUTURE should be introduced in schools to help demystify the notion that science is difficult.
6. Integrated science teachers should not feel reluctant to call for aresource person if they do not have adequate knowledge on a particular topic.
7. University of Cape Coast and Winneba should design a unified integrated science curriculum to be used in training teachers in the subject.

Suggestion for Future Research

I suggest that future research should be conducted on integratedscience students by using questions and answers to assess students' difficulty of the various topics in the syllabus.

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APPENDICES

APPENDIX A

INTRODUCTORY LETTER

UNIVERSITY OF CAPE COAST
COLLEGE OF EDUCATION STUDIES
DEPARTMENT OF BASIC EDUCATION

Telephone No.: 0332133379
Cables: PED, University, Cape Coast
E-mail. dbeucc@yahoo.com

University of Cape Coast
UCC Post Office
Cape Coast

Our Ref.: DBE/32/V.4/163

3rd February, 2015

Dear Sir/Madam,

APPENDIX B

STUDENTS PERCEPTION OF THE INTEGRATED SCIENCE SYLLABUS QUESTIONNAIRE (SPISSQ)

A study was conducted on the perception of JHS3 integrated science students and on topics difficulty in the integrated science syllabus. The questionnaire forms part of the study. There is no right or wrong response. Your opinion about each topic is very important.

PERCEPTION ABOUT TOPICS IN THE INTEGRATED SCIENCE SYLLABUS

Tick (√) the appropriate column corresponding to your opinion about the topic.

Please be sure to respond to all items. If you change your mind about your response to an item, just cross it out and tick (√) another. You are assured of the confidentiality of your opinion. Thank you.

BIO DATA

GENDER (TICK): MALE [ ] FEMALE [ ]

AGE (Write in the box) [ ]

Note:

VEU- very easy to understand;

EU- easy to understand;

ULE- understands only after a lot of effort;

DU- difficult to understand;

NT-not taught

No	Topics	VEU	EU	ULE	DU	NT
3	Introduction to integrated science					

4	Measurement					
5	Matter					
6	Nature of soil					
7	Hazards					
8	Life cycle of flowering plants					
9	Vegetable crop production					
10	Farming system					
11	Respiratory system of humans					
12	Sources of energy					
13	Conversion and conservation of energy					
14	Light energy					
15	Basic electronics					
16	Ecosystem					
17	Air pollution					
18	Physical and chemical change					
19	Elements, compounds and mixtures					
20	Metals and non-metals					
21	Mixtures					
22	Chemical compound					
23	Water					
24	Carbon cycle					
25	Weather, season and climate					
No	Topics	VEU	EU	ULE	DU	NT
26	Reproduction in humans					

27	Heredity					
28	Diffusion and osmosis					
29	Circulatory system in humans					
30	Photosynthesis					
31	Food and nutrition					
32	Electrical energy					
33	Infectious diseases of humans and plants					
34	Pests and parasite					
35	Force and pressure					
36	Machines					
37	Acids, base and salt					
38	Soil and water conservation					
39	Life cycle of mosquito					
40	The solar system					
41	Dentition in humans					
42	Digestion in humans					
43	Heat energy					
44	Magnetism					
45	Science related industries					

APPENDIX C

TEACHERS PERCEPTION OF THE INTEGRATED SCIENCE SYLLABUS QUESTIONNAIRE (TPISSQ)

A study was conducted on the perception of JHS3 integrated science teachers' on the difficulty of topics in the integrated science syllabus.

This questionnaire forms part of the study. There is no right or wrong response. Your opinion about each topic is very important.

PERCEPTION OF TOPICS IN THE INTEGRATED SCIENCE SYLLABUS

Tick (√) the appropriate column corresponding to your opinion about the topic. Please be sure to respond to all items. If you change your mind about your response to an item, just cross it out and tick (√) another. You are assured of the confidentiality of your opinion. Thank you.

BIO DATA

1. Gender (tick): male ☐ female ☐
2. Age (tick) (√)

   20-25yrs ☐

   26-31yrs ☐

   32 and above ☐
3. Academic qualification (tick)

   Diploma ☐

   1st degree ☐

   2nd degree ☐

   Others ☐
4. Area of speciality (write your major Subject)
5. Number of years teaching the subject (tick)

1-5

6-10

11and above

Note:

VET -Very Easy to Teach;

ET - Easy to Teach;

DT - Difficult to Teach;

VDT - Very Difficult to Teach

No	Topics	VET	ET	DT	VDT
6	Introduction to integrated science				
7	Measurement				
8	Matter				
9	Nature of soil				
10	Hazards				
11	Life cycle of flowering plants				
12	Vegetable crop production				
13	Farming system				
14	Respiratory system of humans				
15	Sources of energy				
16	Conversion and conservation of energy				
17	Light energy				
18	Basic electronics				
19	Ecosystem				
No	Topics	VET	ET	DT	VDT

