UNIVERSITY OF CAPE COAST

TEACHERS' AND STUDENTS' PERCEPTIONS ON THE TEACHING OF INTEGRATED SCIENCE IN ABURA ASEBU KWAMANKESE DISTRICT

JOYCE ENYAM EKUA AFORNYO

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BY

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Thesis submitted to the Department of Basic Education of the Faculty of Educational Foundations 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.

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result 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: ……..

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 Supervisor's Signature: …… Date: ……...

Name: ……

Co-supervisor's Signature: …….. Date: ……...

Name: ……

ABSTRACT

Integrated science is very much important in the affairs of modern education and hence issues related to it have attracted much attention in literature. However, little attention has been paid to the teaching methods of the subject. The focus of the study was to assess the perceptions of teachers and students on the teaching of integrated science in secondary schools in the Abura-Asebu –Kwamankese District in the Central Region of Ghana. In the study, the descriptive research design was used. It focused on collecting primary data from the respondents for quantitative analysis. From a population of 3410, simple random sampling procedure and census were used to sample 358 students and 82 teachers respectively. Self-administered questionnaire was used in collecting the data from a total sample of 440 comprising students and teachers. The study revealed that discussions, question and answer and demonstration are highly used in the schools. It also revealed that there are inadequate teaching and learning resources for the subject within the study setting. It is recommended among others that teachers should explore additional teaching and learning methods as well as instructional methods like group work, visual presentation through the use of ICT tools and debate where necessary. Again, the Ministry of Education and school administrators should set up more practical laboratories and fill them with materials such as conical flask, iodine and burettes. Furthermore, school administrators should make sure that teachers are supervised to take students through practical lessons.

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DEDICATION

To my family and children Nicholas, Carl and Emmanuella Nyuieva.

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CHAPTER ONE

INTRODUCTION

Background to the Study

Science has been and would continue to be of tremendous importance because of its ability to explain many natural occurrences and the central role it plays in the world's current technological development. Science is an inevitable ingredient for innovation and invention in today's world. Thus, a growing demand for specialized and practicing scientists abounds, as well as the need for others to be educated in the fields of science. Chepkorir, Cheptonui and Chemutai (2014) noted that there is quick rise in scientific knowledge, which has resulted in the incorporation of new materials into the school syllabus.

Science teaching worldwide has standards. According to Trowbridge and Bybee (1996) as cited in Ajaja (2007) these standards must be followed if the national or specific objectives of science education are to be achieved. They identified six component of a model for standard science teaching to include; teachers of science should plan inquiry-based programme for their students; teachers should interact with students to focus and support their inquires, recognize individual differences and provide opportunities for all pupils to learn; teachers should engage in ongoing assessment of their teaching and resulting students learning; conditions for learning should provide students with time, space, and resources needed for successful science learning; teachers should foster habits of mind, attitudes, and values of science by being good role models for these attributes and it is important for teachers

to become active participants in on-going planning and development of the school science programme.

Although these bench-marks were derived from American Science education specifications they are by no means limited to United States alone. This same standard is recommended in all science classrooms worldwide. The realizations of these standards vary among nations because of variation in commitment to achieve and maintain the set standards. Most poor nations lack resources to enforce standards in science teaching and learning (Ajaja, 2007).

The success of science programmes depends largely on the classroom teachers. They constitute the most important agent in the ongoing exercise to revolutionize the teaching and learning of science. Ajaja (2007) identified the objectives of teaching science to include; Knowledge of science academic discipline; to acquire the skills of scientific method; having clear explanations for societal issues through increasing interest in science literacy and societal goals; for personal needs and for career awareness.

Furthermore, Akueshi (1997) indicated that the world is developing scientifically and technologically in every sphere of human endeavours; we should thrive to join this technological train or else we shall be left behind and it will be disastrous and unpleasant. As a result of poor teaching method, poorly equipped science laboratories and over dependence on print materials, students performed poorly in science subjects in Ghana.

Ilugbusi, Falola and Daramola (2007) noted that inexperienced teachers are easily distressed and undermined by unusual circumstances. This may imply that inexperienced teachers could get perplexed and mixed up the content of the topics taught to the students. As such the students will receive

wrong information which would definitely affect their academic achievement, while the experienced teachers are already immune to challenging classroom situations and have developed the necessary resistance and panacea to agents of classroom bewilderment. Some of the most distinct characteristics of science are experimentation, observation, and discovery. It provides the development of skills of students asking questions and making investigations, making hypothesis, inference of results of experiments to students (Acigoz, Kaygusuz & Oncui, 2004).

Bandura (2012) as cited in Gbore and Daramola (2013) maintained that behaviours are obtained by observation of an individual's behaviour who could be the parent, teacher or a peer group member. The qualifications, attitude, workload and experience of science teachers in the teaching of integrated science as a subject, along with the attitude of student toward the subject may be partly accountable for the perception formed by both teachers and students toward the teaching method of integrated science.

The significant role of integrated science in the attainment of the Ghana's development has prompted the Government of Ghana to make it compulsory for each student to pass at least integrated science as part of the four compulsory core subjects (Integrated Science, English Language, Mathematics and Social Studies) offered at the secondary school level. This notwithstanding, performance in integrated science subject has continued to decline each year (WAEC, 2015). Very Reverend Sam Nii Nmai Ollenu, Head of National Office of WAEC, disclosed this in Accra at a news briefing to release the provisional results for the May/June 2015 WASSCE.

Poor primary school background in science subjects as a factor responsible for the poor performance of students in the science subjects, inadequate science teachers, approach to science teaching, science as an abstract course will only be understood through practice. On June 13, 2017, a news item carried out by Joy News revealed that a teacher in the Assin North District improvised a mouse by using stones to show his students at the basic school level how to click mouse was met with disapproval from the District Director of Education. In this regard, some teachers do not put any effort in improvisation of teaching aids and most importantly students' attitude and aspirations also factor into learning process. With these problems in mind the researcher decided to investigate and possibly suggest ways in which the desire perception to have a comprehensive methodology could be successfully met.

Problem Statement

The teaching and learning environment has a great impact on students' academic performance (Chapman & Adams, 2002). Particularly good teaching in learning environment ensures that teachers involve all the students to participate in their learning (Clark, 2003). Daily observation of science teachers in the classrooms indicate that most of the teaching skills science teachers acquired before certification are not put into practice. The deficiencies in science teaching range from; incomplete of contents in schemes of work, lack of giving and marking of assignments, insufficient supervision of instruction, insufficient organization of practical lessons, insufficient organization of extra lessons to cover lost grounds, insufficient assessment of learning outcomes regularly, insufficient application of improvisation knowledge in instruction to lack of taking out students for field experiences.

Again, all these tend to suggest that teachers are to be blamed for the lack of proper exposure of the science students which result in poor learning outcomes among the science students.

The teaching and learning of sciences have standards to be followed by science teachers if effective learning by students is to be achieved. Literature in the teaching and learning of sciences appears very scanty and as a result, our knowledge of what science teachers do in the classrooms is very limited. This therefore calls for more research efforts directed towards this very important aspect of science teaching.

The continuing poor performance in integrated science has been attributed to a number of factors including students attitude towards Integrated Science, teachers attitude towards students abilities, inadequate teaching and learning resources, and poor teaching methodologies. However, it is not clear which of these factors are responsible for the poor performance of students in Integrated Science. This study therefore isolates teachers and students perception on the teaching of Integrated Science.

Purpose of the Study

The main purpose of this study is to determine teachers' and students' perceptions on the teaching of Integrated Science in Abura Asebu Kwamankese District of the Central Region.

Research Questions

Based on the problem of the study as well as the purpose, the following research questions were developed to guide the conduct of the study:

1. What are the teachers' perceptions of the methods of teaching Integrated Science in secondary schools in Abura Asebu Kwamankese District?
2. What are students' perceptions of the methods of teaching Integrated Science in secondary schools in Abura Asebu Kwamankese District?
3. What are the existing instructional methods and those that teachers use to teach Integrated Science in secondary schools in Abura Asebu Kwamankese District?
4. How are Integrated Science practical lessons organized in secondary schools in Abura Asebu Kwamankese District?
5. How does the use of available resources affect students' achievement in Integrated Science in secondary schools in Abura Asebu Kwamankese District?

Significance of the Study

This study will add to the growing body of research on this topic and be of benefit to other researchers who would want to carry out research on similar topic. It will also help contribute useful, implementable knowledge to the Ministry of Education about headmasters' skills and inform supervisors on the usefulness of some methodologies and some methodological challenges confronting modern education system.

Delimitation of the Study

The study was conducted to establish students and teachers perception on the methods of teaching integrated science. Though there are many students in Senior High Schools in Abura Asebu Kwamankese District, only students in Form Two and Three in the Schools in the Abura Asebu Kwamankese District

were included in this study. Again Form Two and Three students in secondary schools but are not in Abura Asebu Kwamankese District were also not included in this research.

This study relied mainly on primary data rather than secondary data. Although, it is assumed that secondary data are easy to use and more credible since they are often generated by people other than the researcher, the present study focuses on obtaining first-hand information from the target group making use of primary data indispensable.

Limitations of the Study

Lack of cooperation was a major limitation in this research. This was because the researcher had to visit the schools more than once before the school authorities granted permission to administer the questionnaires. This was because the headmasters had to inform the teachers before the questionnaire could be administered. Other limitations included limited time at the time of administration of the questionnaires, hence the researcher could not make use of the observational checklist for all the teachers during teaching hours since the schools were in the revision week for their examination and therefore the researcher did not have the opportunity to observe the use of the science practical lessons for some of the schools. Though the lack of observation of some of the practical lessons affected the research, the primary data gathered from the students and the teachers were enough to come to the conclusions drawn.

Organization of the Study

This research work is divided into five chapters. Chapter One is the introduction to the study which includes the background to the study, the

statement of the problem, purpose of the study, research objectives, research questions, the significance of the study, delimitation, limitations and the organization of the study. Chapter Two reviewed the relevant literature related to the subject under discussion and the empirical work done in the subject area. Chapter Three considers the research design, population, sample and sampling procedure, instrument, validity and reliability of the instrument, data collection procedure, data analysis and ethical issues. The Fourth chapter looks at the findings and discussion and the last chapter; chapter five also examines the summary, conclusions and recommendations. Though the absence of a complete observation of teachers would affect the research, its impact does not over shadow the primary data gathered from both teachers and students.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

When writing any academic paper, review of related literature cannot be left out. This is because according to Randolph (2009), it helps to discuss published or documented articles of research work particularly in the same area of study that a researcher desires to undertake. Some researchers have defined literature review to be an assessment of body of research that addresses a research question (Salleh, Mendes & Grundy, 2011). Others also explain that it is an evaluative report of information found in the literature related to a researchers' selected area of study (Gimenez & Tachizawa, 2012). Explaining how literature review is done, (Parris & Peachey, 2013), indicated that it usually entails the assessment, classification, evaluation and comparison of past studies on the subject under investigation, the main authorities and authors in the area, the various research questions which have been raised and the extent of which they have been answered or otherwise, the existing theories and hypotheses and the general methodologies in use in investigating the subject.

The definitions and explanations given on literature review, makes it important to assess why it is important in this study. The review of related literature would acts as a stepping-stone towards achievement of the study objectives as outlined in the preceding chapter. For scholars, the depth and breadth of the literature review emphasizes the credibility of the writer in their field (Gimenez & Tachizawa, 2012). Moreover, literature reviews provide a solid background to back one's investigation. The review play a critical role in

analyzing the existing literature and giving justification as to how one's research fits into the existing body of knowledge. Therefore, after assessing a whole broad knowledge on the research area the current study would show new directions which have not been captured in previous studies. Moreover, the literature review would provide the general understanding which gives meaning to the discussion of findings, conclusions, and recommendations (Booth, Sutton & Papaioannou, 2016).

In conclusion, the meaning and importance of literature review could be summarized as follows: literature review helps provide context for the research, justifies the research, and ensures the research hasn't been done and shows where the research fits into the existing entire body of knowledge. Moreover, it enables any researcher to learn from previous theory on the subject, illustrates how the subject has previously been studied, highlight flaws in previous research, and outline gaps in previous research. Finally, it shows how the work is adding to the understanding and knowledge of the field help refine and refocuses or even change the topic. In this regard, the chapter specifically discusses theoretical background to justify the studies and relationship between the study variables. It also accounts for empirical evidences as means of comparison and gap analysis. The key concepts drawn from the theoretical reviews are also discussed in this chapter. Therefore, the chapter comprises of theorietical review, empirical review conceptual review from which a framework is constructed and summarised.

Theoretical Review

Theories are formulated to explain, predict, and understand a phenomena and, in many cases, to challenge and extend existing knowledge

within the limits of critical bounding assumptions (Harrison, Flood & Duce, 2013). The purpose of this form is to examine the corpus of theory that has accumulated in regard to an issue, concept, theory, phenomena. The theoretical literature review helps to establish what theories already exist, the relationships between them, to what degree the existing theories have been investigated, and to develop new hypotheses to be tested (Hassini, Surti & Searcy, 2012). Often this form is used to help establish a lack of appropriate theories or reveal that current theories are inadequate for explaining new or emerging research problems. The unit of analysis can focus on a theoretical concept or a whole theory or framework.

According to Savin-Baden and Major (2013), theories are collections of concepts about some real world area of concern or interest which facilitate explaining, predicting, or intervening. With theories it is relatively easy to explain why and how things occur as they do. One can also predict what is going to happen given the way things are. This means that theories are a set of statements or principles devised to explain a group of facts or phenomena, especially one that has been repeatedly tested or is widely accepted and can be used to make predictions about natural phenomena. It also involves a series of interrelated constructs, concepts, abstraction, definition, variables, and propositions that have been hypothesized or assumed with a systematic view of phenomena, for the purpose of explaining and predicting the phenomena (Cranton, 2012).

From the above discussions and observation, there is no doubt as to the relevance of theory to research. Therefore, since the focus of this study as explained in chapter one involves investigating relationships, theoretical

justifications are required. Therefore this section of the study discusses the various relevant theories which underpin the study. The various theories discussed here: the self-efficacy theory, the equivalency theory and the theory of industrialization.

The Self-efficacy Theory

The Self-efficacy Theory was developed by psychologist Albert Bandura in 1977. The theory is based on one's belief in one's ability to succeed in specific situations or accomplish some specific tasks (Schunk & Zimmerman, 2012). The Self-efficacy theory helps reflects confidence in the ability to exert control over one's own motivation, behaviour, and social environment. The theory is again based on the principle or assumption that psychological procedures, whatever their form, serve as a means of creating and strengthening expectations of personal efficacy (Bandura, 2012). The theory also helps to address how people can meet their expectation within challenging conditions. The Self-efficacy theory provides explicit guidelines on how to develop and enhance human effectiveness through enabling environment and motivations while overcoming any form of challenges (Abele & Spurk, 2009).

The ability or otherwise to remain effective under stressful conditions comes from host of factors. According to Bandura (2012) these factors include personal, social, and situational ones which affect how efficacy-relevant experiences are interpreted. For example, the extent to which performance attainments alter perceived efficacy will depend on people's preconceptions of their capabilities, the perceived difficulty of the tasks, the amount of effort they expended, their physical and emotional state at the time, the amount of

external aid they received and finally the situational circumstances under which they performed (Shea & Bidjerano, 2010). Each mode of influence is associated with a particular set of factors that have diagnostic significance in the self-appraisal of personal efficacy.

