UNIVERSITY OF CAPE COAST

DETERMINANTS OF LOW PERFORMANCE OF FEMALE STUDENTS IN SCIENCE SUBJECT: A SURVEY OF JUNIOR HIGH SCHOOLS IN THE AOWIN DISTRICT

EVANS AUSTIN BREW

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BY

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Thesis submitted to the Department of Basic Education of the Faculty of Educational Foundations, College of Education Studies, University of Cape Coast, in partial fulfilment of the requirements for the 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

The study set out to investigate the determinants responsible for the low performance of female students in science in the Aowin district. To achieve the purpose, the study was guided by five (5) objectives. Methodologically, descriptive research design was adopted for the study. The study employed quantitative approaches through the use of self – developed questionnaires. The female students in the five (5) educational circuits in the Aowin District participated in the study via responding to the developed questionnaires. In all, 375 female students were selected for the study using stratified and purposive sampling techniques. The obtained quantitative data analysis was analyzed using descriptive (means and standard deviations). The study revealed that factors responsible for low performance of female students in general are identified as: poor psychological state of the female students in the Aowin district, the teachers in the Aowin district attitude towards the learning of science and finally, the socio – economic background of the parents in the Aowin District. It was therefore recommended that Ghana Education Service in the Aowin District should be encouraged to source for sufficient science teaching – learning resource materials so that each student has a science subject taught. The idea would lead to better performance in science subjects at Junior High Schools in the Aowin District.

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DEDICATION

To my lovely wife, Simona Teiko Nartey, My mother Grace Assemiah and aunty, Rebecca Assemiah.

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CHAPTER ONE

INTRODUCTION

Background to the Study

The significance of formal education in the life of every individual cannot be overemphasized. Education can be viewed as the process which equips an individual with information that is vital for his/her total development and well-being. The total development spans across mental, social, emotional, political and economic. These developments help the individual to be a better person and fit well into the society. Besides, educated individual gets knowledge and skills for innovation to start own business and also for employment in the world of work. This is a key ingredient for alleviating poverty and stimulating economic growth (Livingstone, 2018).

Blakemore and Cooksey (2017), in agreement wrote that formal education offers the individual with many varied opportunities. The individual also gets the necessary trainings to make better- informed decisions and choices in life which go a long way to improve his/her standard of living. The issue of access to education has not been equitable among the genders. The global disparity has now become very topical issue. The growing disparities that existed between males and females have seen a significant reduction since the 1970s (United Nations). In an educational setting, success is measured by academic achievement, or how well a student meets standards set out by the local government or the institution itself.

In Ghana, academic achievement is always measured by students' examination result Bonney, Amoah, Micah, Ahiamenyo and Lemaire (2015). Academic achievement is an important factor in national education because it can be seen as an indicator of whether the education in a country is successful or not. In short, academic achievement is important because it promotes success later in life and in current life (Bonney et al., 2015; Harlen, 2018; Lucas & Mbiti, 2014). Parents care about their children's academic achievement because they believe that good academic results will provide more career choices and job security. Often educators complain that students are unmotivated to learn; parents echo this cry and each blames the other for the students' apathetic response to learning (Shankar, 2015).

Education systems throughout the world place importance on the teaching and learning of science and a lot of resources are allocated to maintain and improve efficiency in these activities. According to (Eisner, 2017), science is important because the study of the subject is associated with more academic and or career opportunities. Thus science study relates the importance of science to the scientific, industrial, technology and social progress of a society. For somewhat similar reasons, the study of science is important in the Ghanaian context too. For instance, a good background or proficient in science will present opportunities in the selection of fields of study at universities and other tertiary institutions. High school graduates who cannot continue with their education in college but would like to have a job with some short-term training are, in most cases, required to present evidence that they have got at least a grade D7 (50-54%) in science in the West African Senior Secondary certificate examination (Adetula, 2015). This trend is not

limited to only high school graduates but synonymous with the basic education level. Before one gets admission into the high school from the basic education level, credit valuation on subjects such as Mathematics, Science, and English are constant. However, it is noticeable that some students, especially female students are always at the disadvantage when it comes to performance in science at the expense of their male counterparts.

According to the United Nations Division of Advancement of Women (UNDAW, 2010) education statistics in Sub-Saharan African (SSA) countries show that women continue to lag behind men in education in general and specifically in science, mathematics, and technology (SMT education. Also, education stereotyping continues, with women and girls tending to study programmes related to so-called "women's" occupations such as nursing, secretarial jobs, and social work. Programmes in engineering, physics and the so-called "hard sciences" continue to be dominated by men and boys. The educational system of any nation is considered as a mirror through which the image of the nation can be seen and shaped (Schön, 2017). It is common knowledge that the development of every nation or society largely depends on effective and quality education available to her citizens. Education, as a social institution, is an instrument that facilitates the reproduction of social structures within a nation (M. W. Apple, 2017). It is generally believed that the basis for any true development must commence with the development of human resources.

Hence, formal education remains the vehicle for socio-economic development and social mobilization in any society (Cars & West, 2015). Narrowing it to Integrated Science education, the enviable position it occupies

is perhaps justifiable (Ifeoma, Ifunanya, & Ngozi, 2014). The reason is that Integrated Science can exert a dominant, if not decisive, influence on the life of individuals as well as on the developmental effort of a nation (Ifeoma et al., 2014).