20	Air pollution				
21	Physical and chemical changes				
22	Element, compound and mixtures				
23	Metals and non-metals				
24	Chemical compound				
25	Mixtures				
26	Water				
27	Carbon cycle				
28	Weather, season and climate				
29	Heredity				
30	Reproduction in humans				
31	Diffusion and osmosis				
32	Circulatory system in humans				
33	Photosynthesis				
34	Food and nutrition				
35	Electrical energy				
36	Infectious diseases of humans and plants				
37	Pests and parasite				
38	Force and pressure				
39	Machines				
40	Acids, base and salt				
41	Soil and water conservation				
No	Topics	VET	ET	DT	VDT

42	Life cycle of mosquito				
43	The solar system				
44	Dentition in humans				
45	Digestion in humans				
46	Heat energy				
47	Magnetism				
48	Science related industries				

49. Indicate five (5) topics under the integrated science syllabus, which you find difficult to teach

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50. Give one reasons to each topics stated above why you have difficulties with them

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APPENDIX D

TEACHERS' MOST DIFFICULT SECTION/TOPICS OF JHS (1-3)

INTEGRATED SCIENCE SYLLABUS (N=30)

Sections	Topics	N	%
Diversity of matter	Measurement	4	3.3
	Hazards	3	2.5
	Mixtures	1	0.8
	Chemical Compounds	11	9.0
	Acids, Bases and Salts	11	9.0
Cycle System	Carbon Cycle	3	2.5
	Respiratory System in Humans	7	5.7
	Reproduction in Humans	1	0.8
	Circulatory System in Humans	6	4.9
	The Solar System	4	3.3
	Digestion in humans	2	1.6
Energy	Conversion of Energy	1	0.8
	Light energy	2	1.6
	Basic Electronics	25	20.5
	Photosynthesis	1	0.8
	Food and Nutrition	5	4.1
	Electrical Energy	8	6.6
	Heat Energy	1	0.8
Interaction of matter	Physical and Chemical Changes	2	1.6
	Infections and Diseases of humans and plants	9	7.4
	Pests and Parasites	2	1.6
	Force and Pressure	4	3.3
	Machines	3	2.5
	Magnetism	4	3.3
	Science related industries	2	1.6

APPENDIX E

Integrated science teachers' reasons for the difficulty of the integrated science syllabus topics

Teaching and learning materials

1. Inadequate teaching and learning materials (basic electronics)
2. Lack of chemicals to test for the presence of food substances (food and nutrition)
3. Lack of teaching and learning materials to carry out practical activities (acid, base and salts)
4. Lack of teaching and learning materials (magnetism, basic electronics, light energy, respiration and solar system)
5. Lack of bar of magnet to do practical (magnetism)
6. Taught in abstract due to lack of chemical (chemical compound)
7. No laboratory for practical (basic electronics)
8. Inadequate materials to handle the topic (chemical compound, physical and chemical compound)
9. It is hard to locate such industries (science related industries)
10. No science laboratory (chemical compound)
11. Lack of materials (basic electronics, magnetism, acids, base and salts)
12. The reagents for the tests are not in the school (food and nutrition)
13. Chemicals are virtually not available (food and nutrition)
14. Unavailability of teaching and learning materials (basics electronics, acids, base and salt, heat energy, measurement, food and nutrition)
15. Lack of teaching and learning materials (basic electronics, circulatory system in humans, solar system)

16. It is cumbersome due to teaching and learning materials (acids, base and salts, basic electronics, chemical compound, conversion and conservation of energy, electrical energy)
17. Getting teaching and learning materials is too difficult (basic electronics, electrical energy, infectious diseases of humans and plants)
18. No science laboratory (chemical compound, force and pressure, acids base and salts)
19. Lack of teaching and learning materials (electrical energy, respiratory system in humans, circulatory system in humans)
20. Unavailability of teaching and learning materials (basic electronics)
21. Unavailability of teaching and learning materials (acids, base and salt basic electronics)
22. Unavailability of teaching and learning materials (hazards, respiratory system in humans, measurement)
23. Lack of teaching and learning materials (electrical energy, basic electronics, measurements acids base and salts)

Pedagogical and content knowledge of teachers in integrated science

1. Have similar signs and symptoms, making it difficult to separate one from the other (infectious diseases in humans and plants)
2. The topic is very complex for my understanding (basic electronics, carbon cycle)
3. Topic should be handle by someone who has knowledge about electricity (electrical energy)
4. I have a problem with calculation (machines, force and pressure)
5. Electricals is not my field (electrical energy, basic electronics)