In an attempt to expand the self–efficacy theory to entail how people could be effective under better conditions and practices, Schunk and Zimmerman (2012) proposed four major processes. They include cognitive, motivational, affective, and selection processes. These different processes usually operate in concert, rather than in isolation, in the on-going regulation of human functioning. For the purpose of this study only the cognitive process is applicable. From the cognitive process, the authors indicated that most courses of action are initially organized in thought. This means that people's beliefs in their efficacy, shape the types of anticipatory scenarios they construct and rehearse. Therefore those who have a high sense of efficacy visualize success scenarios that provide positive guides and supports for performance. Those who doubt their efficacy visualize failure scenarios and dwell on the many things that can go wrong. It is difficult to achieve much while, fighting self-doubt.

Relating this explanation to the current study, it stands to reason that to be effective as a student and a teacher; people have to predict events and to develop ways to control those that affect their lives. Such problem-solving skills definitely require effective cognitive processing of information that contains many complexities, ambiguities, and uncertainties. Some of these complexities could include attending to family needs and caring for children. From the perspective of teachers this could have influence on their perceptions

about the teaching methods on integrated science. If the family pressure is very high, teachers would perceive the teaching method differently than when the family pressure is minimal. Thus, Shea and Bidjerano (2010) contend that, in learning predictive and regulative rules people must draw on their knowledge to construct options, to weight and integrate predictive factors, to test and revise their judgments against the immediate and distal results of their actions, and to remember which factors they have tested and how well they have worked.

Similarly, Van Dinther, Dochy and Segers (2011) have also tested the relevance of the self- efficacy under the circumstances of high school education. Van Dinther and co observed that it requires a strong sense of efficacy to remain task oriented in the face of pressing situational demands. This is because failures and setbacks can have significant personal and social repercussions. Indeed, when people are faced with the task of managing difficult environmental demands under taxing circumstances, those who harbor a low sense of efficacy become more and more erratic in their analytic thinking and lower their aspirations, and the quality of their performance deteriorates (Bandura, 2012). In contrast, those who maintain a resilient sense of efficacy set themselves challenging goals and use good analytic thinking, which pays off in performance accomplishments.

The observation by van Dinther et al (2011) helps in analysis of the current study that, to have a good perception about the teaching or learning of a particular subject method, people should remain focused by building strong mental thought. The building of such strong mentality would make it easier to excel under difficult circumstances or stringent environmental demands. Some

of these stringent environmental demands which could be regular experiment could easily be dealt with when higher aspirations are set. On the other hand, if such strong mental capacities are not built, failures and setbacks could ruin the possibility of any higher achievement. In sum, teachers and students' perceptions about the teaching method of Integrated Science could be skewed positively only be effective when people have strong mental capacities to overcome challenges.

The self-efficacy theory has also been studied in relation to students' persistence and academic success in pursuing a major in colleges and other institutes of higher learning. Niemiec and Ryan (2009) conducted a study to investigate self-efficacy for attaining each of 15 scientific and technical occupations. During a 1-year follow-up, students with strong belief in their ability displayed greater persistence and achieved significantly higher grades in science and engineering courses than those with low confidence. Perceived efficacy correlated positively with objective measures of mathematics aptitude and high school achievement. These findings were replicated in subsequent research (Vuong, Brown-Welty & Tracz, 2010), and additionally, self-efficacy was found to predict persistence and academic performance in the science/engineering major even when the variance attributable to other variables was controlled.

From another observation, Shea and Bidjerano (2010) demonstrated that People's appraisal of their efficacy is strongly influenced by social comparisons. This is especially true in educational context where academic performances are subjected to a great deal of modeling and comparative evaluation. The successes and failures of others can affect one's own efficacy

and motivation through perceived similarity. Van Dinther et al (2011) further studies the role of perceived similarity in competence with a peer model. College students judged self-efficacious for solving anagrams and or attempted to solve them. Subjects were told they performed better than, or the same as, a model, who was observed to fail on this task. Observers maintained a high sense of efficacy and did not slacken their efforts, despite repeated failure, after exposure to a failing model that they believed to be of lower ability. In contrast, observing a model of comparable ability fail had a detrimental effect on observers' self-efficacy and persistence. The more their self-efficacy was undermined by vicarious failure, the more readily they gave up when they encountered difficulty.

The postulations and assumptions of the self-efficacy theory as well as the observations revealed from test by scholars are applicable to the current study. Using the self-efficacy theory, studies with regards to the teaching methods on Integrated Science can be effective if people are confident in the ability to exert control over their own motivation, behaviour, and social environment. The social environment in this case represents the teaching methods and schooling activities or academic achievement. This social environment could pose a lot of challenges to both teaching and learning. However from the theory it is evident that people must develop skills in regulating the motivational, affective, and social determinants of their intellectual functioning as well as the cognitive aspects. This requires bringing self-influence to bear on every aspect of the learning and working process. The theory has demonstrated that good self-regulators do much better academically than do poor self-regulators. Similarly, proper self -regulation

makes it easier to cope with the challenges that education especially in the Abura-Asebu-Kwamankese District.

The theory has linked the extent to which performance attainments and perceived efficacy to people's preconceptions of their capabilities. Hence, to be effective in teaching and learning in the areas of integrated, how people perceive the various task assigned them would determine their success. If students and teachers perceive the teaching methods to be a difficult task, the likelihood to be less effective would be high. On the other hand, if students and teachers based on their capabilities perceive the teaching methods to be less burdensome, higher effectiveness would be attained. This is because such capabilities would ginger people to deal with insurmountable obstacles that cross their ways. Moreover, the cognitive construct of the theory illustrate that beliefs in ones efficacy, shape the types of anticipatory scenarios they construct and rehearse. Therefore, those who have a high sense of efficacy visualize success scenarios that provide positive guides and supports for performance. This means that the sense of efficacy affect the extent of effectiveness of teaching and learning Integrated Science in whatever circumstances. When the sense is high so does the extent of efficacy and vice versa.

In spite of the fact that the theory of self-efficacy has received much attention in diverse areas of academic literature, the theory has many limitations and hence faced several criticisms. One of the criticisms of self-efficacy as provided by Vecchione and Caprara (2009) indicate that it is, "impossible to exclude outcome considerations from efficacy expectations. This is as a result of the fact that it is human nature to be aware and concerned

with the outcomes in performing a task. Moreover, while Bandura's studies focused on discrete tasks, the applications for self-efficacy move beyond discreet tasks with limited outcomes. While critics of Bandura and self-efficacy agree that there is value in his experiments, it is doubted that self-efficacy and outcomes can be limited and distinct on a larger scale or in application of the theory (Vuong Brown-Welty & Tracz, 2010).

In another vein, Schmidt and DeShon (2010) found that when a person had a high level of self-efficacy, this did not mean they had a high level of performance. In fact, it could lead to a low level of performance. Vecchione and Caprara (2009) again found that a person that was over-confident in their abilities were high is self-efficacy and that these individuals also had less motivation and contributed less to reaching these goal. After looking at these studies, one may conclude that high levels of self-efficacy may not at all times be as good as Bandura once thought. These deficiencies in the self- efficacy theory make it imperative to access other theories that make it possible for distance learners' move in the same way as traditional classroom learners. Assessing such theories would help reveal the perceptions of teachers and students with regards to the teaching methods of Integrated Science and most especially whether or not the students or the teachers have some fear in the discipline.

The Extended Parallel Process Model (EPPM)

The Extended Parallel Process Model (EPPM) was proposed by Kim Witte (1994). It tries to predict the manner in which people would react when they are confronted with fear provoking stimuli. Messages which are fear appealing have been effective in behavioural change since they draw attention

to the risk(s) a person faces for not performing or performing a particular action (Murray-Johnson, Witte, Patel, Orrego, Zuckerman, Maxfield, & Thimons, 2004). Certain persuasive strategies attempt to produce particular behaviour or decisions by giving information that is emotionally loaded or biased. Strategies of such sort might use urging, inducement and reasoning, and also use either rational or emotional appeals, or a combination of both appeals as the basis of their message. Also, persuasive communications usually employ "fear tactics" as a technique to boost the level of arousal of recipients and also to make them have the feeling that they are more susceptible to certain risks. It posits that, when people are given risk messages, they undertake two appraisal activities (Murray-Johnson et al., 2004).

First, they observe whether or not they stand susceptible to a recognized threat and also whether that threat is a severe threat. This is to say the first process involves perceived susceptibility - the level to which an individual feels they stand at risk for some particular threat and perceived severity - the level to which an individual sees a threat as being serious. Generally, if it is perceived that the threat is irrelevant or trivial, they overlook the message of risk as well as the advice to perform the needed action.

Second, if individuals think they stand susceptible to some threat which is severe and their fear level is stimulated, they become motivated to consider whether the required action could minimize that threat - the response efficacy and also whether they could carry out the required action - the self-efficacy. Once they feel they are capable to act, they will suitably keep the risk under control.

Several fear- provoking work-related studies have tested the EPPM. This includes gun safety (Roberto, Meyer, Johnson, & Atkin, 2000), tractor safety (Witte et al., 2003), loss of hearing amongst occupational groups, for instance coal miners (Murray-Johnson et al., 2004) or landscape farmers and workers (Smith et al., 2008), as well as pandemics amongst workers (Barnett, Carol, Edbert & Catlett, 2010). Witte and Allen's (2000) meta-analysis of the EPPM indicated that usually threats serve as an effective stratagem in a number of situations. This theory is applicable as a justification for the study: the perception of teachers and students on the teaching methods of Integrated Science since its proponents touch on how fear appeals influences the behaviour of individuals (Witte, 1992).

The postulations or assumptions from the extended parallel process model can be applied to the present study. Borrowing from the EPPM, there is a relationship between teachers and students' perception on the teaching method of science and their performance. If education is centered on the general knowledge, penalties for poor performance and illustrations on cases both teachers and students the consequences suffered by poor performance, the level of performance will be high. For instance, I stand a risk of being penalized if I evade teach well or score low marks, but I can avoid the possible penalty if I am able to perform well.

On the other hand, when they are in doubt about their capability to reduce the threat, which may be due to physical, social or personal barriers, they rather concentrate on how to control their fear. For instance, "I stand a risk of being penalized if students score low grades in the subject, but I don't believe I can evade forever, and I also don't think there is any means to avoid

the possible penalty if I am a student. In addition, they will go into some state of defensive avoidance, or denial (for instance, "I would just not ponder over it"). All in all, perceived threat (perceived susceptibility as well as severity) induces action. The perceived efficacy (required response efficacy as well as self-efficacy) decides whether an individual will control the associated danger and make changes in behaviour or will control their fear by means of mechanisms of psychological defense (Witte & Allen, 2000).

This arguably means that, perception about the teaching method could easily be influenced by the consequence performance from both the side of the students as well as the teachers. However, the fear of the subject or the perceived difficulties of it could be as result of factors including availability of materials and consistency in practical lessons.

Drawing from the above theoretical discussions, it can be explained that to identify the perceptions of teachers and students on the teaching methods of Integrated Science, many factors need to be considered. Some of the factors include, the performance of the teachers with regards to how well the students perform and availability of teaching materials. From the perspective of students, their perception may be influenced on the perceived punishment for poor performance and the number of times practical lessons are held. The EPPM explains why in certain cases fear appeals leads to adaptive responses, whiles in some other cases it leads to maladaptive responses.

Notwithstanding the theoretical reasons provided by extended parallel process model, it has some flaws. The model is solely formed on fear. Fear appeals do not always lead people to undertake the danger-control which is

what is being fostered, but instead people may engage in strategies of fear-control in which they take on maladaptive responses, for instance, counter-arguing, disregarding the messenger or the message, or just ignoring the message (Witte, 1992). Taking wholesomely the propositions of this model, ensure that there is a good perception form the point of both teachers and students, authorities should engaged in fear arousing educational programmes.

However, this strategy has short term outcome as in the long run the teachers and students may be used to such threats and seek more possible means to subdue the effect of the fear. In addition, the EPPM predict similar behaviour pattern for people. This is not always the case. Some individuals are able to accommodate some situations whiles others cannot. Therefore there is 'NO ONE SIZE FIT FOR ALL' strategy. Considering these weaknesses, relying on only the EPPM may reduce the robustness of the study. Therefore other theories or models which work on some of these weaknesses are considered.

The Theory of Industrialization

In a major treatise on education, Otto Peters of Germany developed a view of teaching methods as an industrialized form of teaching and learning. In the 1960s, Otto Peters examined a research base that included an extensive analysis of the distance teaching and learning and organizations (Saba, 2011). The extensive analysis of the composition of teaching methods led Otto Peters to propose that distance education could be analysed by comparing it with the industrial production of goods. The author indicated among other things that, from many points of view, conventional, oral, group-based on teaching methods was a preindustrial form of education (Simonson, Schlosser &

Orellana, 2011). His analogy gives reasons to believe that teaching methods could not have existed without the revolution of industrialisation. Therefore, using economic and industrial theory, Peters proposed the following new categories (terminology) for the analysis of perception regarding teaching methods.

1. Rationalisation
2. Division of labour
3. Mechanisation
4. Assembly line
5. Mass production
6. Preparatory works
7. Planning
8. Organization
9. Scientific control methods
10. Formalisation
11. Standardisation
12. Change of function
13. Concentration and centralisation

The following paragraphs takes each of these categories of industrialisation and justify how it relate to teachings methods and how it application aids in the effectiveness of teaching methods in Integrated Science. Starting with rationalisation, it could be described as the use of methodical measures to reduce the required amount of input of power, time, and money (Saba, 2011). This means that to be successful or effective in the industrial sector, there is the need to put up various policies to control or as it were

rationalise resources (power, time, and money). In teaching methods of every subject, ways of thinking, attitudes, and procedures can be found which only established themselves in the wake of an increased rationalization in the industrialization of production processes. Thus utilising the concept of rationalisation people who combine work and education should rationalise their energy and other resources in order to acquire the expected benefit of the education (Salleh et al, 2011). Otherwise, the difficult task at the work place would render their distance learning ineffective.

The next terminology in Otto Peter's category is division of labour, which means the division of a task into simpler components or subtasks. Here, to render an organisation effective, different tasks are assigned to different people on the basis of expertise. In so doing goals are achieved in a timely and effective manner (Schunk & Zimmerman, 2012). Similarly, in teaching methods, there is the need for separate individuals perform the tasks of conveying information, counselling, assessment, and recording performance. To Peters, the division of labour is the main prerequisite for the advantages of teaching and learning to become effective. The division of labour as demonstrated here lies within the power of education authorities (Makoe, 2012). Conscious effort should be made to decentralise the teaching stuff vis-a-vis the students of the schools per the needs of the students to achieve efficiency.

For the mechanisation, Otto Peter borrowed from the tenets of the equivalency, interactions and communication theories to make his proposal. Relating to industrialisation he asserts that machines are very relevant in any working process. Hence, relating to the concept of learning integrated science,

Moore, Wedemeyer, and Delling (1990) in their theory of interactions and communication agreed with Otto Peters that machines are indispensable in any meaningful distance learning. Likewise, teaching and learning of integrated science, Jin (2013) noted, would be impossible without machines. Duplicating machines and transport systems are prerequisites; later forms of distance teaching have the additional facilities of modern means of communication and electronic data processing installations (Simonson et al 2011). Therefore to be very effective in combining work and distance learning, machines in the form of computers, projectors, digitized television streaming and other ICT equipment should be introduced.

The assembly line commonly is a method of work in which workers remain stationary while objects they are working on move past them (Makoe, 2012). Similarly in teaching and learning programs, materials for both teacher and student are not the product of an individual. Rather, instructional materials are designed, printed, stored, distributed, and graded by specialists. Therefore effectiveness depends on the quality of materials (Schmidt & DeShon, 2010). Moreover, with regards to mass production in industrialisation, Peters noted that because demand outstrips supply at colleges and universities, there has been a trend toward large-scale operations not entirely consistent with traditional forms of academic teaching (Saba, 2011).