Statement of the Problem

The inadequate attention given to science and technology education has brought about the low state of science and technology education in Ghana (Avgerou & Walsham, 2017; James Smoot Coleman, 2015). This has had a negative impact on the country's economic and social development. The National Development Planning Commission lamented on the low state of science education in Ghana especially among females about 14 years ago (Langer et al., 2015). The youth who are students in junior high, senior high and tertiary institutions have a great role to play in reversing this scary situation as they form a majority percentage of the population. The 2000 population and housing census estimated about 65% of the population of Ghana to be youth (A. Thompson, 2014). Most of the youth in this category are students in the basic, senior high or tertiary institutions. If conscious effort is made to equip them with innovative ideas and skilled human capital through science and technology, it will reduce some social problems such as unemployment and poor sanitation.

Unfortunately, this is not the case in Ghana as there is low attention to science and technology education in Ghana. This is evidenced by the poor performance of students in science related subjects at all levels of education especially in the basic schools. The 2012 Basic Education Certificate Examination showed only 25% of the students had above average in science

whiles 23% had above average in mathematics (Snyder, de Brey, & Dillow, 2016). The situation was not too different in 2014 as 24% and 25% of students who sat for the Basic Education Certificate Examination had above average in science and mathematics respectively (Snyder et al., 2016). This situation is more worrying because a greater percentage of students who perform poorly in science related subjects are females. Basic Education Certificate Examination results by gender statistics in 2012 revealed that, 61% of males passed science subject but only 39% of the females passed. Again, in 2014, out of the 422946 students who sat for the BECE, 23.75 of males had above average in science but 21.1% of the females had above average in science (Snyder et al., 2016).

This situation is worse in the deprived districts of Ghana of which Aowin district is no exception. In 2010, 53% of females failed in science whiles 47% of males failed. In 2011, 51% of females failed in science as against 49% of males (Mills & Mereku, 2016). In 2012, the situation improved a bit where 45% of females failed in science whilst 55% of males failed. The 2013 BECE results showed 54% failure of females in science as against 46% failure of males. 2014 BECE statistics showed that 58% of females failed in science while 42% of males failed. In 2015, 57% of female students failed in science as against 43% for males. In 2016, 60.90% of female students failed in science whilst 39.10% of males failed in the same subject (Snyder *et al.*, 2016). Interviewing students and teachers has revealed that the low motivation, poor teaching techniques and poor teaching environment all contribute to this menace. This serious phenomenon called for immediate attention. Despite the many efforts by successive governments to reverse the

massive failures and numerous research into this area (Kena *et al*., 2016; Kena *et al.*, 2015; Snyder et al., 2016), the problem has not been completely eradicated. Most of the previous studies concentrated mainly on senior high schools and tertiary institutions in the country with little attention on the junior high schools (Akyeampong, 2017; Ansong, Okumu, Hamilton, Chowa, & Eisensmith, 2018; Atinga, Abiiro, & Kuganab-Lem, 2015; Bruce, 2016; James Smoot Coleman, 2015), the problem has not been completely eradicated. Again, many of the earlier studies were mainly in the urban setting neglecting the dynamics of the rural setting which is very critical. Therefore, this study bridges the gap by looking at the determinants of poor performance of females in science in rural junior high schools in the Aowin district of Ghana.

Purpose of the Study

The main purpose of the study was about investigating the determinants of the low performance of female students in science in Aowin District.

Research Questions

For the study to keep focus and address the core issues in the study, the following research questions were formulated.

1. What are psychological factors responsible for the low performance of female students in science?
2. What socio-economic factors are responsible for the low performance of female students in science subject?
3. What teacher factors are responsible for the low performance of female students in science subject?
4. What are student factors responsible for the low performance of female

students in science subject?

5. What teaching and learning materials are responsible for the low performance of female students in science subject?

Significance of the Study

The study identified factors that are responsible for the low performance in science subject by female basic school students in Aowin District. It will, therefore, offer the opportunity for policy makers to understand the low performance of the female student in science subject and workout with modalities to curb it. It will also help stakeholders such as heads of schools, teachers, students and even parents to be abreast with the situation and the necessary solutions to be applied.

Delimitation

The scope of this study was at the Aowin District of the Western Region. The study intended to look at the determinants affecting the performance of girls in science subject. There may be several educational challenges but passing science subject related courses especially among girls is paramount as these courses determine their future progress in the educational ladder so this study is limited to some of these determinants that influence the performance of girls in science subject at the Junior High Schools of the district. The study uses 375 female students but intends to generalize to the entire population of female Students in Junior High Schools of the district. The study however does not capture enrolment levels of girls in the schools or the performance of boys in science subject in the schools.

Limitations

One limiting factor was the inability of the researcher to employ varied instruments for data collection. The use of the only questionnaire limited the ability of the respondents to express their views about the phenomena. However, modalities were kept in place to alleviate any methodological errors or problems. In addition, since the study was limited to some Junior high schools in the Aowin District, the findings of the study cannot be generalized beyond the study area.

Organization of the Study

The study was organized into five major chapters. Chapter one focused on the introduction which consists of the background to the study, statement of the problem, purpose of the study, research questions, significance of the study, limitations, and delimitation of the study. Chapter Two will also cover the review of related literature which was grouped into conceptual, theoretical review and empirical review. Chapter Three dealt with the methodology of the study which comprises research design, target population, sample and sampling procedure, research instrument, data collection procedure and data analysis. Also, chapter four will focus on the results and the discussion on the data obtained from the field. Lastly, Chapter Five covered the summary, conclusions and recommendations or suggestion made on the entire research.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This aspect of the thesis is committed to reviewing scholarly works related to this current study. The chapter undertakes this review in three thematic areas including: (a) Theoretical Review, (b) Conceptual Review and (c) Empirical Review.

Theoretical Reviews

Basically, theories are propositions that stand to give guidance to imminent issues or situations under study. The proceeding discussions focus on the theories guiding this current work.