6. Most of the hazards seem to resemble each other (hazards)
7. Calculating the oxidation number to write the systematic name is a problem (chemical compound)
8. It demands a lot of information on the topic (food and nutrition, infectious disease of humans and plants)
9. Explaining chemical changes are hard (physical and chemical changes)
10. Explaining the diseases to students is difficult (infectious diseases in humans and plants)
11. It was not done when in training collage (basic electronics)
12. I am not well versed in the subject (basic electronics)
13. Understanding chemical compound is my problem (chemical compound)
14. Difficult to do practical (circulatory systems in humans,
15. Difficult to do practical (pests and parasites)
16. Difficult to do practical (infectious diseases of humans and plants)
17. Difficult to do practical (the solar system)
18. Difficult to do practical (force and pressure)
19. Basic electronic, quiet technical not enough background (basic electronics)
20. It must be handle by a physics teacher (basic electronics, electrical energy)
21. Difficult to balance chemical equation (chemical compound)
22. Topics are not related to practical life (mixtures, machines)
23. Inadequate knowledge (basic electronics, digestion in humans)

Students Learning Difficulties

1. Students find it difficult to understand (circulatory system in humans, force and pressure)
2. Students do not shows interest in learning it (respiratory system of humans)
3. Students find it difficult to understand it (reproduction in humans)

Topics too Broad and Abstract

1. Chemical changes in it are in abstract (physical and chemical changes)
2. Topics too broad (infectious diseases in humans and plants, pests and parasites)
3. Topic too broad (infectious diseases of humans and plants)
4. Topics too broad (circulatory system in humans, infectious diseases of humans and plants)

Other Comments

1. Pathogens are microscopic and students are not unfamiliar with them and it is always taught in abstract (infectious diseases of humans and plants)
2. Government policies of changing the syllabus frequently (basic electronics)
3. The controversy surrounding the existence of some planets (solar system)
4. The placement of the various topics (basic electronics)
5. No industries in Volta Region to go in for practical
6. Student fears that machines kills so do not show interest in learning topics concerning machines (machines)
7. Students fear acids, hence they shows less interest in its practical lessons (acids, base and salt)

APPENDIX F

Distribution of Students by School Location and Gender

Schools	School location	Gender		Number of respondents from each school
		Male	Female	
	Rural	5	5	10
	Rural	5	5	10
	Rural	5	5	10
	Rural	5	5	10
	Rural	5	5	10
	Rural	5	5	10
	Rural	5	5	10
	Rural	5	5	10
	Rural	5	5	10
	Rural	5	5	10
	Rural	5	5	10
	Rural	5	5	10
	Rural	5	5	10
	Rural	5	5	10
	Rural	5	5	10
	Urban	5	5	10
	Urban	5	5	10

Schools	School location	Gender		Number of respondents from each school
		Male	Female	
	Urban	5	5	10
	Urban	5	5	10
	Urban	5	5	10
	Urban	5	5	10
	Urban	5	5	10
	Urban	5	5	10
	Urban	5	5	10
	Urban	5	5	10
	Urban	5	5	10
	Urban	5	5	10
	Urban	5	5	10
	Urban	5	5	10
	Urban	5	5	10
Total		150	150	300

APPENDIX G

Summary Bio Data for Teacher

	Academic qualification	Area ofspeciality	Gender	Age	Teaching Years
1	Diploma	Science	M	32and above	1-5
2	Diploma	Science	M	26-31	1-5
3	Teachers' Certificate 'A'	Pre-technical skills	M	32and above	1-5
4	1st degree	Mathematics	M	32and above	1-5
5	1st degree	Mathematics	M	26-31	1-5
6	1st degree	Technical skills	M	26-31	1-5
7	Diploma	Mathematics	M	26-31	1-5
8	1st degree	Mathematics	M	32and above	6-10
9	Diploma	Agricultural science	F	32and above	6-10
10	HND	Statistics	M	26-31	1-5
11	1st degree	Agricultural science	M	26-31	1-5
12	Diploma	Mathematics	M	20-25	1-5
13	Diploma	Integrated science	M	26-31	1-5
14	HND	Statistics	M	26-31	1-5

	Academic qualification	Area of speciality	Sex	Age	Teaching Years
15	Diploma	Technical skills	M	26-31	6-10
16	2nd degree	Administration	F	32and above	1-5
17	SSCE	General science	M	26-31	6-10
18	Diploma	Social studies	M	26-31	1-5
19	Diploma	Integrated science	F	32and above	6-10
20	WASSCE	Agricultural science	M	20-26	1-5
21	HND	Automobile engineering	M	32and above	1-5
22	1st degree	Integrated science	M	32and above	11and above
23	Diploma	Agricultural science	M	32and above	1-5
24	Diploma	Science	M	26-31	1-5
25	1st degree	Integrated science	M	26-31	1-5
26	Diploma	Social studies	M	26-31	1-5
27	WASSCE	General art	M	20-25	1-5

	Academic qualification	Area of speciality	Sex	Age	Teaching Years
28	1st degree	Mathematics	M	26-31	1-5
29	1st degree	Business management studies	M	32and above	11and above
30	1st degree	Mathematics	M	32and above	1-5