Therefore mass production of distance education courses, however, can enhance quality. This is so, because as the number of course increases workers could easily find those courses which directly relate to their areas of work thereby reducing the difficulty in studies to improve effectiveness. Further Peters indicated that the large number of courses produced forced distance

teaching organizations to analyse the requirements of potential learners far more carefully than in conventional teaching and to improve the quality of the courses (Nyerere, Gravenir & Mse, 2012).

Other items that were proposed by Otto Peter in determining the effectiveness of distance learning are preparatory and planning. Determining how workers, machines, and materials can usefully relate to each other during each phase of the production process (Makoe, 2012). Peters indicated that the success of teaching and learning Integrated Science depended decisively on a preparatory phase (Jin, 2013). The preparatory phase concerns the development of the distance study course involving experts in the various specialists' fields with qualifications often higher than those of other teachers involved in distance study. This system of decision according to Simonson et al (2011) is required to determine an operation before it is carried out.

On the issue of planning, Peters noted that planning was important in the development phase of distance education, as the contents of correspondence units, from the first to the last, must be determined in detail, adjusted in relation to each other, and represented in a predetermined number of correspondence units (Liyanagunawardena, 2012). The importance of planning is even greater when residential study is a component of a teaching programmes. This is because like the working class, residential studies and classes would be very difficult to attend. Hence, effective planning makes it necessary to identify which residential course would be useful in their learning processes.

The next item on Peters' industrialisation theory of teaching methods is organisation. This item is the last one which is much applicable as far as this

study is concerned. Peters defined organisation to be creating general or permanent arrangements for purpose-oriented activity (Nyerere et al, 2012). Peters noted the relationship between rational organization and effectiveness of the teaching method. Organization makes it possible for students to receive exactly predetermined documents at appointed times, for an appropriate university teacher to be immediately available for each assignment sent in, and for consultations to take place at fixed locations at fixed times (Saba, 2011). Organization, Peters pointed out is needed to be optimized in large distance education programs.

It could therefore be concluded that for distance teaching to become effective, the principle of the division of labour is a constituent element of distance teaching. The teaching process in the theory of industrialization is gradually restructured through increasing mechanization and automation. The relevance of the theory for the study could be summarized as follows:

1. The development of teaching and learning courses is just as important as the preparatory work taking place prior to the production process.
2. The effectiveness of the teaching process is particularly dependent on planning and organization
3. Courses must be formalized and expectations from students standardized to make sure that all students are equally benefiting from the programme irrespective of where they are.
4. Distance study can only be economical with a concentration of the available resources and a centralized administration.

There is no denying the fact that within the complex overall distance teaching activity, one area has been exposed to investigation that had been

regularly omitted from traditional analysis. It is true that new concepts are used to describe new facts that merit attention (e.g. the concept of interaction and communication). Though one cannot deny that there are disadvantages to the theory of the industrialization of teaching; however, in any exploration of distance learning, the industrial structures characteristic of distance teaching need to be taken into account in decision-making (Saba, 2011).

The various theoretical explanations have illustrated how teachers and students may be affected by several factors with regards to the teaching methods of Integrated Science even in the basic and high school level. The theoretical underpinnings have justified that these factors highly affect the perception that people have and hence could also affect the entities (teachers and students) of this study. Aside the theoretical demonstration, there is also some empirical evidence on the perceptions of teachers and students in relation to science and other subjects. These evidence or studies present result which shapes the current study and offer practical directions.

Empirical review is sometimes defined as research based on experimentation or observation (evidence). Empirical research is conducted to test a hypothesis. The word empirical means information gained by experience, observation, or experiment. The central theme in scientific method is that all evidence must be empirical which means it is based on evidence. In scientific method the word empirical refers to the use of working hypothesis that can be tested using observation and experiment (Graham & Leary, 2011). According to Kuss and Griffiths (2012), empirical review helps to capture contextual data and complexity, identify and learn from the collective experience of others from the field. Moreover, it aids in the identification,

exploration, confirmation and advancing the theoretical concepts to further improve educational design.

Commenting on the objectives of empirical study, Aguinis and Glavas (2012), assert that it goes beyond simply reporting observations but rather, promote environment for improved understanding, combine extensive research with detailed case study and lastly prove relevancy of theory by working in a real world environment or context. It could thus be inferred that empirical review helps to understand and respond more appropriately to dynamics of situation, provide respect to contextual difference, help to build upon what is already known and specifically provide opportunity to meet standards of professional research. It is therefore against such numerous importance of empirical review that this section tends to examine the study of other authors in relation to the current study.

Migwi (2009) researched on Assessment of Public Secondary School preparedness in integrating ICT for instruction: A Case of Ruiru Division, Thika District. The researcher employed a descriptive survey, combining both qualitative and quantitative research strategies. Twelve schools constituting 44% of the 27 schools in Ruiru Division were sampled. Proportionate sampling was used in the selection of schools to ensure fair representation within the three strata National, Provincial and District schools. Fair representation within school types (Boys, Girls and Mixed) was ensured by selecting respondent teachers and head teachers along school type category. From each of the schools, the researcher used simple random sampling to select five teachers giving a total of 65 teachers. All the 12 head teachers from the 12 schools participated in the study. The research instruments used were

head teachers' questionnaire, teachers' questionnaire and DEO's interview schedule.

The researcher pre-tested the questionnaires using two schools in the division. Split half technique was employed to ensure reliability, whereby the pilot questionnaires were divided into two equivalent halves and the correlation coefficient of 0.81 was obtained which is high enough to judge the research instruments as reliable. The findings were that although 62% of the respondents had received training on the use of computers up to 84% of the respondents thought that the schools were not prepared to integrate ICT for instruction citing teachers' negative attitude towards ICT and related infrastructure and heavy workload among teachers. The recommendations were that there is need for intensive training in the use of ICT for instruction with school based courses and ongoing support through refresher courses. Secondly apart from teachers acquiring certain fundamental skills in ICT, the emphasis needs to be placed on how these skills can be applied in teaching.

Recommendations for further research were that a comparative study be carried out to assess the status of ICT integration in private and public secondary schools. This study focused on assessment of public secondary school teachers' preparedness in integration of ICT for instruction while the current study assessed the perceptions of students and teachers on the teaching methods of Integrated Science in the Abura Asebu Kwamankese District. It assessed the extent to which ICT has been integrated by the teachers in teaching Business Studies content in Ruiru Division, Thika District in Kenya while this is on public secondary schools in Abura Asebu Kwamankese District.

Focusing on teaching methods, Tilya and Mafumiko (2010) conducted a library based research on the compatibility between teaching methods and Competence Based Curriculum in Tanzanian Secondary Schools. The study explored how far teachers were faring with the implementation of Competence Based Curriculum. The results revealed that, teachers' practices in the classroom have generally remained traditional. The traditional teaching method referred to is the lecture method which most of the time is pre-occupied with teacher-talk-and-chalk while students listen and write. The findings also revealed that, the assessment of students' performance was still geared to pass examinations and not on assessing the level of competency attained by the students during their secondary education.

Similarly, Vuzo (2010) did a study on the problem of integrating visualised environment teaching strategies and the learning process in Tanzania secondary school classrooms. Her focus was on integrating visualised environment teaching strategies and the learning process using qualitative method. He found out that, scarcity of media resources and practical environment was the chief course of students' problems in the mastery of subject like geography and computer related programs as a subject and medium of instruction in Tanzania. She suggested that, educational planners should integrate quantitative and qualitative approaches in planning for education. This integration will make sure that, optimal members of schools are constructed and all necessary resources for smooth teaching and learning are available.

In china, Zhang and He (2012) realized that the Integrated Science education major has been implemented for a decade in China but faced

numerous challenges. Hence, an investigation was conducted in 2010 to find out students' satisfaction with the programme. Participants included 27 senior students and 25 past students from six normal universities. Results showed very low satisfaction. Identified reasons included the fact that the curriculum did not reflect the intended integration objectives of the major, and that the quality of science educators was inadequate to teach integrated courses. The most unsatisfactory aspects related to the treatment of the nature of science, the integration of subject matters, and students' experience of inquiry learning in terms of both curriculum content and teaching methods. In addition to establishing an effective evaluation system, a more fundamental suggestion is to change the current normal college-based Chinese teacher education system especially in the science education sector.

Using a different subject as a case study, Abdu-Raheem (2015), sampled the perceptions of secondary school teachers on the effectiveness of various methods used to teach Social Studies in secondary schools. It also examined the methods that facilitate learning more, the method commonly used by male and female teachers and also by qualified and non-qualified teachers. The population consisted of all secondary school teachers in Ekiti State and the sample comprises of 320 teachers who responded to a questionnaire designed by the researcher to express their opinion on the subject matter. Simple random sampling was used to select ten teachers from each school sampled. The validity of the instrument was ensured by experts in Social Studies and Educational Management. The reliability of the instrument was ascertained through test-re-test method and the reliability coefficient of 0.81 was obtained. One research question was raised and three hypotheses

formulated were tested at 0.05 level of significance. The data collected were analysed using Kendall' Rank Order Correlation and t-test statistical tools.

The study revealed that teachers perceived problem-solving as the best method and note-dictation as the least effective method of teaching Social Studies. It was discovered that teachers are significantly related in their perception of the effectiveness of methods of teaching Social Studies. It also showed that male and female teachers are related in the methods used but the methods used by qualified teachers are different from those used by non-qualified teachers. It was therefore recommended that more qualified teachers should be employed to improve the quality of teaching in schools. The current study adopts the methodological approach used by Abdu-Raheem (2015) in the data sampling procedure. This is because different schools within the district would be selected for the data gathering.

In Ghana, Mensah (2015) conducted a study of similar nature on the perception on the teaching method of science. The study aimed at investigating how pupils of Ampabame No. 1 Roman Catholic Junior High School in the Asokwa Sub-Metro performance can be enhanced through activity based approach. Fifty Junior High School form three pupils were purposively sampled for the study. The nature of the study was an action research. The pre-test and the post-test research design was used, the same participants were pre-tested and post tested to find the effects of the intervention(i e practical activity), five science teachers were selected for the research. The instruments used for the study were test, observation, questionnaire and interview. Data were analyzed with the aid of the Statistical Package for the Social Science (SPSS) version 16.0. Descriptive statistics

were used to analyze the data, in terms of frequencies, mean percentages, and standard deviation. The pre-intervention and post-intervention findings revealed a remarkable improvement in pupils' performance. The findings of this research indicated that, practical activity improves pupils' understanding of science concepts. Observation of pupils revealed that they were highly excited when taught using activities. It was recommended that teachers consider the use of activity method during instructional period should be more than the lecture method to sustain pupils' interest as well as enhance performance in science.

Still in Ghana, Azure (2015) conducted a study to investigate the views of students about integrated science in Ghana. The study examined Senior High School students' perceptions of the teaching of Integrated Science in Ghana. The design of the study was descriptive survey. Stratified random sampling method was used to select the schools and subjects for the study. A student questionnaire, titled, "Science Opinion Questionnaire (SOQ)" was used to collect information from 350 SHS 3 students. The views of SHS students were that most of the processes of science (i.e. observing, hypothesizing, classifying, taking measurements, reporting, etc.) were not often carried out in Integrated Science lessons. The chi-square test revealed that school setting had significant effect on the students' opinions of the activities carried out by students and what the teachers do during integrated science lessons. It was suggested that UEW should critically examine its integrated science curriculum to tailor it towards producing teachers who can teach science as an integrated whole or unit.

A more robust study which is highly identified with the current study is the study by Kibet (2015) conducted in Kenya. The study focused on the perceptions of students and teachers towards the revised Integrated Business Studies Curriculum in public secondary schools in Nandi East District. The study was guided by five research questions; what are the perceptions of students towards the revised integrated business studies curriculum in secondary schools in Nandi East District? What are the perceptions of teachers towards the revised integrated business studies curriculum in secondary schools in Nandi East District? To what extent is the revised integrated business studies curriculum implemented in secondary schools in Nandi East District? To what extent are the resources adequate in teaching the revised integrated business studies curriculum in secondary schools in Nandi East District?, and what are the challenges facing the implementation of the revised integrated business studies curriculum in secondary schools in Nandi East District?

The knowledge gaps identified in the study was filled by literature review and empirical findings from 150 sampled respondents using stratified and simple random sampling techniques. Mixed method was the main design used in this study. Both Quantitative and Qualitative methods of collecting data were used in carrying out this study. Using ten schools based on each category, the sample comprised 20 Business Studies teachers, 10 HoD's (Applied Science) and 120 Business Studies students in form four. The instruments for collecting data comprised questionnaires, interview guide and document analysis. The instruments were tested for validity and reliability for objectivity and accuracy. Descriptive and inferential statistics were derived

summarizing the data into frequencies, percentages and means. Qualitative data were transcribed then organized into themes, after which it was reported verbatim.

The findings of the study revealed that both teachers and students have a positive attitude towards the revised business studies curriculum. Majority of the students noted that teachers use extra time in covering the syllabus. Majority of the teachers agree that subjects making up business studies are well integrated although some teachers are not comfortable teaching some topics. In addition, the findings indicated that majority of the teachers have never attended any In-service course on business studies and are not supervised while teaching the subject. The findings also showed that majority of the teachers neither embrace the use of non print media nor integrate ICT in teaching business studies. The study recommends that KIE review business studies syllabus with a view of removing difficult topics and concepts which are challenging to both teachers and learners. They should also raise the text book evaluation threshold and organize more In-service courses for business studies teachers. In addition teachers should embrace methods of teaching that are learner centered and KNEC should train business studies teachers as national examiners. TSC should appoint qualified teachers as Heads of Departments.

In spite of the integrated and the multidimensional nature of Kibet's study, the study was conducted outside Ghana and was purely geared towards secondary education. However, the current study focuses on a district in Ghana which includes both basic and secondary schools where integrated science is taught.

Akani (2016) conducted a study in Nigeria to evaluate the classroom experiences of basic school science teachers competencies and opinions. Two instruments were developed and used for the study, the instructional skills performance level (ISPL) based on five-point performance scale and questionnaire. The two instruments were developed by the researcher and validated by 3 specialists in Science Education, one from measurement and evaluation and two from biology and Chemistry. The questionnaire was administered on 200 Basic Science Teachers randomly selected from Ebonyi State Junior Secondary Schools.

The questionnaire was divided into 2 sections. Section I contains all the variables. Section II contains a 10-point item scale constructed by the researcher seeking the opinions of basic Science Teachers. It also contains a list of 76 instructional materials used in teaching Basic Science. The Results showed that Basic Science teachers seem to have a title performance level in classroom management and students participations and in evaluation/summary. They performed averagely in the remaining 3 instructional skills; it was also found that most teachers who teach Basic Science used lecture and demonstration method in teaching. Based on the findings, it was recommended that serving Basic Science teachers need to be provided with some opportunity for the improvement of their instructional skills. Such opportunities may take the form of workshops and seminars or conferences where proficient and experienced teachers serve as coaches or trainers. The study in Nigeria, Akani (2016) is related to the current study. It could be observed that teaching of science at the basic level is inhibited by inadequate instructional materials. The current study thus assesses whether or

not similar canker affect the educational setup in the Abura-Asebu-Kwamankese (henceforth A. A. K) District.

Conceptual Review

This section describes the various concepts with regards to teachers and students perceptions on the teaching methods of integrated science. In respect to these concepts, many areas are covered in order to give detailed explanations to the entire study. Each of the concept comes as a sub-heading in this section.