The Theory of Performance by Don Elger

Many theoretical views and propositions have been adopted to explain the performance and learning of students since the advent of modern learning and in this regard (Elger, 2015; Kiraly, 2014; Kolb, 2014; Olson, 2015), Elger (2015) proposed the most recent Theory of learning which he referred to as The Theory of Performance (ToP). Elger's theory in small way is applicable in students learning and performance (Apple & Ellis Jr, 2015; Monsalve, 2016; Olson, 2015).

For a better understanding of the reasons why students work assiduously to better their academic fortunes, the Theory of Performance (Elger, 2015) can be used to identify what constitutes the performance of learners. Elger's Theory of Performance states that, figuring out how to learn

is influenced, both decidedly and adversely, by five unique segments: The student's character, his or her learning abilities, the level of information, the learning setting, and any individual factors the student may need to manage during the process of learning. What is more, people have effectively distinguished numerous parts of each of these segments, landing at diverse parts of figuring out how to learn. The five components of ToP explained below:

Learners' Identity: the learners' efficiency, ownership and responsibility constitute his/her learning ability. Students must be able to enhance their adequacy as the progress from lower educational level to a more additionally difficult school condition. The mental self-view of students affects their exhibitions in developing knowledge in various situations (Torres et al., 2016). (Apple & Ellis Jr, 2015) argued that the more students gain successes and achievements, in the most difficult learning situations, the more their self-viability becomes grounded. The number and decent variety of individuals who certify with proof and recurrence the students' triumphs will unequivocally impact their level of adequacy. When learners are able to measure their own particular achievements and survey their own capacities, they will be able to fortify their own particular adequacy and way of life as students (Apple & Ellis Jr, 2015).

In the view of Blackburn (2018), students must have control in the development of information. In this way, the experience of most students is that instructors endeavor to guide them learning. In this regard, the viability in learning comes to fruition when the students need to learn, do the reasoning, contextualize, and sum up information for their own utilization (Warren,

2016). When this happens, especially where the student assumes an extra liability for their taking in, the more grounded their character moves toward becoming as free life-long students (Kolb, 2014).

Learners Knowledge: This aspect emphasizes on the learners' level of knowledge, learning processing methodology and forms of knowledge.

According to (Apple & Ellis Jr, 2015), level 1 is where basic believing of students is utilized to process vital information and in level 2, to create significance and comprehension. Applying new learning (level 3) to take care of basic issues in new circumstances requires this comprehension, not simply remembered information (Apple & Ellis Jr, 2015). Level 4 represents the capacity to take care of complex issues which largely depends on the unprompted particular exchange of information (Apple & Ellis Jr, 2015). All around reported issue arrangements and tasks are assessed and approved (level 5) to confirm that the levels of value meet benchmarks (Apple & Ellis Jr, 2015). Making new information or unique inventive undertakings (level 6) requires elevated amounts of learning and personality, well create learning aptitudes, and a variety of logical encounters. As learners intentionally advance through these levels of information in each progressive learning execution, their capacity to quantify and control their learning procedure makes strides (Apple & Ellis Jr, 2015).

The Learning Process Methodology (LPM) is an unequivocal demonstration of the means of the learning procedure that instructors and students use to investigate, examine, comprehend, and apply information to enhancing learning execution. LPM has helped to enhance learning execution through engagement and learning in the past 20 years as posited by (Apple &

Ellis Jr, 2015). Students make use of the LPM to develop information, measure levels of learning, enhance perusing, consolidate basic idea, control their own particular learning and enable them to fabricate metacognition of their own learning procedure (Banda, 2014). The ability to figure out how to learn adjusts well to the LPM and the levels of information direction by enacting essential information, delivering information that is comprehended, and by contextualizing, summing up and coordinating learning for use in taking care of issues.

The five types of information comes with diversified apparatuses, procedures and techniques and these include ideas, procedures devices, settings and methods for being, Students who have understanding of the types of information can fluctuate how the LPM is utilized to take in more successfully (Banda, 2014). For instance, in the LPM, the models (stage 9) you would utilize would fluctuate and learning item or idea demonstrate for calculated information, a strategy or procedural case for processed information, a schematic chart or a brisk reference card for a device, a story for relevant information and a profile for a method for being (Banda, 2014). In line with this, (Herzberg, 2017; Nardi, 2018) indicated that the estimation of the level of learning goes up against various prompts in view of the type of information (Sternglass, 2017).

Learning skills: These are concern with the cognitive, social and affective domains of learning. Students who are able to enhance their learning executions are those that are able to effectively begin coordinating every one of the five levels of intuition abilities into the learning procedure (Durlak, 2015).

According to Apple and Ellis (2015), the foremost stage in applying thinking to the learning procedure is currently pondering over what you definitely know, and exchanging earlier information and diverse beneficial encounters to the present learning challenge. Preparing the accessible data through viable perusing utilizing an exceptionally mindful and deliberate technique occupies the second stage (Dar & Resh, 2018). The following stage is to clear up the learning objectives and desires so an arrangement can be made for accomplishing these learning results. The urgent and paramount phase of the learning background is thinking fundamentally by utilizing pertinent information and prior knowledge to dissect and gasp understanding of models and cases (Elbaz, 2018). Chatting with others and writing to learn can be improved cognizance that proceeds this learning (Apple & Ellis Jr, 2015). The last stage is to apply the reasoning abilities expected to contextualize and sum up this learning with the goal that it can be exchanged to new critical thinking circumstances (Apple & Ellis Jr, 2015).

Dar and Resh (2018), emphasized that social learning aptitudes are imperative in getting to the advantages of learning in groups. Research has demonstrated that Agreeable Learning, Communitarian Learning, Undertaking Based Learning, and Learning People group contribute quantifiably to enhanced understudy learning execution. It has further been demonstrated through this exploration that these educational methodologies, where students connect with different students, likewise enhance students' social learning aptitudes (Dar & Resh, 2018). These ability zones incorporate correspondence, relating with others, social skill, and administration/authority. As the social aptitudes increased so do student’s ability to accomplish additionally difficult

learning situations – like school (Elbaz, 2018).