Nature of Science

Science has two structures-the conceptual structure and the methodological structure. The conceptual structure is also known as the product of science and consists of the ideas, facts, theories, hypothesis etc which scientists generate as they work (Pearson, Moje & Greenleaf, 2010). The methodological structure of science which is also known as the process of science is the method scientists use to collect data. This method comprises experimentation, classification, observation, reporting, communication, plotting etc. Irrespective of the level at which science teaching and learning occurs, it should reflect the procedures scientists adopt in order to make discoveries Apart from using approved approaches in their work scientists are also required to adopt certain dispositions in their work. These dispositions according to Bimbola and Daniel (2010) are known collectively as the scientific attitude and include the following attributes:

(i) Open-mindedness

(ii) Being critical in thought and observations

(iii) Respect for other viewpoints

(iv) Curiosity

(v) Objective

(vi) Freedom from superstition

(vii) Belief in cause and effect relationship

(viii) Honesty

(ix) Use of systematic problem solving procedures

(x) Willingness to change one's views in the face of new evidence

(xi) Suspended judgment

(xii) Belief that all scientific knowledge is tentative

(xiii) Utilization of different instead of fixed problem-solving techniques

(xiv) Selection and use of recent and accurate material related to problems

(xv) Seeking facts and avoiding exaggerations

Scientists who possess the above dispositions are expected to attack problems, even in unfamiliar areas, in the same way.

According to Jimoyiannis (2010), scientists use extensive experimentation and observation as the basis for the development of conceptual structures. These conceptual structures evolve out of the regularity they find in the phenomena explore during the experiment. The value of these structures is the degree to which they lead to successful predictions which in turns further shed light regarding behaviour of nature. These predictions are the basis of further observations and experimentations. In effect, the whole process is a self-renewing, never-ending one which continuously builds new concepts and structures through experimentation.

However, Laurillard (2013), sees science as a process of dynamic interaction of rational inquiry and creative play. According to him, scientist

probe, poke, handle, observe, question, think up theories, test ideas, jump to conclusion, make mistake, revise, synthesize, communicate, disagree and discover. The primary science syllabus is geared basically towards the development and acquisition of process skills, scientific attitudes and concepts for further use both in and out of school.

The importance of Integrated Science

Science as described by Becker and Park (2011) is essential to understand the world that we live in and it is about learning how to take care and protect the things in it. They also described science as the method of gathering knowledge through observation and recording the knowledge gathered by using them to find answers to questions that humans ask every day. It has been recognized globally that development and application of science and technology are vital for a country's economic development strategy and policy aimed at improving the living conditions of its people (Jimoyiannis, 2010). In general, science helps man to understand the natural environment by interacting with living organisms and also to help eradicate ignorance in the areas of superstition and other progress and development (Becker & Park, 2011). Another aspect of science is that it helps people to develop the ability to operate simple appliances and gadgets that are commercially used in our everyday lives. It also helps people to acquire the spirit of science attitude and to promote our agriculture by developing early and high yielding varieties of crops (Callister Jr & Rethwisch, 2012).

From the forgoing description and importance of science, it could be inferred that the teaching methods in Integrated Science is very critical if any meaningful benefits is to be derived for the studies of Integrated Science. The

studies of Integrated Science cover all aspect of science including ICT and even agriculture studies. The methods adopted as well as the materials used would enhance the studies of the subject. This is because such materials provide both the teachers and the students the opportunity to be abreast with the subject concepts to attain the needed academic laurels.

Perception

Perception, according to Longman Dictionary of Contemporary English (2018) 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 (Entwistle, & Ramsden, 2015). Perception according to Cambridge International Dictionary of English (2013) 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).

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 sensory information 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 of undergraduate 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 valuable inputs 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's perception is his/her ability to notice and understand things that are not obvious to other people. Perception may be defined 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 sensory memories, 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 affects perception 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. Entwistle and Ramsden, (2015) 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, perception cannot be done in vacuum; it depends on some background information that would trigger a reaction. This is consistent with the views of

researchers Kim, Kim, Lee, Spector and DeMeester (2013) 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).

Traditional Teaching in Education

Teacher education programmes in most colleges and universities are set up to prepare aspiring young people to become teachers. According to Lowery, Roberts, and Roberts (2011), most teacher education programmes have a specific structural context after which they pattern themselves. If most colleges and universities instruct by traditional methods via lecture, blackboard, and drill and practice, then new teachers will usually follow that same pattern. When teachers follow the traditional ways of teaching, their classrooms are usually teacher centered. According to Sadker and Zittleman (2006), in a teacher-centered model of instruction, knowledge, information, and skills are transferred from the teacher to the student and the learning process is controlled by the teacher. In the traditional classroom, teaching-learning is face-to-face interaction between the teacher and the student, according to Wang and Holcombe (2010).

The teacher is concerned with being in control of the learning environment. Through this method, teachers usually find, themselves spending a lot of time speaking and explaining the curriculum in their classes. Students

are usually required to sit in their seats passively and listen to the teacher (Wang & Holcombe, 2010). Other aspects of traditional teaching, the students are expected to memorize rules, rote vocabulary, and skills from textbooks. In traditional methods of teaching, the teacher plays the most important role in the instructional process. Through this process of teaching, materials are used to present facts and information, and the teacher's teaching style is formal and impersonal (Wang & Holcombe, 2010).

Traditional Teaching Methods

There are several methods of traditional teaching. Lecture, whole group discussion, and drill and practice are three methods that are regularly employed in classrooms.

Lecture. Lecture is a traditional teaching method that is often used in schools. Held and McKimm (2009) defined lecture as a style of teaching used to transfer new knowledge and skills to promote and stimulate further learning. Through this style of teaching, an oral presentation is used to present information or teach people about a particular subject. Lectures are used to convey critical information, history, background, theories, and equations to be developed later in small group settings or during an activity, according to Held and McKimm (2009). Typically, the instructor stands before the class and speaks about information for the students to learn. The students are expected to take notes while listening and very little exchange occurs between the teacher and the students during the lecture (Wang & Burton, 2013). In this style of teaching, the teacher usually controls the activities of the entire class.

There are many advantages to using lecture as a method of teaching. Criticized by educators and methodologists for its typical one-way

communication, lectures have nevertheless survived in academia, mainly for their cost-effective way of transmitting factual information to a large audience (Held & McKimm, 2009). According to Wang and Burton (pp. 633-662, 2013), other advantages of lecture as a teaching method are:

1. Instructors have greater control over what is being taught because they are the sole source of information in the classroom.

2. Students who are auditory learners find that lectures appeal to their style of learning.

3. Lecture is easier to create than other methods of instruction.

4. Lecture is a familiar method to most teachers because it was typically the way they were taught.

5. Because most college courses are lecture-based, students gain experience in this instructional delivery method.

Just as there are advantages to the lecture format of teaching, there are also disadvantages. Typically, these disadvantages involve the students and the lack of engagement causing students to become passive listeners. Other disadvantages of lecture as a teaching method according to Kelly (pp. 59-71, 2012) are:

1. Students strong in learning styles other than auditory will have a harder time being engaged by lecture.

2. Students weak in note taking will have trouble understanding what they should remember from the lecture.

3. Students often find lectures boring and easily lose interest.

4. Due to the delivery format, students may not be able to ask questions as they arise during the lecture.

5. Teachers may not get a feel for how much students understand because there is not much opportunity for exchanges during the lecture.

The lecture format of teaching is just one method used in the traditional methods of teaching. When using this method, teachers should be sure that students are trained in note taking skills. According to Kelly (2012), the teacher should help students understand verbal clues and learn methods of organizing and taking notes so that they will become successful and get the most out of lectures. Teachers should be careful when using this method of teaching and be sure that this method will benefit most students.

Whole Group Discussion. A modified version of lecture is the whole group discussion. Whole group discussion is defined as a discussion that involves the teacher and students in an oral exchange of information, with an opportunity for students to verbalize conceptual insight, think aloud, and receive instantaneous responses (Huang, & Fraser, 2009). Through this type of modified classroom lecture, the focus is shared between the instructor and the students for information transfer. The main advantage in this type of teaching method is interaction between teacher and students. Students have the tendency to remain engaged because they may be called upon during the discussion. Teachers can check for students' understanding and retention through questions and answers, (Kelly, 2012). Students can also benefit from answers that the teacher gives to another individual's question.

Ultimately, the teacher and students experience a mutual sense of satisfaction when they discover, overcome, or solve a problem simultaneously (Ram, 2008). There are disadvantages to the whole group discussion. The main disadvantage is the time constraint imposed on the session. According to

Ram, the time limitations may prevent prolonged discussions on a particular problem and therefore it may not be solved to the satisfaction of every student in the class. Also, the teacher must set ground rules and if the rules are not enforced there is a possibility that the discussion could quickly go off topic. Besides the time restraint and ground rules, students may also feel uncomfortable with the chance of being put on the spot during the discussion. In this respect, teachers must be good at managing time, facilitating the discussion, and giving the students the topics ahead of time in order to create a successful whole class discussion (Kelly, 2012).

Drill and Practice. Traditional methods of teaching extend beyond lecture and whole group discussion. The format of drill and practice is also a method of traditional teaching. Drill and practice refers to the structured, repetitive review of previously learned concepts to master a specified learning objective (Huang, & Fraser, 2009). Through repetitive practice, the acquisition of skills and knowledge are promoted and students can do this at their own pace. Lewis (2007) stated that students can solidify newly learned skills when teachers use drill and practice in an effective way. However, if overly used, students may only be learning things in order to get to the next step and not gaining a full understanding of the material. Using drills for different learning styles can help students integrate various tactics for remembering skills (Lewis, 2007).

There are many advantages and disadvantages to using drill and practice. One advantage it provides is mastery of basic skills for students. According to Lewis (2007), teaching students through various methods such as flashcards or repetitive rewriting can help them use these skills in different environments. The rewriting method can benefit a student by using it with

misspelled words. Using flashcards repeatedly can help students who learn visually. Another advantage is that it allows students to build on mastered skills. Lewis stated that in order for students to learn higher level skills, they need to have mastered the basic skills of that same concept. Through drill and practice, the basic skills can become second nature. The disadvantages of drill and practice include students who find it difficult to focus when doing this type of activity too often and students who may have trouble learning.

When students are drilled too often, they find the teaching method boring and become distracted easily according to Bardenstein (2012). Also, students may be relying on just remembering in order to take a test and not really understanding the material. Lewis stated that just memorizing and not mastering the material can cause problems later when trying to accomplish more complex tasks.

Perceptions on Traditional Teaching Methods

Teacher education programs play a large role in the way teachers instruct in their classrooms. According to Taskin-Can (2011), the way colleges and universities prepare teachers for professional practices may shift or refine the beliefs, knowledge, values, and assumptions that form their personal theories about teaching. Often, teachers believe that students are empty vessels that need information poured into to fill it. According to Covill (2011), lecturing is an effective traditional teaching method for teachers who lecture well and for students who are audio learners. Teachers also find that traditional methods of teaching, especially lecture, benefit students who are passive learners. Griffin and Cashin (1989) noted that because of the one-way pattern of communication, in which the teacher talks and students listen, the

lecture method is ideally suited for covering core material and would thus facilitate factual learning. Teachers also believe that traditional methods of teaching help to keep the class in control. Goldstein and Benassi (2006) stated traditional methods of teaching tend to be structured and the strategy leads to a well-managed and organized classroom

Teachers also perceive class discussion as another important traditional teaching strategy. This strategy is used by teachers to get students involved in their education. Skilled discussion leaders are excellent at motivating students to take an active role in researching a particular topic or issue for discussion (Goldstein & Benassi, 2006). Many teachers believe that this method is a good way to get students to research a topic and to bring their ideas to the classroom for discussion. Flynn and Klein (2001) stated that student discussions have been found to be more effective if students prepare beforehand. During the discussion, teachers feel that when students have questions, they can answer the questions or guide the discussion so that students will discover the answers for themselves.

According to Held and McKimm (2009). it is perceived by teachers that students can benefit from answering a student's individual question or by allowing students to experience classroom discussions that will help them to understand the subject. Another aspect of whole group discussion that teachers believe to be beneficial is that it helps to manage the behavior of the class. According to Mullola, Ravaja, Lipsanen, Alatupa, Hintsanen, Jokela, and Keltikangas-Järvinen (2012) a group-oriented model which involves students in the discussion process with the teacher guiding the group and following through with the agreed-upon rules and regulations will keep the class focused

upon the topic at hand. Many teachers will use whole class discussion to gain greater interaction between teacher and students. Teachers feel that this is the time that they can check on what students are retaining and what they understand (Kelly, 2012).

Drill and practice is another form of traditional teaching that teachers believe benefits students. Through the drill and practice method, teachers feel that the repetitive mode helps students to achieve mastery level in a subject. Teachers see drill and practice as a method of teaching that helps students to gain knowledge quickly and obtain a full understanding of the material (Schmeck, 2013). Teachers also believe that students can learn at higher levels when they master basic skills through drill and practice. The American Psychological Association (2007) stated that effective drill and practice can lead to new knowledge and skills that can later develop into more complex knowledge and skills. It is perceived by teachers that drill and practice help students to acquire expertise in the areas on which they are working. Through these stages, cognitive gains from practice often bring about motivation for more learning, (Holzberger, Philipp & Kunter, 2013).

The teaching and learning of Integrated Science

Teaching of integrated science subject especially at the secondary school requires a sound background in theory and practical aspects by the teachers of the subject. The new 6-3-3- 4 system requires that the minimal aspect of the subject be is treated in the Junior High School and as a core subject in the secondary school level (National Policy on Education, 2004). The relationship between teaching and learning is at the heart of the education process. Each teacher and student is an individual and as such will have their

own ideas and preferences with regards to teaching approaches and how they like to learn. It should never be assumed that because you have clear intended outcomes for a session that you teach this will necessarily be what students will learn. This is because each of us responds differently to learning situations. Some, for example, will enjoy learning in mathematics lessons and will respond to mathematical ideas with ease, while finding reading difficult; others will respond well in practical learning situations, while finding the accumulation of information from graphical representation difficult (Smith, 2012).

Good teachers have recognized the challenges presented by these factors for a long time and have learned to plan their lessons in ways which address a range of preferred learning styles and which present opportunities for pupils to tackle learning in a variety of ways. Bell and Federman (2013) suggest that it is not always easy to define good teaching practice. Teachers may appear to be well organized and efficient but this in itself will not guarantee that pupils learn. Teaching and learning are complex processes that are subject to many social, cultural and economic influences. Hence, in order to succeed, effective teachers need to vary their teaching approaches, to be adaptable and to be vigilant in gauging how students respond to their teaching style, the resources they use and the environment in which they are working. This would make it easier for the students to quickly adapt to the various strategies and mechanism there is in the teaching and learning of the subject at hand.

Learning takes place when students can do, understand or know something which previously they could not achieve or did not know (Lambert

& Balderstone, 2012). While much of what is learned in schools comes from the formal process of teaching, there is much which students learn that can be described as incidental or for which no direct planning takes place. In addition to learning about subjects or developing specific skills in school, students engage in learning as a social process through which they engage with others, learning how to play a role as a member of a team and collaborating in solving problems as stipulated from the cognitive theory. This is an important part of learning and provides a foundation for students to become effective learners

Learning the skills of participation, co-operation and teamwork are critical elements in the classroom. Therefore students who can work in social situations usually prosper in school more than those who find it difficult to form relationships and collaborate with others. This is not to say that working independently is not important. Effective learners can adjust to a variety of teaching approaches and learning situations. In most classrooms students will encounter a wide variety of such situations and opportunities. These will typically include whole class teaching, small group work, paired work and even individual sessions working with an adult. Not all students will respond equally well to each of these situations and it is important that teachers are aware of how pupils respond in different circumstances.

Freeman and Hancock (2011).have emphasized the importance of talking to students about how they prefer to learn and about their understanding of teacher expectations. Good teachers are able to identify those critical components of what is being taught which students must master in order to make progress. They are aware that pupils need to develop skills at one point in their learning which will ensure that they can make progress later

on. Some students who have difficulties with learning will need longer than others to acquire these core skills and are likely to need additional support.

The Concept of Effectiveness and Teaching Methods of Integrated Science

The desire to be effective is almost always pronounced in all spheres of human activities. It is usually heard on issues concerning business though; however effectiveness is also assessed medicine, engineering and even metaphysics (Niemiec & Ryan, 2009). According one Productivity Commission's report in Australia, effectiveness is the extent to which stated objectives are met - the policy achieves what it intended to achieve. The goal can be as broad or as narrow as is deemed appropriate - a continuum exists, ranging from achieving very specific outputs (such as 'increasing the number of solar heating panels installed in new houses') to very general outcomes (such as 'improving the environment' or even 'improving community living standards or wellbeing') (Productivity Commission, 2013). Effectiveness is also seen as the extent to which an activity fulfils its intended purpose or function (Saba, 2011).

However, for the purpose of this study, the UNESCO's definition for educational effectiveness is adopted. It defines effectiveness an output of specific review/analyses (e.g., the MOE Educational Effectiveness Review or its Reports on Institutional Effectiveness) that measure (the quality of) the achievement of a specific educational goal or the degree to which a higher education institution can be expected to achieve specific requirements. It is different from efficiency, which is measured by the volume of output or input used. As a primary measure of success of a programme or of a higher

education institution, clear indicators, meaningful information, and evidence best reflecting institutional effectiveness with respect to student learning and academic achievement have to be gathered through various procedures (inspection, observation, site visits, etc.). Engaging in the measurement of educational effectiveness creates a value-added process through quality assurance and accreditation review and contributes to building, within the institution, a culture of evidence (Vlãsceanu Grünberg & Pârlea, 2007).

The explanations to effectiveness above illustrate that to be effective the teaching and learning of integrated science, the goal or the expectations of all students and teachers should be met at the end of their study. This means that to the students and teachers who are in the A. A. K District should realise their objective. If their goals are met, irrespective of the challenges in accessing that form of education, then there is effectiveness in the teaching and learning of integrated science. However, the challenges involved should be rectified in order to increase such effectiveness. However, if the reasons for which there are enrolled are not met, then it stands to reason that there is ineffectiveness.

As illustrated in the industrialisation theory, for distance education to be effective, educational programs and materials for both teacher and student should not be observed as a product of an individual. Rather, these materials should be respected as instructional materials which should be designed, printed, stored, distributed, and graded by specialists. Therefore effectiveness depends on the quality of materials (Schmidt & DeShon, 2010). Furthermore, with regards to mass production in industrialisation as noted, because demand outstrips supply at colleges and universities, there has been a trend toward

large-scale operations not entirely consistent with traditional forms of academic teaching (Saba, 2011). These measures would make it possible for students to achieve their goal which then signals effectiveness

Additionally Simonson et al. (2011) indicated that machines are indispensable in any meaningful distance learning. Likewise, distance education would be impossible without machines. Duplicating machines and transport systems are prerequisites; later forms of learning integrated science have the additional facilities of modern means of communication and electronic data processing installations (Simonson et al., 2014). Therefore to be very effective in the subject or discipline under review, machines in the form of computers, projectors, digitized television streaming and other ICT equipment are equally relevant as they are in conventional form of learning.

According to Shea and Bidjerano (2010), effective teaching methods is largely about making sure that both students and instructors become comfortable with the technology, and that courses are designed to work within the medium rather than trying to bend it to fit the lesson plan. That being said, delivery systems can and should be adapted to best meet the needs of students, so instructors must be knowledgeable and flexible enough to be able to alter things on the fly if need be. Besides, technical problems should be addressed and planned for before they happen, and backup forms of communication established. Guidelines for how to communicate also need to be set, and everyone must understand that clarity should be the number one goal; it is very easy to misconstrue someone's meaning when technological barriers are in the way, so everyone should be aware and understanding of this issue (Simonson et al., 2014). It is also useful to set requirements for people to

communicate, especially early on, because it's important to make sure that everyone becomes comfortable with the process of emailing, chatting and other forms of communication.

The Use of Teaching and Learning Materials

Teaching materials are described as aids materials used in teaching for illustrative purposes. Its ultimate goal is to facilitate and demonstrate an understanding of a lesson (Adodo & Agbayewa, 2011). Teaching and learning materials may be defined to include materials which can be seen or heard and contribute to the teaching and learning process. Learning is done through the use of five senses. Any medium which gives learners the opportunity to use many senses as possible is the best medium in learning (Akinbobola & Afolabi, 2010).

The use of teaching and learning materials arouse the interest of students in what is being taught and make understanding and remembering concepts easily. Teaching and learning materials also serve the teacher the trouble of explaining at length hence the teacher talks less and also encourages students to find more on their own and thereby stimulating self-learning. Teaching and learning materials are divided into three groups; these are audio materials, those that appeal to the sense of learning. Examples are radio, cassette recorders, drum etc. Visual materials are those that appeals to the sense of sight, examples are real objects (relia), chalks, textbooks, charts. The last group is the audio-visual materials which appeal to both the sense of sight and hearing; examples films, video, television etc. (Adodo & Agbayewa, 2011).

The use of teaching and learning materials in science lesson delivery brings variety, curiosity and interest among students to assist retention and recall. Students tend to forget what they hear easier than what they see. Confucius gave a practical statement on how the human mind approaches the learning process: I hear and I forget, see and remember, I do and I understand (Nilsson & Van Driel, 2010).

One of the best ways to understand something is to get ones hands on it and actually experiment with it. Therefore, the use of teaching and learning materials must be encouraged in the teaching and learning process during science lessons in the Senior High Schools. Mensah (2015) again asserted that, science teaching and learning will definitely be better done if the issue of inadequate supply of science equipment and materials is tackled with zeal. He further explained that, learning by doing is one of the cardinal principles of teaching science. Experimentation has put many theories on a sound footing and has also resulted in the rejection of many. History reveals that many beliefs and superstitions were trashed out from the minds of people as a result of experimentation.

Practical Lessons and the Teaching and Learning of Integrated Science

Science exploration and discovery can take place almost anywhere! When learners are actively engaged in science activities, they often gain better understanding of scientific principles, have better retention, and enjoy the learning process more than when they are taught through passive techniques. According to Stohlmann, Moore and Roehrig, (2012) as cited in the North Central Region Education Laboratory (NCREL, 2012) reported that a new vision of science learning is emerging, one that calls for instructional

conceptualizations. The new paradigm for learning science emphasizes engagement and meaning in ways that are not consisted with past practices. The anticipated outcome of this new approach to teaching is a higher level to pupil's achievement in science. It calls for learning that hands-on, and authentic. This approach to teaching and learning of science enables students to participate in a community where the teacher is not the only source of knowledge and information. It encourages full involvement in a community of learners that includes other students, parents, teachers and outside experts.

Conceptual Framework

This section gives a diagrammatical relationship between the theoretical analysis of the study and dependent variable of the study. The dependent variable is the teaching methods of integrated science. The independent variable is the perception of teachers and students which has been supported by the theoretical argument that such perception has some relationship with the teaching methods.

In Fig 1, it could be observed that the perceptions of teachers' and students' is affected by certain factors from the theoretical and conceptual review. These factors compounded on teachers and students' perceptions have a direct consequence on the teaching methods of the subject.

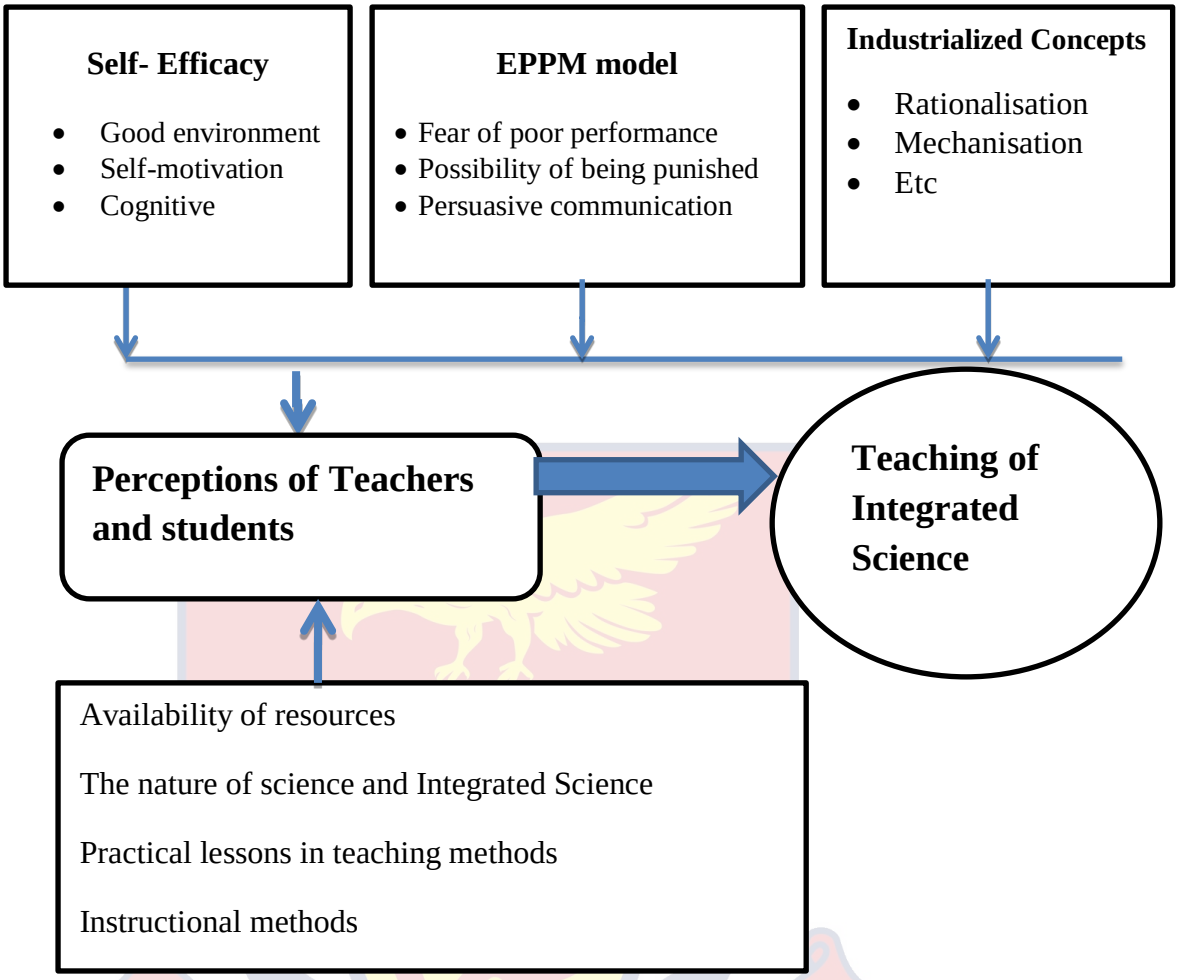

Figure 1: Conceptual framework
Source: Authors construct (2017).

Summary of Literature Review

The literature review has given a comprehensive theoretical, empirical and conceptual analysis of the perception of teachers' and students' on the teaching methods of integrated science. The various theories discussed explained human behaviour from industrial, social and cultural perspective which affect their mental or psychological well-being and hence their perception to a situation. Form the empirical analysis; it was observed that many studies on teaching methods and other related information pointed to giving out the required resources for the teaching and learning at schools.

CHAPTER THREE

RESEARCH METHOD

Introduction

This chapter presents the methodology that was used in the study. This includes research design, population, sample and sampling procedure, research instrument, validity and reliability of the Instrument, data collection methods, and data analysis.

Research Design

This study employed the descriptive survey design. According to Collis and Hussey (2013) the survey design is an efficient manner of gathering information about a large population. They explained further that the survey design is easy to administer and it is also less error-prone since it is standardized and could be tailored precisely to the phenomena the researcher wishes to study (Fraenkel & Wallen, 2002). Tabachnick and Fidell (2007) also assert that a survey is a research design which involves gathering and analyzing large amounts of data from a large population using inferential and descriptive statistics. With the survey design the researcher is able to gather data and information from representative samples of individuals.

This design was chosen because it has the advantage of producing a good amount of responses from a wide range of people. It also provides a clear picture of events and people's behaviour on the basis of data gathered at a point in time. Furthermore, in-depth follow-up questions can be explained using a descriptive survey design. According to Cooper and Schindler (2001), descriptive study has become popular because of its versatility across disciplines. They have further explained that descriptive investigations have a

broad appeal to the administrator and policy analyst for planning, monitoring, and evaluating. Angrist and Pischke (2010) postulated that descriptive survey addresses issues such as quantity, cost, effectiveness, and adequacy. This design has been selected because of the nature of the variables at hand to produce data required for quantitative analysis and to allow simultaneous description of views, perceptions and beliefs at any single point in time.

Study Population

According to Singleton and Straits (2010) population is the entity or unit of analysis which is being studied. The population for this study is the second cycle schools in the Central Region; however, the accessible population were all the seven Senior High and Technical Schools in Abura Asebu Kwamankese District. There are about 3410 and 82 Integrated Science students and teachers respectively.

Sample Size and Sampling Procedures

The data that was used for this study cannot be collected from the entire population of the study and for that reason a representative of the population must be obtained. This makes sampling and sampling techniques necessary. According to Cohen, Manion and Morrison, (2005) sampling is the process, technique or act of obtaining or selecting sufficient elements or representatives of a larger population purposely to determine characteristics or parameters of the larger population.

In order to select this target group, the appropriate sampling technique is purposive sampling. Purposive sampling is a sampling technique wherein there is a zero chance of selecting certain units of the study population since it offers no basis for evaluating the probability of including every item within

the population in the sample (Anol, 2012; Kothari, 2004). This therefore means that, the sample to be purposively selected were second and third year students in the schools because the research appreciates that form one students will not have gone through at least a one year study in Integrated Science.

Table 1- *Senior High and Technical Schools in Abura Asebu Kwamankese District*

Schools	Form 2 And 3 Students	Teachers
Abakrampa SHS	456	11
Aburaman SHS	502	13
Aggrey Memorial SHS	963	14
Andam SHTS	287	10
Charity international SHS	424	11
Ekumfi T.I. Ahmadiiyya SHS	453	13
Nsaba Presby SHS	325	10
Total	3,410	82

Source: Fieldwork, Afornyo (2018)

The sample size was chosen from the total population of students and science teachers in the district. The total population of students is 3,410 and teachers are 82. In arriving at the sample size, the TARO YAMANI sample size formula was used. Below is the formula:

$$n = \frac{N}{1 + N(e)2}$$

Where: n is the sample size yet to be determined

N is the total population of students in the district.

e is the maximum acceptable margin of error in selecting the sample size, and this is usually 5% or 0.05 for social science research (Krejcie & Morgan, 1970).

If 3,410 is fixed in the formula, one will arrive at; n= 358 for students.

Therefore, simple random sampling technique was used to select 358 students from the seven schools and a census technique to select all 82 teachers.

Table 2 - *Sample Size of Students and Teachers*

Schools	Students	Teachers
Abakrampa SHS	48	11
Aburaman SHS	53	13
Aggrey Memorial SHS	101	14
Andam SHTS	30	10
Charity international SHS	44	11
Kumfi T.I. Ahmadiiyya SHS	48	13
Nsaba Presby SHS	31	10
Total	358	82

Instruments

This study used mainly primary data and supported by secondary data. The primary data for this study are gathered through the use of data collection instruments. A data collection (research) instrument as a tool that researchers use to gather appropriate data that will help them address their research objectives and problems.

Researchers use questionnaires to gather confidential and sensitive data from respondents who are given enough time to carefully consider their responses (Collis & Hussey, 2013). Dunn (2012) defined questionnaires as a series of questions that usually refer to as a particular set of issues or similar issues that interest the researcher.