Student development happens more rapidly and altogether when they are outside their usual range of familiarity (Stern, 2017). Disappointments likewise happen and can be more frequent when students are outside their usual range of familiarity (Stern, 2017). Extra emotional abilities like overseeing time, enduring, fearlessness, and centering are steady of hazard taking and reacting to disappointments (Piggott, 2017).

Learners Context of Learning: This represents cooperative and affective learning and as a member of a learning community and learning team, the students will individually and collaboratively think critically all the time to compare and contrast different perspectives, accept and provide peer feedback and finally contextualize this new knowledge into their own lives in some meaningful ways (Apple & Ellis Jr, 2015)..

Cooperative Learning is a great tool for improving learners' performances. Through the team structure, each team member is able to practice different aspects of a self- directed learner (Apple & Ellis Jr, 2015). There is always a captain who manages the learning, recorder of documents of the learning, spokesperson who articulates the learning, reflector who assesses the learning performance, critical thinker who validates the created knowledge, optimist who keeps the process positive, and spy who steals learning practices. The rotation of roles in each new learning experience propagates the sharing of learning practices among the team members (Wlodkowski & Ginsberg, 2017). The learning challenges given to the team can exceed the abilities of any team member and the validation of learning of all members can be accomplished in less time than individuals can produce the

same level of learning on their own (Apple & Ellis, 2015). These practices can extend into learning communities and broaden the impact (Wlodkowski & Ginsberg, 2017).

According to Apple and Ellis (2015), students are usually involved in a set of activities in which there are multiple agencies watching and assessing performance and these include the team mentor, the facilitators, spies from the other teams, student mentors, and even the reflector within the team. Student teams must therefore construct learning so that they can share this learning publicly with the other teams by having the spokesperson teach other teams or enter into competition with other teams during problem solving challenges (Boud, Cohen, & Sampson, 2014). The students are often challenged consistently in their critical thinking processes and skills in every activity (Boud et al., 2014).

Learners' personal factors: The pressures and demands of everyday life in an increasingly more complex world make learning more challenging. To be successful in life, as well as in college, learners must produce strong learning performances with less sleep and probably with exhaustion from hours of work, nursing a sick child, or while caring for an aging grandparent (Pennington & Richards, 2016). Beyond all these, the learner needs to recover quick and effectively from whenever a divorce happens, a job is lost, an accident occurs, a family member or friend dies, or life's greatest possessions are stolen and these all inherent learners' personal factors affecting the learning process. As a result of these, improving the emotional skills like persisting, coping, responding to failures, and adapting to change are critical to the resilience that is needed to overcome the difficulties that arise from these

personal factors (Pennington & Richards, 2016).

As the other learning to learn components progress, like higher levels of learning, improved learning skills, and identity as a learner, so does the proactive problem solving capacity for addressing these personal factors improve (Rai & Chunrao, 2016). During the early life stages, most personal factors of your circumstances are the result of decisions by parents, guardians and extended family (Rai & Chunrao, 2016). As individuals grow and begin to take ownership of the decisions that shape their lives, a critical shift begins. For instance they now stop thinking of themselves as victims and start thinking of being empowered individuals who assume full responsibility and accountability for their decisions and their lives (Rai & Chunrao, 2016). On the other hand, if you allow important decisions to be made for you (by parents and others), many people see you as a victim, make excuses for you, think less of you, and expect less of you (Rai & Chunrao, 2016). Once one takes ownership of his/her decisions and their consequences, others will stop treating them as a victim and start to respect them. By making better life decisions, you will have fewer future personal factors. Rai and Chunrao (2016), reiterated that as these factors are reduced, the individuals' life will begin to improve and so will his/her learning performance.

In carefully analyzing the five components of The Theory of Performance, it can concluded that they are characterized by thirteen essential sub-components which are interrelated and interdependent and are compromised on the notion that learning is a process and a performance that can be improved. Additionally, improving one component of the learning performance will automatically improve other components of the learning

performance as well.

For its application to this study, ToP is valuable in the sense that students would learn better to improve upon their performance in any subject provided they are able to identify and accept their abilities, have believe about their knowledge level, trusting and accepting their learning skills, understand the context in which the learning is taking place and finally defying all challenges for making the right choices in the learning process.

Motivation System Theory of Performance by Ford (1992)

(Clark, 2015) in his study asserted that a direct offspring or subset of Sigmund Freud's theory is Martin Ford's motivational systems theory (MST). As seen in Gilmore and Donohoe, motivation in Ford theory is defined as the organized patterning of three psychological functions that serves to direct, energize, and regulate goal-directed activity: personal goals, emotional arousal processes, and personal agency beliefs (Gilmore & Donohoe, 2016). It can therefore be deduced from Ford's definition that, motivation is an interactive construct representing the direction a person is going, the emotional energy and affective experience supporting or inhibiting movement in that direction, and the expectancies that a person has about reaching their destination or achieving their goals (Clark, 2015).

The components of this theory are believed to be working in tandem and if one fails to function properly, there is the tendency that an individual would may not be able to achieve his or her aims due to lack of motivation (Clark, 2015). This framework focuses on the individual as the unit of analysis, but embeds the individual in the biological, social, and environmental contexts that are crucial to development. According to Limbe

(2017), MST attempts to describe the development of the whole person-in-context, as much as the same way a biologist might describe an individual plant and its relationship to its immediate ecological niche, as well as the larger ecosystems in which it located. Ford (1992) proposed a simple mathematical formula that attempts to represent all these factors in one model. Ford (1992), referred to this model as the effective person –in-context functioning which is mathematically expressed as;

Achievement = *(Motivation x Skill*) x Responsive Environment. This means that achievement is a product of motivation, skill and responsive environment.