The advantages of the use of questionnaires are numerous. For instance, questionnaires offer a relatively cheaper means for collecting primary data makes it easy for researchers to get a large data from a large population, enables researchers to carry out straightforward analysis of

responses to closed questions (Gillham, 2000; Saunders, Lewis & Thornhill, 2009). Furthermore, with the use of questionnaires, there is minimum pressure for an instantaneous reply from the respondent, the respondent‟s identity and confidentiality are protected, there is no interviewer bias, questions are standardised and can give suggestive data to test hypothesis (Gillham, 2000; Saunders et al., 2009).

A structured questionnaire and an observation guide were adopted as the instruments that were used in data collection. Questionnaires were administered to 358 students and 82 teachers. This helped gather quantitative information regarding the perceptions of students and teachers on the methods of teaching Integrated Science. The observational guide was used by the researcher to observe two teachers in each school during classes hours.

The questionnaires are presented in two categories. That is for teachers and for students with five sections, namely, section A, B, C, D and E. Sections A comprises closed ended items and focuses on demographical factors of the respondents. Sections B, C, D and E collected data on the four key study variables, namely perception of methods, existing instruction methods, Integrated Science practical lessons and perceptions of teachers and students on learning resources. The study used Likert Scale to measure the questions on the questionnaires. According to Yates (2004), Likert-scale is used to measure variables where constructs required quantitative units. Likert scales are reliable and widely used tool for measuring respondents' attitudes, opinions and beliefs (Yates, 2004). The score for all items were consolidated to measure the score for each respondent.

Validity and Reliability of the Instrument

Validity is the extent to which the instruments used during the study measure the issues they are intended to measure (Amin, 2005). To ensure validity of instruments, the instruments were developed under close guidance of the supervisors. After the questions were designed, they were piloted to a tenth of the students and the teachers in the sample with a reliability of 0.82. This helped to identify ambiguous questions in the instruments and be able to re-align them to the objectives.

Data Collection Procedure

An introductory letter was obtained from the Department of Basic Education University of Cape Coast. The letter was delivered to the Heads of the selected Senior High Schools in the district. The questionnaires were personally administered by the researcher so as to clarify issues for the respondents when necessary and also to increase the return rate. Respondents were briefed on the purpose of the study and the nature of the questionnaire. Respondents were also assured of the confidentiality of the data provided and their anonymity during the analysis of the data. The respondents filled the questionnaires within five days and the researcher went back for them. It was a 100% return rate.

The study however, could not achieve the objectives of using the check list in conjunction with the questionnaire. This was because as of the time of data collection, the secondary schools were getting ready for recession and hence made it difficult to observe all the teachers as they teach.

Data Analysis

The researcher used 15 days to collect data and observe the teachers teaching methods after which the data from the semi-structured questionnaire was entered into a computer and Statistical Package for Service Solution (SPSS) programme version 20 used to process it. The data was further presented in chats (pie and histogram) and Tables (frequencies and percentages) for interpretation. All the research questions were analysed using chats (pie and histogram) and Tables (frequencies and percentages.

Ethical Issues

According to Saunders, Lewis and Thornhill (2009) ethics is how appropriate the behaviour of the author is, with regards to the rights of participants or the subjects of the research, or those who are directly or indirectly affected by the research. They further explained that good researchers take into consideration ethical requirements, principles and values throughout their research. This study therefore considers ethical issues over the course of the research.

At the onset of data collection, the researcher sought permission from the head of department or supervisor who introduced the researcher to the school heads, teachers and students. In addition, each questionnaire contained an opening introductory letter requesting for the respondents' cooperation in providing the required information for the study. The respondents were assured of confidentiality of the information provided and that the study findings would be used for academic purposes only. Respondents were further assured of their personal protection and that they have the will to refuse or accept to answer the questionnaires.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents data generated using the statistical tools. The chapter presents interpretations of statistical results generated from the models used and reports the comparative analysis of the findings with prior theoretical and empirical evidences as reviewed in the chapter two. The various implications of the findings to the study settings are also discussed in this chapter. As indicated in the preceding chapter the results are presented in a descriptive statistics using mean, standard deviation, frequencies and percentages as well as graphs with inferential deductions. The presentation of the results follows the research questions of the study.

Research Question 1: What are the teachers' perceptions of the methods of teaching Integrated Science?

The first research question sought to find out teachers' perception of the methods used in the teaching of integrated science and the instructional strategies and methods that teachers adopt in teaching. This research question helps to find out teaching methods that teachers are conversant with together with instructional strategies. The perceptions of teachers on the methods used in teaching Integrated Science are illustrated in Table 3.

Table 3 - *Teachers' Perception on the Methods of Teaching Integrated Science*

Responses	N	Minimum Rank	Maximum Rank	Mean Rank	Std. Deviation
I use group discussions	82	1.00	5.00	2.1481	.70907
I use Field trips in teaching integrated science	82	1.00	5.00	3.6341	1.02454
I use Question and answers	80	1.00	5.00	1.3375	.54988
I use Debates in teaching integrated science	82	1.00	5.00	2.9136	.85436
I use Participation	82	1.00	5.00	1.7561	.86867
I use Demonstration	82	1.00	5.00	1.5309	.50216
I use Brainstorming	82	1.00	5.00	2.5062	1.42411
I use Resource person	82	1.00	5.00	3.3293	1.35223
I use ICT/ Audio-Visual Group discussion	82	1.00	5.00	3.1098	1.24728
Valid N (listwise)	82				

Source: Fieldwork, Afornyo (2018)

The mean statistics presented in Table 3 is drawn from a Likert Scale of 5 ranging from strongly agree to strongly disagree. In order of highest, 1 represents strongly agree, 2 represents agree, 3 represents not sure, 4 represents disagree and 5 represents strongly disagree. The mean values of 1-2 is an indication of strongly agree or agree whereas 3-4 is an indication of disagree or strongly disagree.

From Table 3, it could be identified that all except the use of ICT/ Audio-visual group discussion, field trips, use of debates, the use of resource person and brainstorming are usually adopted by teachers in the teaching of

integrated science. These methods have a mean value of 3.11, 3.63, 2.91, 3.33 and 2.51 respectively. With this mean values, it stands to indicate that the response fall within the category of not sure on the Likert Scale of 1-5. This observation is backed by the standard deviation of 1.25, 1.02, 1.02, 1.35 and 1.42 respectively. The standard deviation of such values which is relatively high is an illustration that respondents wide away from the expected value which falls on either strongly agree or agree. Though the values do not connote disagreement, it is not that closer to agreement as well. It is thus inferred that, the aforementioned teaching methods (ICT/ Audio-Visual Group discussion, field trips, debates, the use of resource persons and brainstorming are not usually employed by the teachers.

However, Table 3 indicates that the use of questions and answers, demonstration and participation methods of teaching is very high in the secondary schools. This is substantiated by the mean values of 1.34, 1.53 and 1.76 respectively. Accordingly, these are accompanied by standard deviation values of 0.55, 0.50 and 0.87 respectively. The low level of the standard deviation (< 1) illustrates that, respondents either agree or strongly agree to the use of questions and answers, demonstration and participation methods of teaching. It is therefore inferred from the statistics that teachers frequently use questions and answers, demonstration and participation methods of teaching as methods of teaching integrated science within the A. A. K District.

Research Question 2: What are students' perceptions of the methods of teaching Integrated Science?

This section is in three-fold, these are the perceptions of students about their Integrated Science teachers, methods of teaching and finally learning of

Integrated Science. The first part of the section deals with students' perception of their teachers. A mean scale of 1-5 is used to analyse how students view their teacher, 1-2.9 denotes poor perception and 3-5 denotes good perception. The perception is sub-categorized into preparation to class and effective communication. The same criterion is used to assess students' perception on the learning of Integrated Science. The methods of teaching Integrated Science is compared with the response of teachers. Students perceptions on their teachers in relation to the teaching of Integrated Science are illustrated in Table 4. The total number of respondents were 358.

Table 4 - *Students' Perceptions about Their Teachers' Methods of Teaching*

Students perceptions about teachers' methods of teaching	Frequency	Percentage
The teacher comes prepared to teach		
Strongly agree	173	48.3
Agree	141	39.5
Not sure	0	0
Disagree	31	8.7
Strongly disagree	13	3.5
The teacher has got a lesson plan		
Strongly agree	194	54.1
Agree	94	26.2
Not sure	54	15.1
Disagree	10	2.9
Strongly disagree	6	1.7
The teacher has got clear objectives for the lesson		
Strongly agree	117	32.5
Agree	157	43.8
Not sure	55	15.4
Disagree	19	5.3

Table 4: Cont'd

Strongly disagree	10	3.0
The teacher's choice of language for teaching is good		
Strongly agree	187	52.3
Agree	108	30.2
Not sure	15	4.1
Disagree	34	9.3
Strongly disagree	15	4.1
Teacher's language is at the level of students understanding		
Strongly agree	171	47.7
Agree	121	33.7
Not sure	39	11.0
Disagree	10	2.9
Strongly disagree	19	4.7
Frequency of teacher-student eye contact when talking to class is good		
Strongly agree	139	39.0
Agree	150	41.9
Not sure	29	8.1
Disagree	23	6.4
Strongly disagree	17	4.7
Strongly agree	175	48.8
Agree	121	33.7
Not sure	20	5.8
Disagree	36	9.9
Strongly disagree	6	1.7
GRAND MEAN:		
Overall Agreement (Agree)	**165**	**46.1**
Overall Agreement (strongly Agree)	**127**	**35.6**

Source: Fieldwork, Afornyo (2018)

Seven scale items or construct were used to assess the perception of students about their teachers. It could be observed from Table 4 that on the average, as many as 292 (strongly agree plus agree) out of the 358 students has good or positive perception about their teachers. This is represented by 81.7% of the total respondents. This means that only 66 representing 18.3% has negative or poor perception about their teachers.

It could be observed from the Table 4 that among all the assessors, the students perceive that their teachers come to class well prepared to teach. This is substantiated by 314 students representing 87.8% of the total student participants. This is followed by the teachers' choice of language for teaching and the frequency with which teachers ask questions during class. The total number of students in this category is 295 with 82.5%. The least on the list is that of the frequency of teacher-student eye contact when talking to class. This item has 290 students representing 80.9% of the total respondents.

In relation to Students' perception of their teachers on their lessons plan preparation, 288 students representing 80.3% confirms the theory of industrialisation on the issue of planning. The theory noted that planning was important in the development phase of education, as the contents of correspondence units, from the first to the last, must be determined in detail, adjusted in relation to each other, and represented in a predetermined number of correspondence units (Liyanagunawardena, 2012). The importance of planning is even greater when residential study is a component of a teaching program. This is because like the working class, residential studies and classes would be very difficult to attend. Hence effective planning makes it necessary

to identify which residential course would be useful in their learning processes.

The next to be discussed from the perspective of the students is the teaching methods used by the teachers in teaching integrated science as shown in Figure 2.

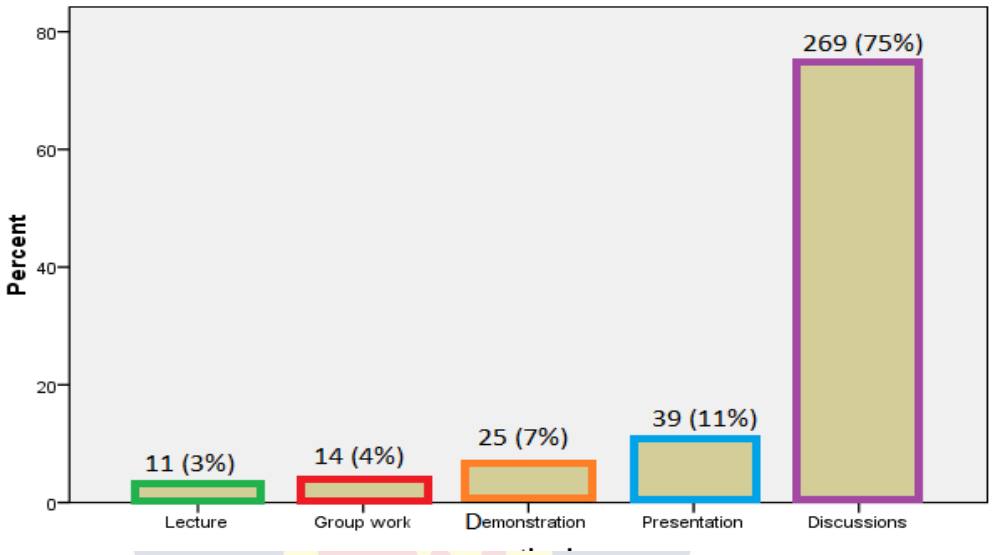

Figure 2: Teaching methods of integrated science from the perspective of students

From figure 2, it could be observed that "discussions" as a method of teaching is the most used method by the teachers. This is represented by 269 (75%) of the total respondents. The next to follow after discussions is presentation and demonstration in that order. This confirms the response from the teachers as indicated in Table 2 where majority of the teachers revealed that they use questions and answers in class. It further confirms other methods such as demonstration and participation as indicated by the teachers in Table 2.

The observation of the teaching methods adopted by the teachers affirms what has been noticed in literature. According to Callister and Rethwisch (2012), learning the skills of participation, co-operation and

teamwork are critical elements in the classroom. This is because students who can work in social situations usually prosper in school more than those who find it difficult to form relationships and collaborate with others. However, this is not to say that working independently is not important. Effective learners can adjust to a variety of teaching approaches and learning situations.

Moreover, Freeman and Hancock (2011) emphasized the importance of talking to students about how they prefer to learn and about their understanding of teacher expectations. This buttresses the point in Figure 2 where discussion was observed as most used method of teaching. In fact, Freeman and Hancock continued that good teachers are able to identify those critical components of what is being taught which students must master in order to make progress. They are aware that pupils need to develop skills at one point in their learning which will ensure that they can make progress later on. Some students who have difficulties with learning will need much time than others to acquire these core skills and are likely to need additional support.

Having discussed students' perception on their teachers and methods that teachers use in teaching integrated science from the perspective of the students, the next to follow is students' perception in learning integrated science. The information is presented in Table 5. The mean values of minimum of 1 and maximum of 3 as demonstrated in Table 5 ranges from Yes, Sometimes and No. Much as the mean value is within 1 and 2 it indicates that the respondents answer is Yes and as the mean value moves away from 1 to three, it indicates that respondents answer is NO.

Table 5 - *Students Perception on Learning Integrated Science*

	N	Minimum Rank	Maximum Rank	Mean Rank	Std. Deviation	Skewness
Teachers teach according to the syllabus	358	1.00	3.00	1.6453	.97142	1.151
I ask questions or make contributions when I do not understand an aspect of what is taught in class	358	1.00	3.00	1.5848	.88624	.920
My teacher pays attention to my needs when I do not understand something	358	1.00	3.00	1.6512	.79865	.714
My teacher shouts or embarrasses me in class when I give a wrong answer	358	1.00	3.00	2.0116	.70078	-.016
the teachers gives enough exercises to check my understanding of what is taught	358	1.00	3.00	1.7035	.85114	.611
My teacher provides feedback on exercises and tests after marking	358	1.00	3.00	1.6353	.86136	.782
Teachers ask questions in class during teaching	358	1.00	3.00	1.5263	.85623	1.084
My teachers discusses solutions to class exercises and tests after marking them	358	1.00	3.00	1.7076	.94986	.742
I am motivated by my core subject teachers during teaching and learning processes	358	1.00	3.00	2.2616	1.15780	.160
Valid N (listwise)	358					

Source: Fieldwork, Afornyo (2018)

Table 5 suggests that students have fairly good perception on the learning of integrated science. The information presented in Table 5 suggests that the students responded "YES" to almost all the items posed soliciting their respective views. The highest on the item is "Do teachers ask questions in class during teaching". This has a mean value of 1.53. The next on the items with the highest value is "Do you ask questions or make contributions when you do not understand an aspect of what is taught in class". This also has a mean value of 1.58.