The formula proposes that real achievement and competence are the results of a motivated, skillful, and biologically capable person interacting with a responsive environment (Ford, 1992). The motivational systems theory attempts to organise the various motivational constructs from different theories into one model rather, than attempting to replace or supersede any of the existing theories. The main constructs of the theory includes self-efficacy beliefs, the role of expectancy, and goal orientation. The formula proposed by (Ford, 1992) suggests that in the occurrence of any learning behaviour, there are four key conditions for effective functioning:

1. The person must have the ***motivation*** needed to initiate and maintain the learning activity until the goal directing the experience is attained.
2. There must be the ***skill*** necessary to construct and execute a pattern of learning activity that will produce the desired result.
3. The ***biological structure*** and functioning of the person must be able to support the operation of the motivation and skill components.
4. Lastly, the person must have the cooperation of a ***responsive***

environment that will facilitate progress towards the goal.

In relation to this study, the MST model attempts to provide a complete theory of motivation towards students' learning/performance and proposes that real attainment and capability are the results of a motivated, skillful, and biologically capable student interacting within a responsive environment.

Social Cognitive Theory by Albert Bandura

Bandura (2014) Social Cognitive theory is regarded as the most research referenced theory for many scholars in the field of development and learning. In general, the theory states that people learn by observing and emulating others (modelling). Besides, people also learn by observing other people's experiences (vicarious learning). The hallmark of this theory is the self-efficacy and this study will dwell much on it as a factor affecting students' performance.

(Bandura, 2014) in one of his influential books summarised the significance of self-efficacy as 'people make causal contributions to their own psychosocial functioning through mechanisms of personal agency. Among the mechanisms of agency, none is more central or pervasive than beliefs of personal efficacy. People will often have little incentive to act unless these people believe they can produce desired effects by their actions. This therefore makes efficacy belief, a major basis of action and people guide their lives by their beliefs of personal efficacy.

Bandura (2014), pointed out that self-efficacy beliefs lie at the core of human functioning so it is not enough for individuals to possess the requisite knowledge and skills to perform a task however they must also have the

conviction that they can successfully perform the required behaviours under typical and, essentially, under challenging circumstances. (Artino, 2012) in citing Bandura indicated that effective functioning, then, requires skills and efficacy beliefs to execute them appropriately and two components that develop jointly as individuals grow and learn. More so, these two components of successful human functioning act upon one another in reciprocal fashion and in what (Bandura, 2014), referred to as "reciprocal causation", where the functioning of one component depends, in part, upon the functioning of the other.

Bandura (2014) defined self-efficacy in his theory as judgments of capabilities to organize and execute courses of action that are required to attain designated types of performances by people. This definition is characterized by two important aspects that deserves more explanation. Foremost, self-efficacy represents a *belief* about one's capability, and as such, may not necessarily match one's real capability in a specific domain. It has been reported by research findings that most people actually overemphasize their academic capabilities, Paiares as cited in (Artino, 2012). (Bandura, 2014) argued that the most useful efficacy judgments are those that slightly exceed one's real capabilities, as this modest overemphasis can actually increase effort and persistence during difficult times. The other relevant aspect of self-efficacy as defined by (Bandura, 2014), is the idea that individuals make use of their efficacy judgments in reference to some *aim* which reflects both the task and situation-specific nature of efficacy beliefs.

According to Bandura (2014), this aspect of self-efficacy stands in contrast to other more general measures of expectancy, such as self-concept

and self-perceptions of competence which, although may be domain specific, tend to be more global self-perceptions. Bandura (2014) in some instances assumed that self-efficacy affects an individual's choice of activities, effort, and persistence. People who have low self-efficacy for accomplishing a specific task may avoid it, while those who believe they are capable are more likely to participate. Moreover, individuals who feel efficacious are hypothesized to expend more effort and persist longer whenever they face difficulties than those who are unsure of their capabilities (Bandura, 2014).

To (Bandura, 2014), the tendency for efficacious people to 'expend more effort and persist longer' is of particular importance because most personal success requires persistent effort. As a result, low self-efficacy becomes a self-limiting process and in order to succeed, individuals need a strong sense of task-specific self-efficacy, tied together with resilience to meet the unavoidable obstacles of life.

According to Artino (2012), Bandura was of the conviction that self-efficacy results from some primary sources that include mastery of actual performances, observation of others vicariously, forming of persuasion and physiological and affective states from which people partly judge their abilities, strength and vulnerability to dysfunction.

Among the sources listed above, mastery of actual performance is believed to be the most influential source of efficacy information because due to the fact it provides the most direct and authentic evidence that an individual can gather the personal resources necessary to succeed (Bandura, 2014). Bandura (2014) opined that an important aspect of self-efficacy is its domain specificity which implies that people judge their capability depending on the

particular domain of functioning. Personal efficacy, then, is not a general disposition void of context, but rather a self-judgment that is specific to the activity domain. Bandura (2014) in this sense indicated that high self-efficacy in one domain does not necessarily mean high efficacy in another. Therefore, to achieve predictive power, measures of perceived self-efficacy should be tailored to domains of functioning and must represent gradations of task meet the demands within those domains.

Applying Bandura's theory to the study, it is relevant that students develop positive views about themselves and assume the conviction that no matter how the situation, they stand the chance to achieve their aims in education. Again, it could be prudent for teachers to depicts behaviours that would ginger their students to develop interest in whatever they teach and so that they can emulate (vicarious) it to their benefit.