However, the item noted "Do your teachers shout or embarrass you in class when you give a wrong answer" has a mean value of 2.01 and negatively skewed with value -.02. This clearly demonstrates that, the teachers do not engage in such act in class when teaching. It is therefore inferred from Table 5 that the information presented in Table 4 about how the students perceive their teachers is in the right direction.

From another perspective, Table 5 illustrates that students are not motivated by their core subject teachers during teaching and learning processes. This is as illustrated owing to the mean value of 2.26. However, such an observation is insignificant to the current study due to its direction and purpose. While the current study focuses on integrated science, core subjects in the secondary school include mathematics and English language. Therefore, it could be argued that the lack of motivation is coming from other subjects and not integrated science.

The perception of the students on learning integrated science has theoretical implications. From the self-efficacy theory, Bandura (2012) indicated that factors such as personal, social, and situational ones which

affect how efficacy-relevant experiences are interpreted to have significant effect on achievement. For example, the extent to which performance attainments alter perceived efficacy will depend on people's preconceptions of their capabilities, the perceived difficulty of the tasks, the amount of effort they expended, their physical and emotional state at the time, the amount of external aid they received and finally the situational circumstances under which they performed (Shea & Bidjerano, 2010). Each mode of influence is associated with a particular set of factors that have diagnostic significance in the self-appraisal of personal efficacy. Therefore, from the theory, having a good view of the subject is likely to influence their capabilities to achieve higher laurels.

Research Question 3: What are the existing instructional methods that teachers use to teach integrated science?

The third research question sought to find out the existing instructional methods that teachers use to teach integrated science. Table 6 illustrates the type of instructional methods and it ranges from strongly agree to disagree as explained under Table 3. 1 means the participants strongly agree to an item on the checklist and 5 means participants strongly disagree to an item on the checklist.

Table 6 - *Existing Instructional Methods in Teaching Integrated Science*

Instructional methods	N	Minimum Rank	Maximum Rank	Mean Rank	Std. Deviation
group discussions	81	1.00	5.00	3.0617	1.14396
Field trips	81	1.00	5.00	4.2963	.90062
Question and answers	81	1.00	5.00	1.9506	1.02349
Debates	82	1.00	5.00	3.7317	.96927
Participation	81	1.00	5.00	2.3086	1.23128
Demonstration	82	1.00	5.00	1.8293	.79822
Brainstorming	82	1.00	5.00	2.3902	1.25468
Resource person	82	1.00	5.00	3.5122	1.73022
CT/ Audio-Visual	82	1.00	5.00	3.3537	1.13716
Group discussion					
Valid N (listwise)	81				

Source: Fieldwork, Afornyo (2018)

Table 6 indicates that all the aforementioned instructional methods are used in the various secondary schools. The teachers use all the instructional methods as well in teaching integrated science. However, the extent to which each one of them is employed differs with some extremely limited in use whereas others are highly utilised. For instance questions and answers, demonstration, participation and brainstorming are often used in the various schools. These existing instructional methods are having 1.95, 1.83, 2.31 and 2.39 respectively as their mean values. Thus on a scale of 1-5 with 1-2.9 being the highest and 3-5 being the lowest, it could be observed that these instructional methods are highly employed in the various schools.

On the other hand certain instructional methods are not being employed often in the various schools. Some of these include field trips, debates and ICT. These instructional methods have mean values of 4.30, 3.73

and 3.51 respectively. It could be observed at this juncture that, field trips are not utilised at all as it runs through from Tables 3 and 6.

The findings from the existing instructional methods have empirical significance. It is consistent with the study of Migwi (2009) which found that although 62% of the respondents had received training on the use of computers up to 84% of the respondents thought that the schools were not prepared to integrate ICT for instruction citing teachers' negative attitude towards ICT and related infrastructure and heavy workload among teachers. Thus the recommendations which were that there is need for intensive training in the use of ICT for instruction with school based courses and ongoing support through refresher courses would be recommended for the current study. Secondly apart from teachers acquiring certain fundamental skills in ICT, the emphasis needs to be placed on how these skills can be applied in teaching.

Research Question 4: How often are Integrated Science practical lessons organized in secondary schools?

This question sought to find out the frequency of practical lessons in Integrated Science, available resources as well as materials for teaching and learning of integrated science. The data captures the views of teachers and that of students. The first two figures under this section present how often lab practical lessons are held from the perspective of both teachers and students.

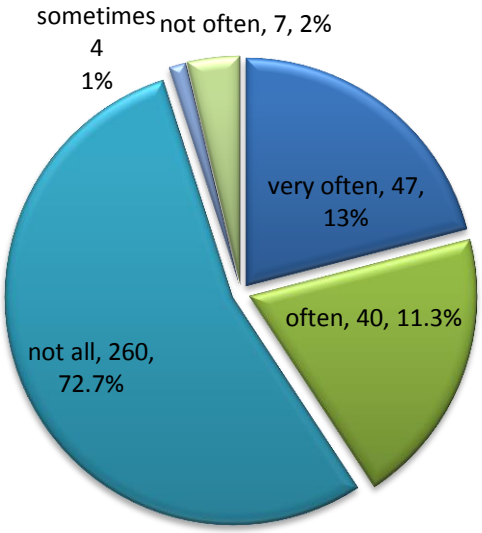

Figure 3: How often students go for laboratory practical lessons

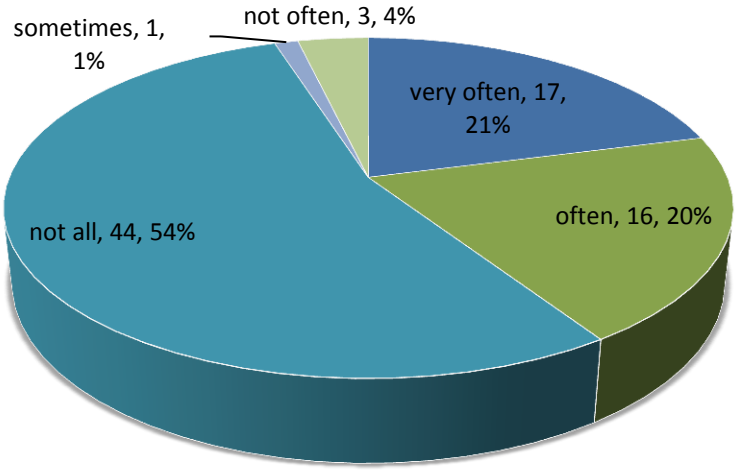

Figure 4: How often teachers take students to laboratory for practical lessons

Figure 3 illustrates that students do not often go for lab practical in the various secondary school. This is demonstrated by 271 of the students, which is represented by 75.7% of the total respondents. This information is in consonance with that of the teachers as illustrated in Figure 4. With regards to the teachers, a total of 48 teachers presenting 59% indicate that they do not

take students for practical lessons. This means that practical lessons are mostly not incorporated in the teaching and learning of Integrated Science.

Table 7- *Availability of Laboratory Materials in the Various Schools*

Availability of materials	Frequency	Percentage
Litmus paper		
Highly available	109	30.4
Available	58	16.1
Not sure	53	14.9
Inadequate	53	14.9
Not at all	85	23.8
Pipette		
Highly available	79	22.0
Available	49	13.7
Not sure	49	13.7
Inadequate	34	9.5
Not at all	147	41.1
Iodine		
Highly available	98	27.5
Available	56	15.6
Not sure	43	12.0
Inadequate	56	15.6
Not at all	105	29.3
Highly available	85	23.8
Available	23	6.5
Not sure	38	10.7
Inadequate	49	13.7
Not at all	163	45.3
Conical flask		
Highly available	49	13.7
Available	38	10.7
Not sure	47	13.1
Inadequate	30	8.3
Not at all	194	54.2
Burette		
Highly available	53	14.7
Available	44	12.4
Not sure	42	11.8
Inadequate	48	13.5
Not at all	171	47.6

Source: Fieldwork Afornyo (2018)

In general, Table 7 illustrates that there is low availability of lab materials in the schools. The material with least availability is conical flask, which 224 of the students representing 62.5% indicate that it is not available in the school. The next is burette which is also 219 students representing 61.1% of the total respondent. The next is Bunsen burner which 212 students representing 59%.

Teachers were further asked about the teaching resources available to teachers in teaching Integrated Science. Their responses are illustrated in Table 8.

Table 8 - *Availability of Teaching Resources for Integrated Science Teachers*

Statements	N	Minimum Rank	Maximum Rank	Mean Rank	Std. Deviation
Teachers' guides/hand books	82	1.00	5.00	3.1341	1.09727
Specimens	82	1.00	5.00	3.9512	1.57827
chemical reagents	81	1.00	5.00	3.4691	.90948
Amount of equipment for experiments	82	1.00	5.00	3.3049	.98994
teachers textbook	81	1.00	5.00	3.4691	.90948
Valid N (listwise)	81				

Source: Fieldwork Afornyo (2018)

From the mean values in Table 8, it could be observed that teaching resources are not available in the secondary schools. On a scale of 1-5, the availability measured from highest to lowest. Within this measurement, 1-2.9 is indicated to be high and 3-5 indicated to be low. The level however keeps decreasing as the value approaches 5 with 5 being the uttermost weakest. The expected value of all the resources was 1-1.5, with standard deviation of 0-0.9.

From Table 8, it could be observed that specimen has the weakest availability with mean value of 3.95 and standard deviation of 1.58. The set of resources with weak availability are chemical reagents and textbooks. These resources have 3.47 as mean and .91 as standard deviation. The information in Table 8 further indicates that, there is not a single resource with strong value of availability. This presupposes that teachers find it difficult to teach the subject since the needed resources to ensure smooth teaching are mostly not available.

Students were also asked to indicate the availability of resources in the teaching of Integrated Science. Their responses are illustrated in Table 9.

Table 9 - *Availability of Resources for Students in Integrated Science*

Response	N	Minimum Rank	Maximum Rank	Mean Rank	Std. Deviation	Skewness
We have adequate materials	358	1.00	5.00	3.0698	1.58790	-.045
We have a separate biology laboratory in our school	358	1.00	5.00	2.5814	1.70287	.452
We have a separate physics laboratory in our school	358	1.00	5.00	2.5465	1.72126	.526
We have a separate Chemistry laboratory	358	1.00	5.00	2.6337	1.65067	.365
We have adequate resources for Chemistry lesson	358	1.00	5.00	3.0765	1.44322	-.075
The Chemistry apparatus are adequate for the Chemistry practical lessons	358	1.00	5.00	3.1279	1.40005	-.153
We have Sufficient laboratory facilities	358	1.00	5.00	3.2209	1.29236	-.157
We have enough Supply of chemical reagents	358	1.00	5.00	3.2500	1.34262	-.159
We have enough Quality student textbooks	358	1.00	5.00	2.9591	1.36493	.201
Valid N (listwise)	358					

Source: Fieldwork, Afornyo (2018)

Table 9 indicates that the problem of unavailability of resources is not only seen by the teachers but also the students. It could be observed that, all the materials that the teachers cited as not being available are confirmed by the students. The statement "We have adequate materials to support our learning of the subject" has a mean value of 3.07. This item on the checklist has a negative skew value of -.045. It does not only support the fact that materials are few in the various schools, other materials are also not available as well.

For instance, "Our school has adequate resources for teaching Chemistry", "The Chemistry apparatus and chemicals are adequate for the Chemistry practical lessons" "We have Sufficient laboratory facilities" and "We have enough Supply of chemical reagents" all have values indicating weak availability. These items have mean values of 3.08, 3.13, 3.22, and 3.25. Interestingly, to confirm the observation of weak availability these mean values have corresponding negatively skewed values of -.075, -.153, -.157 and -.159 respectively.

The information from Figures 2 and 3 and Tables 7, 8 and 9 has theoretical and empirical implications for the current study. In general, laboratory practical and learning materials and resources are woefully inadequate in the various secondary schools. This means that teachers and students find it difficult to properly handle the Integrated Science subject. This is because, teaching materials are described as aids materials used in teaching for illustrative purposes. Its ultimate goal is to facilitate and demonstrate an understanding of a lesson (Adodo & Agbayewa, 2011). Therefore, its absence negatively affects students and teachers as well. It is further argued that visual materials appeal to the sense of sight; examples are real objects (relia), chalks,

textbooks, charts. The last group is the audio-visual materials which appeal to both the sense of sight and hearing; examples films, video, television etc. (Adodo & Agbayewa, 2011).

According to empirical studies, one of the best ways to understand something is to get ones hands on it and actually experiment with it. Therefore, the use of teaching and learning materials must be encouraged in the teaching and learning process during science lessons in the Senior High Schools. In view of this, Mensah (2015) asserted that, science teaching and learning will definitely be better done if the issue of inadequate supply of science equipment and materials is tackled with zeal. He further explained that, learning by doing is one of the cardinal principles of teaching science. Experimentation has put many theories on a sound footing and has also resulted in the rejection of many.

With theoretical implications, Otto Peters borrowed from the tenets of the equivalency, interactions and communication theories to assert that machines are very relevant in any working process. Hence, relating to the concept of learning integrated science, Moore, Wedemeyer, and Delling (1990) in their theory of interactions and communication agreed with Otto Peters that machines are indispensable in any meaningful distance learning. Likewise, teaching and learning of integrated science, Jin (2013) noted, would be impossible without machines. Duplicating machines and transport systems are prerequisites; later forms of distance teaching have the additional facilities of modern means of communication and electronic data processing installations (Simonson et al 2014). Therefore, to be very effective in combining work and distance learning, machines in the form of computers,

projectors, digitized television streaming and other ICT equipment should be introduced.

Research Question 5: How does the use of available resources affect students' achievement in Integrated Science?

The last research question sought to demonstrate how students' achievement in Integrated Science is affected by the availability or otherwise of teaching and learning resources. The responses from the students on how the availability of resources affected their performance are illustrated in Table 10.

Table 10 - *How the Availability of Resources Affect Students' Performance*

Achievements	N	Minimum Rank	Maximum Rank	Mean Rank	Std. Deviation
I get good grades in integrated science	357	1.00	5.00	2.3392	1.19392
I can confidently do my practical	357	1.00	5.00	2.6491	1.15031
I easily understand lessons taught	357	1.00	5.00	2.3918	1.28966
I do not have difficulty in my assignment	357	1.00	5.00	2.3158	1.12967
I would pursue science programme in the university	357	1.00	5.00	2.1404	1.37334
Valid N (listwise)	357				

Source: Fieldwork Afornyo (2018)

From Table 10, it could be observed that, the unavailability of resources has negative consequence on students' achievements. With respect to the mean values, from 1-2.9 indicates that students have low achievement

while 3-5 connotes high level of achievement. Looking at the mean values it could be observed that none of them has values more than 3.0. All the list of students' achievement has values within low achievements. In fact, the least on the list is the item stated "I would pursue science programme in the university" which has a mean value of 2.1404.

The findings are consistent with the observation of (Schmidt & DeShon, 2010). The authors indicated that as a primary measure of success of a programme or of a high school, clear indicators, meaningful information, and evidence best reflecting institutional effectiveness with respect to student learning and academic achievement have to be gathered through various procedures (inspection, observation, site visits, etc.). Thus, there is little wonder that students are not able to achieve and also not aiming high in science education. The number of students desiring to pursue science related programmes in the university is very low with mean value of 2.1404. In fact, engaging in the measurement of educational effectiveness creates a value-added process through quality assurance and accreditation review and contributes to building, within the institution, a culture of evidence (Vlãsceanu, Grünberg & Pârlea, 2007).