Conceptual Reviews

This study dwells on the concept of education, concept of science subject and the concept of female students and science subject education. These concepts are reviewed in the proceeding paragraphs.

Concept of Education

Education in layman's perspective is all about becoming enlightened to the issues and developmental trends of the past and the current. However, According to Dewey (1944), education is the process of facilitated learning, or the acquisition of knowledge, skills, values, beliefs, and habits. Education concern with storytelling, discussion, teaching, training, and directed research. Education can be formal or informal and often takes place under the guidance of educators, but learners may also educate themselves. (Modood & Meer,

2012) indicated that education in the largest sense is any act or experience that has a formative effect on the mind, character or physical ability of an individual. In a technical sense, education is the process by which society deliberately transmits its accumulated knowledge, skills and values from one generation to another (Modood & Meer, 2012).

Education is simply humanize the human beings as posited by (Arung, 2016). In the view of Arung (2016), education does not mean merely teaching or increasing cognition, but about preparing a media for the cognition of the learners. It is an attitude and having good attitude will provide a good medium for the cognition, learning behavior, learning autonomous, and critical thinking. People's simple knowledge can be facilitated through education especially those who need it. Humanity deserves education although they are being alive and have thought, emotion, and willingness (Arung, 2016). They need a long life education to support their existence in life. The various choices or conditions in life make human more optional in life in making any life decision. This habit means that people could be wrong in their life choices and therefore, human beings still need to be educated in order to place them in the appropriate concept of thinking and life choices (Arung, 2016).

Brief History of Education

According to Coulson (2017), education began in prehistory and started as adults trained the young in the knowledge and skills deemed necessary in their society. In pre-literate societies, this type of education was achieved orally and through imitation. For instance, story-telling passed knowledge, values, and skills from one generation to the next (Kovach, 2015). As several cultures began to extend their knowledge beyond skills that could

be readily learned through imitation, formal education developed. Schools existed in Egypt at the time of the Middle Kingdom (Tait, 2016).

Plato founded the Academy in Athens, the first institution of higher learning in Europe and the city of Alexandria in Egypt, established in 330 BCE, became the successor to Athens as the intellectual cradle of Ancient Greece (Landau, 2015). It was in this era that the great Library of Alexandria built thus in the 3rd century BCE. The European civilizations suffered a collapse of literacy and organization following the fall of Rome in BCE 476 (J. Thompson, 2015).

Landau (2015) pointed out that China Confucius (551–479 BCE), of the State of Lu, was China's most influential ancient philosopher, whose educational outlook continues to influence the societies of China and neighbours like Korea, Japan, and Vietnam. Confucius gathered disciples and searched in vain for a ruler who would adopt his ideals for good governance, but his Analects were written down by followers and have continued to influence education in East Asia into the modern era.

After the Fall of Rome, the Catholic Church became the sole preserver of literate scholarship in Western Europe. The church at that time established cathedral schools in the Early Middle Ages as centres of advanced education (Doig, 2017). According to (Landau, 2015), some of these educational establishments ultimately evolved into medieval universities and forebears of many of Europe's modern universities. During the High Middle Ages, Chartres Cathedral operated the famous and influential Chartres Cathedral School (Doig, 2017). The medieval universities of Western Christendom were well-integrated across all of Western Europe, encouraged freedom of inquiry, and

produced a great variety of fine scholars and natural philosophers, including Thomas Aquinas of the University of Naples, Robert Grosseteste of the University of Oxford, an early expositor of a systematic method of scientific experimentation (Doig, 2017) and Saint Albert the Great, a pioneer of biological field research (Moore & Kyle, 2017). Founded in 1088, the University of Bologne is considered the first, and the oldest continually operating university in Europe (Haskins, 2017).

According to (Egger, 2016; Iksan, Saper, & Rashed, 2016), elsewhere during the middle Ages, Islamic science subject and mathematics flourished under the Islamic caliphate which was established across the Middle East, extending from the Iberian Peninsula in the west to the Indus in the east and to the Almoravid Dynasty and Mali Empire in the south. The Renaissance in Europe ushered in a new era of scientific and intellectual inquiry and appreciation of ancient Greek and Roman civilizations (Black, 2018). Around 1450, Johannes Gutenberg developed a printing press, which allowed works of literature to spread more quickly to other area (Black, 2018). The European Ages of Empires saw European ideas of education in philosophy, religion, arts and science subjects spread out across the globe. Missionaries and scholars also brought back new ideas from other civilizations – as with the Jesuit China missions who played a significant role in the transmission of knowledge, science subject, and culture between China and Europe, translating works from Europe like Euclid's Elements for Chinese scholars and the thoughts of Confucius for European audiences. This enlightenment saw the emergence of a more secular educational outlook in Europe (Black, 2018).

In most countries today, full-time education, whether at school or otherwise, is compulsory for all children up to a certain age. As a result of this the proliferation of compulsory education, combined with population growth, UNESCO has concluded that in the next 30 years more people will receive formal education than in all of human history thus far (Black, 2018).

Forms of Education

Formal Education: It represents orderliness in the process of education and it is characterized by systematic procedures (Fägerlind & Saha, 2016), formal education is the type of education that takes place in a structured environment with an explicit purpose of teaching students (Gruppen, Irby, Durning, & Maggio, 2018). Usually, formal education occurs in a school environment with classrooms of multiple students learning together with a trained, certified teacher of the subject as a facilitator (Gruppen et al., 2018). Most school systems are designed around a set of values or ideals that govern all educational choices in that system (Baker, 2016a). Such choices may include curriculum, organizational models, design of the physical learning spaces (classrooms), student-teacher interactions, methods of assessment, class size, educational activities, and many more. (Baker, 2016a) asserted that formal education comprises of preschool, primary education, secondary education, tertiary education, vocational education and special education.