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The chapter covers summary of the study, presents the conclusions from the major findings in relation to the specific objectives discussed in this study, recommendations emanating from the key findings and the conclusions drawn and finally relevant suggestions for future studies

Summary of the Study

The focus of the study was to assess the perceptions of teachers and students on the teaching of Integrated Science in secondary schools in the Abura Asebu Kwamankese District in the Central Region of Ghana. In order to achieve this grand purpose, the study was guided by five research questions, these are What are the teachers' perceptions of the methods of teaching Integrated Science in secondary schools in Abura Asebu Kwamankese District?, What are students' perceptions of the methods of teaching Integrated Science in secondary schools in Abura Asebu Kwamankese District?, What are the existing instructional methods and those that teachers use to teach Integrated Science in secondary schools in Abura Asebu Kwamankese District?, How are Integrated Science practical lessons organized in secondary schools in Abura Asebu Kwamankese District?, How does the use of available resources affect students' achievement in Integrated Science in secondary schools in Abura Asebu Kwamankese District?

The study employed the use of descriptive research design which focused on collecting primary data from the respondents required to produce quantitative analysis. From a population of 3410, the study employed

purposive sampling procedure to sample 358 students and 82 teachers. The study was also guided by self-administered questionnaire which was used in collecting the data from a total population of 440 comprising students and teachers. All the respondents participated in the questionnaire hence a 100% response rate was achieved. Some key observations were made from the study.

Summary of key Findings

From the first research question, it emerged that all except the use of ICT/ Audio-Visual Group discussion, field trips and the use of resource person are usually adopted by teachers in the teaching of integrated science. It was also revealed that the use of questions and answers, demonstration and participation methods of teaching is very high in the secondary schools**.** The two findings led to inferential deduction that teachers frequently use questions and answers, demonstration and participation methods of teaching as methods of teaching Integrated Science.

From the second research question, it was revealed that the students perceive that their teachers come to class well prepared to teach. It was further revealed that discussions and questions and answers as a method of teaching are the most used methods by the teachers. Again, students have fairly good view on the learning of Integrated Science**.**

The third research question sought to investigate the existing instructional methods in teaching Integrated Science. It emerged that teachers use more of question and answer, demonstration and participation in teaching Integrated Science.

From the fourth research question, it was revealed that students do not often go for laboratory practical in the various secondary schools. It was

further revealed that most teachers do not take students for practical lessons. Again**,** there is low availability of laboratory materials in the schools with least availability being conical flask.

The final research question revealed that the absence of instructional materials and practical labs has a negative effect on the achievement of students. This most of the students indicated it affected their output of work.

Conclusions

Based on the findings of the study as revealed in the preceding paragraphs, the following conclusions are made in order of the research questions of the study. The first research question sought to find out the perceptions of teachers on the teaching methods of integrated science. From the findings, the study concludes that the teachers use questions and answers, demonstration and participation methods of teaching is very high in the secondary schools. It however concludes that, the use of of ICT/ Audio-Visual Group discussion, field trips and the use of resource person are not utilised at all in the secondary schools. This conclusion is applicable to the second and third research questions of the study.

The fourth research question sought to find out the how often practicals are organized in the schools with regards to Integrated Science. The study per the findings concludes that, laboratory and practical lessons are not effective in the schools, most practical materials like conical flask, burette, bunsen burner, and iodine as well as litmus papers are highly inadequate in the various secondary schools. This has serious negative implications on the student's achievement, which the last research question identified.

Recommendations

Based on the conclusions, the following recommendations are made;

1. Teachers should explore additional teaching and learning methods as well as instructional methods like group work, visual presentation using ICT tools and debate where necessary.
2. The Ministry of Education should set up laboratories that are more practical and fill them with materials such as conical flask, iodine and burettes.
3. School administrators should make sure that teachers are supervised to take students through practical lessons.
4. The Ministry of Education should provide practical textbooks and other related resources like charts and graphs to the students.
5. Teachers should be motivated by the Parent Teacher Association (PTA) to make room for improvised materials in cases where getting the right materials may take longer period from the government or the Ministry of Education.

Suggestions for further Study

Since the current study examined perceptions of teachers and students on teaching methods, it is important for future researchers to look at impact of improvised tools on the teaching and learning of Integrated Science. Due to the growing decline in students' performance with respect to integrated science, it would also be necessary to exclusively examine the teaching methods and performance of students in Integrated Science.

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APPENDICES

APPENDIX A

UNIVERSITY OF CAPE COAST

FACULTY OF SCIENCE

INSTRUCTIONAL SKILLS-TEACHING STRATEGIES

(OBSERVATION CHECK LIST)

1. Does the introduction of the lessons relate to the prior knowledge and life experiences of the class?

Yes [ ] No [ ]

2. Which appropriate strategy does the teacher use for motivation?

(a) Using previous knowledge [ ]

(b) Narrative [ ]

(c) Audio visual materials [ ]

(d) Experimentation [ ]

(e) Arousing intellectual curiosity [ ]

3. Does the teacher use familiar vocabulary in explaining concepts?

Yes [ ] No [ ]

4. Does the teacher use appropriate symbols while giving an explanation?

Yes [ ] No [ ]

5. Are examples and illustrations appropriate for the level of the students?

Yes [ ] No [ ]

6. Which of these media does the teacher use?

Object [ ]

Model [ ]

Pictures [ ]

Diagrams [ ]

Sketches [ ]

Experiments [ ]

Demonstration [ ]

7. Does the teacher use teaching / learning aids properly?

Yes [ ] No [ ]

8. Has he / she employed variety of teaching methods?

Yes [ ] No [ ]

If yes list any two

i……

ii……

9. Which teaching technique does he / she use?

……

……

10. Is he / she gender sensitive?

Yes [ ] No [ ]

11. does he/she do closure at the end of the lesson?

Yes [ ] No [ ]

APPENDIX B

UNIVERSITY OF CAPE COAST

FACULTY OF SCIENCE

QUESTIONNAIRE FOR TEACHERS

QUESTIONNAIRE ON TEACHERS AND STUDENTS PERCEPTION ON THE METHODS OF TEACHING INTEGRATED SCIENCE IN ABURA ASEBU KWAMANKESE DISTRICT

Dear Sir/Madam,

This questionnaire seeks to solicit your opinion to aid a master's research work. The research aims at examining teachers and students' perception on the methods of teaching integrated science in Abura Asebu Kwamankese district. It is to fulfil partial requirement for an award of master degree from University of Cape Coast.

The opinions expressed here are purely for academic purposes and therefore confidential. It is also guided by all relevant ethical standards of research. Total anonymity of participants are assured. To the best of your knowledge and ability, please provide your candid responses to the questions in this questionnaire.

Thank you.

SECTION A: PERSONAL DEMOGRAPHICS

Please indicate your response by ticking (√) in the applicable box for each question.

1. Sex:

   Male [ ]

   Female [ ]

2. Age category

(a) 21 -30 years [ ]

(b) 31 - 40 years [ ]

(c) 41 – 50 years [ ]

(d) 51 – 60 years [ ]

3. What is your highest academic qualification?

i) Diploma [ ]

ii) Bachelor of Education [ ]

iii) Masters [ ]

iv) Any other, specify.....

4. How long have you being teaching integrated science?

(a) 1 – 5 yrs [ ]

(b) 6 – 10yrs [ ]

(c) 11 – 15 yrs [ ]

(g) 16 – 20 yrs [ ]

(e) 21 – 25 yrs [ ]

(f) 26 – 30 yrs [ ]

SECTION B: Perception of the methods of teaching integrated science

KEY:

Strongly Agree **(SA),**

Agree **(A),**

Not Sure **(NS),**

Disagree **(D)**,

Strongly Disagree **(SD)**

	Methods	SA	A	NS	D	SD
1.	I use Group discussion in teaching integrated science					
2.	I use Field trips in teaching integrated science					
3.	I use Question and answers in teaching integrated science					
4.	I use Debates in teaching integrated science					
5.	I use Participation in teaching integrated science					
6.	I use Demonstration in teaching integrated science					
7.	I use Brainstorming in teaching integrated science					
8.	I use Resource person in teaching integrated science					
9.	I use ICT/ Audio-Visual Group discussion in teaching integrated science					

SECTION C: Existing instructional methods that teachers use to teach integrated science.

	Methods	Very often	Often	Not at all	Sometimes	Not often
15.	Group discussion					
16.	Field trips					
17.	Question and answers					
18.	Debates					
19.	Participatory					
20.	Demonstration					
21.	Brainstorming					
22.	Resource person					
23.	ICT/ Audio-Visual					

24. Do you receive complaints from students on the methods of teaching the subject during lessons?

Yes [ ]

No [ ]

SECTION D: integrated science practical lessons

25. Do you visit the lab with students in lessons that involve practical or hands-on activities?

Yes [ ]

No [ ]

26. How often do you send students to the lab for practical lessons?

Often [ ]

Very often [ ]

Sometimes [ ]

Not at all [ ]

27. Indicate the availability of the following materials at the lab on the scale of 1-5 with 1 being lowest and 5 highest

Material	1	2	3	4	5
Litmus paper					
Pipette					
Iodine					
Bensen burner					
Conical flask					
Burette					

28. Describe the extent of students understanding and use of these materials

……

……

……

……

Which other materials are lacking in the laboratory

SECTION E: Perceptions of Teachers towards Teaching and Learning Resources

KEY:

Very Adequate

Adequate

Undecided

N- Not Adequate

N- Not Available (2)

		Very Adequate	Adequate	Undecided	Not Adequate	Not Available
27.	Text books					
28.	Teachers' guides/hand books					
29.	Specimens					
30.	chemical reagents					
31.	Amount of equipment for experiments					

32. Have you been trained on how to use teaching and learning resources?

1. Yes 2. NO

33. If yes which learning resources have you been trained on

……

……

34. Do students access teaching and learning resources regularly?

1. Yes 2. NO

APPENDIX C

UNIVERSITY OF CAPE COAST

FACULTY OF SCIENCE

QUESTIONNAIRE FOR STUDENTS

QUESTIONNAIRE ON TEACHERS AND STUDENTS PERCEPTION ON THE METHODS OF TEACHING INTEGRATED SCIENCE IN ABURA ASEBU KWAMANKESE DISTRICT

Dear Student,

This questionnaire seeks to solicit your opinion to aid a master's research work. The research aims at examining teachers and students' perception on the methods of teaching integrated science in Abura Asebu Kwamankese district. It is to fulfil partial requirement for an award of master degree from University of Cape Coast.

The opinions expressed here are purely for academic purposes and therefore confidential. It is also guided by all relevant ethical standards of research. Total anonymity of participants are assured. To the best of your knowledge and ability, please provide your candid responses to the questions in this questionnaire as they relate to your personally assessment.

Thank you.

SECTION A: PERSONAL DEMOGRAPHICS

Please indicate your response by ticking (√) in the applicable box for each question.

1. Name of school:

……..

2. Gender of student:

Male [ ]

Female [ ]

3. Level of student:

SHS 1 [ ]

SHS 2 [ ]

SECTION B: Perception of students about integrated science teachers

KEY:

Strongly Agree **(SA)**

Agree **(A)**

Not Sure **(NS)**

Disagree **(D)**

Strongly Disagree **(SD)**

No.		SA	A	NS	D	SD
	GENERAL PREPARATION					
5.	Does the teacher come prepared to teach?					
6.	The teacher has got a lesson plan					
7.	The teacher has got clear objectives for the lesson					
	EFFECTIVE COMMUNICATION					
8.	The teacher's choice of language for teaching the subject is good.					
9.	Teacher uses appropriate language for students' understanding					
10.	Teacher's language is at the level of the students					
11.	Frequency of teacher-student eye contact when talking to class is good					
12.	Does teacher ask questions frequently during teaching					

13. Which of the following methods to teachers use to teach in class?

Lecture [ ]

Group work [ ]

Demonstration [ ]

Role play [ ]

Presentation [ ]

Discussion [ ]

Brainstorming [ ]

Combination of many [ ]

Perception of students on the learning of integrated science

14.	Do teachers teach according to the syllabus?	Yes	No	Sometimes
15.	Do teachers ask questions in class during teaching?			
15.	Do you ask questions or make contributions when you do not understand an aspect of what is taught in class?			
17.	Do your teachers pay attention to your needs when you do not understand something			
18.	Do your teachers shout or embarrass you in class when you give a wrong answer?			

19.	Do your teachers give enough exercises to check your understanding of what is taught?			
20.	Are you provided with feedback on exercises and tests after marking?			
21.	Do your teachers discuss solutions to class exercises and tests after marking them?			
22.	Are you motivated by your core subject teachers during teaching and learning processes?			

23. How would you grade your teachers who teach the various core subjects?

Please tick

i. excellent [ ]

ii. Very good [ ]

iii. Good [ ]

iv. Average [ ]

v. poor [ ]

SECTION C: How often integrated science practical lessons are organized

24. Do you visit the lab in lessons that involve practical or hands-on activities?

Yes [ ]

No [ ]

25. How often do you go to the lab for practical lessons?

Often [ ]

Very often [ ]

Sometimes [ ]

Not at all [ ]

27. Indicate the availability of the following materials at the lab on the scale of 1-5 with 1 being lowest and 5 highest

Material	1	2	3	4	5
Litmus paper					
Pipette					
Iodine					
Bensen burner					
Conical flask					
Burette					

28. How would you grade your understanding of using practical tools

i. excellent [ ]

ii. Very good [ ]

iii. Good [ ]

iv. Average [ ]

v. Poor [ ]

SECTION D: The use of available resources by students of integrated science

In terms of facilities respond to the following:

KEY:

Strongly Agree (SA)

Agree (A)

Not Sure (NS)

Disagree (D)

Strongly Disagree (SD)

No.	Available resources	SA	A	NS	D	SD
29.	We have adequate materials to support our learning of the subject.					
30.	We have a separate biology laboratory in our school					
31.	We have a separate physics laboratory in our school					
32.	We have a separate Chemistry laboratory in our school					
33.	Our school has adequate resources for teaching Chemistry					
34.	The Chemistry apparatus and chemicals are adequate for the Chemistry practical lessons					
35.	We have Sufficient laboratory facilities					
36.	We have enough Supply of chemical reagents					
37.	We have enough Quality student textbooks					

38. How available materials affects achievements in integrated science

KEY:

Strongly Agree (SA)

Agree (A)

Not Sure (NS)

Disagree (D)

Strongly Disagree (SD)

Achievements	SA	A	NS	D	SA
I get good grades in integrated science					
I can confidently do my practical					
I easily understand lessons taught					
I do not have difficulty in my assignment					
I would pursue science programme in the university					

APPENDIX D

APPENDIX D

INTRODUCTORY LETTER

UNIVERSITY OF CAPE COAST
COLLEGE OF EDUCATION STUDIES
FACULTY OF EDUCATIONAL FOUNDATIONS
DEPARTMENT OF BASIC EDUCATION

Telephone: +233-(0)3321-33379
Cables: University, Cape Coast
Email: basic.education@ucc.edu.gh

UNIVERSITY POST OFFICE
CAPE COAST, GHANA

Our Ref: DBE/14/V.7/

Your Ref:

12th June, 2018

WHOM IT MAY CONCERN

LETTER OF INTRODUCTION

The bearer of this letter, Joyce Afornyo, is an MPhil student at the Department of Basic Education, University of Cape Coast.

She is undertaking a study on **"Perception of Teachers and Students on the Method of Teaching Integrated Science"**. In connection with this, she needs to collect data.

The study is academic in purpose and data collected will be treated with much confidentiality. I would be grateful if you could give her the necessary assistance.

Yours faithfully,

Dickson H. Angbing (PhD)
(Head)

DEPARTMENT OF BASIC EDUCATION
UNIVERSITY OF CAPE COAST
CAPE COAST