Informal Education: apart from the well-structured and organized formal educational system is the informal educational system. This form of education is somehow haphazard and requires not any strict procedures or levels in the operation (Baker, 2016a). In his view, (Baker, 2016a) indicated that informal education occurs in a variety of places, such as at home, work, and through

daily interactions and shared relationships among members of society (Baker, 2016a). For many learners, this includes language acquisition, cultural norms, and manners. Informal learning for young people is an ongoing process that also occurs in a variety of places, such as out of school time, in youth programs at community centers and media labs (Baker, 2016a).

Informal education usually takes place outside educational establishments and does not follow a specified curriculum and may originate accidentally, sporadically, in association with certain occasions, from changing practical requirements (Baker, 2016a). It lacks unplanned pedagogical conscious, systematic and according to subjects, but rather unconsciously incidental, holistically problem-related, and related to situation management and fitness for life with experiences directly in its natural function of everyday life and is often spontaneous (Baker, 2016a).

Concept of Science subject Education

According to (Erduran & Dagher, 2014), science subject education is the field concerned with sharing science subject content and process with individuals not traditionally considered part of the scientific community. The learners may be children, college students, or adults within the general public and the field of science subject education includes work in science subject content, science subject process, some social science subject and some teaching pedagogy. The standards for science subject education provide expectations for the development of understanding for students through the entire course of their education and beyond. The traditional subjects included in the standards are physical, life, earth, space, and human sciences (Erduran & Dagher, 2014).

According to (Ary, Jacobs, Irvine, & Walker, 2018), science has become an important component in the educational curriculum in American schools, but less so than reading and mathematics. At the end of the twentieth century reading and mathematics received more attention, government support and focus for testing. It was assumed then that reading and mathematics must be mastered first and that these skills were essential before the study of science and social studies. Science is often not taught daily in elementary schools, does not receive major attention in middle schools, and is often organized around disciplines that emphasize college preparation in high schools (Ary et al., 2018).

Ary et al., (2018) noted that at the end of the twentieth century it was evidently clear that science and technology education has played significant roles in the lives of all people, the area of employment and careers, the formulation of societal decisions, general problem solving and reasoning, and the increase in economic productivity. There has been consensus that science and technology are central to living, working, leisure, international competitiveness and resolution of personal and societal problems but basic skills that characterize science and technology education remain unknown for most people globally (Ary et al., 2018).

As the twenty-first century emerged, many nations around the world argued for the merger of science and technology in schools and many of these people were resisting such a merger, mostly because technology is often not seen as an area of study for college-bound students and such courses were hardly parts of collegiate programmes for preparing new teachers (Ary et al., 2018). Science along with technology education in the school curriculum has

occupied a dominant role in producing scientifically literate and innovative persons around the world.

Ghana's education system after independence has undergone several reforms to wean it from purely academic system handed over by the British to one that will serve the manpower needs of the nations. Notable among these were the reforms in the 1980s that change the structure of education from seventeen to sixteen years. The change in the structure and content of education from 1987 has led to significant reduction in the number of years of pre-tertiary education from 17 years to 16 years with two years of early childhood schooling (Adu-Gyamfi, Donkoh, & Addo, 2016).

The present structure of education is made up of six years primary education, three years junior high school, three years senior high school and four years of tertiary (university and polytechnic) education. Students who complete successfully form high school enter either the university or polytechnic (Adu-Gyamfi et al., 2016). Others also enter diploma awarding institutions such the teacher education or nursing institutions for three years (Adu-Gyamfi et al., 2016).

Basic education in Ghana is made up of a free and compulsory primary and junior high school which is designed to expose all learners to a wide range of skills and knowledge that will inculcate in them creative abilities that will help them harness resources in the environment for their well-being and that of the society. Therefore the primary school curriculum is designed for work and consist of subjects such as English Language, Ghanaian Language and Culture, Mathematics, Environmental studies, Integrated Science, Religious and Moral Education with physical activities such as Music and Dance and

Physical Education. At the junior high level of the basic education a clear demarcation is made between Agricultural and General Science with additional subjects like Social Studies, Vocational Skills and Pre- Technical Skills and French as a third language(ibid) (Donkor, 2017).

Girls and science 'education in Ghana

Educating women and girls has been the concern of many governments in Ghana and much is emphasized on the lack of persistent equality in the participation and achievement of girls and women in education. Currently the Ghana is among one of the West Africa countries that have made meaningful progress towards increasing access to education and bridging the gender gaps in enrolment (Gajigo, 2016; Mbiti, 2016). The idea of national vision for girls' education was born in December 1995 after Ghana's participation in the Beijing Conference. This led to the drawing of National Plan of Action (NPA) which led to the establishment of Girls' Education Unit (GEU) with the goal of ensuring equity in education of boys and girls in terms of access, participation, retention and achievement with a special emphasis on increasing transition of girls from junior high school to senior high and their participation in science, technology, engineering and mathematics (STEM) education (Baker, 2016a; Gajigo, 2016).

In order to achieve the set goal in the action plan, several strategies have been put in place by the government of Ghana and her development partners and notable among them are the school feeding programmes, free uniforms and abolishment of school fees at the basic level of education. A renewed commitment towards achieving parity in science education was re-echoed in the policy goals one and ten of the Education Strategic Plan aimed

at providing girls equal opportunity to participate at all levels of education in the country (Aziabah, 2018). The government through the ministry of education in collaboration with Campaign for Female Education (Camfed), UNESCO and World Vision established and implemented science, technology and mathematics education (STME) clinic for girls at the junior and senior high schools in Ghana in 1998 (ibid) (Marginson, 2016).

Significant progress has been made with respect to girls' participation in education in recent decades. Trends show a small but consistent increase in female students' enrolment rates at all levels of education since 2000 (Marginson, 2016). According to (Group, 2014), gender parity in primary education has been achieved in most Latin American countries, while at the secondary level, many countries in the region show disparity in favour of females. Girls outnumber boys overall in secondary enrollments while female enrollment is greater than male enrollment in most Latin American countries at the tertiary level. However, the gender balance for science and technology remains in favour of males overall.

(Erwin, 2018) asserts that at the primary level, even though girls and boys have the same access to coursework, they do not emerge with the same levels of understanding due to unfavourable life experiences and ability on their part to participate actively in class. It has been further emphasized that girls do not pursue science and technical studies at the same rate as boys, though there is variation by subject area and by country. Societal and parental attitudes toward boys' and girls' abilities as well as access to resources play a role in this regard. (Erwin, 2018) indicated that girls and boys experience differential access to technical and vocational education and in the majority of

countries worldwide, young men are more likely than young women to enroll in vocational education, and young men are more likely than young women to graduate from secondary level certification programmes.

Mirowsky and Ross (2015) indicated that one clearest signs of a society's intellectual health is the strength of its science and math education. Science and math help to spur developments in scientific research and industrial technology, and ultimately lead to a more diverse and robust economy. But even in the United States, and in other countries where a greater emphasis is placed on math and science, there is still one segment of the population that does not always benefit from the best science and math education the community has to offer: girls and women (Mirowsky & Ross, 2015). It has long been known that there is a "gender gap" in the sciences, which affects the quality and type of education offered to women even up to the advanced college level (Mirowsky & Ross, 2015).

According to (Mirowsky & Ross, 2015), evidence of a science gender gap has been provided by research evaluating the population of professionals in the academic fields of science and engineering, as well as surveys and polls focusing on students' perceptions of these subjects. Research has generally supported the conclusion that there are no biological, neurological, or genetic factors at work in the creation of scientific gender disparity. Rather, a combination of elements pooled together to make it more difficult for women to train for and maintain a high-achieving scientific career in the area of science and math. These factors include social discrimination of the sciences as "masculine", institutional bias in the scientific community, and pressures related to starting a family life.

According to Mirowsky and Ross, 2015), science is a part of all students' education by preparing students for a more scientifically and technologically complex world requires the best possible education including the deliberate inclusion and full contributions of all students, especially an underrepresented group: females in science. It is evident from the explanation that females are less involved in science related fields as compared with their male counterparts. This seems pathetic as the world people, life is the same for both men and women yet there exist disproportionalities among them when it matters with science and math.

Miller, Eagly and Linn (2015) indicated that, in the United States and elsewhere in the world, the participation of girls and women in science education and professional careers in science is limited, particularly in the physical sciences.

Crowell and Schunn (2016) touted that some science courses at the tertiary level see 50% or higher female participation in the Americas, yet this trend is generally restricted to the biological and life sciences. Participation rates for females in other science and engineering courses remain substantially and consistently less than males throughout the Hemisphere. In his study in Brazil revealed that female representation in tertiary level biological, medical and life sciences was an astonishing 70% in 2009, while for engineering and physics, including computer sciences, it was a mere 21%. (Ballantine, Hammack, & Stuber, 2017) stated that despite promising numbers in some countries and in some disciplines at the first degree level, the global trend is for decreasing representation of women as one continues in the field. This was based on a study conducted in India among women who earned 32 per cent of

all first-level degrees and 20 per cent of all third-level degrees in physics, but made up only 11 per cent of professionally-employed physicists. According to (Ballantine et al., 2017), notwithstanding these efforts, textbooks used in schools still portray science and technology as male activities, as recent studies in the U.S. show that when children are asked to draw a picture of a scientist, 61% will draw a picture of a male.

The literature indicates that efforts have been made progressively to bridge the gap between male and female students when it comes to science education, yet the situation still is in existence and this demands concerted efforts from stakeholders bring about parity so that the world's scientific landscape can be balanced to benefit everyone irrespective of the person's gender. The value of science on humanity in general cannot be divided and so goes how science supposed to be embraced by everyone individual in academia or those in school.

School type and girls participation in science

McLaren (2015) mentioned that school type place greater role in sustaining student interest in all activities, he added that school type either keep student in school or have the potential of drawing student away from school. Studies over three decades have indicated that school type influences the preference for and attitude towards science and mathematics (Ary et al., 2018; Freeman et al., 2014; Tizard, Blatchford, Burke, Farquhar, & Plewis, 2017). Studies have shown that girls in co-educational schools have less favourable attitudes to subjects such as mathematics and physical sciences (Ary et al., 2018; Dale, 2017; Freeman et al., 2014; Tizard et al., 2017). Also (Dale, 2017) indicated that school type being government, single-sex ,

coeducational, catholic and independent has a significant impact on achievement and participation in science.

On the contrary, there is a greater number of girls enrol in science and mathematics in single-sex schools found that physics was more liked by girls in single-sex schools compared with girls in mixed schools. Similarly, Dale (2017) study in Brunei indicates that girls had a more positive attitude towards science than that of boys. They also found that girls and boys in single-sex schools had a marginally more positive attitude towards science than boys and girls in co-educational schools. Also, Baker (2016a) study of Catholic schools in the US and Spielhofer Thompson (2014) study in England stated that girls in single-sex schools show a greater interest in mathematics and are more likely to enroll on mathematics courses. This gives an indication that girls in single-sex schools are less likely to show interest in studying subjects that have stereotyped as female subjects. Ballantine et al.(2017) concurs that single-sex learning environments in primary and secondary schools do not necessarily eliminate sexism or lead to increases in achievement for girls.

Empirical Review

Psychological factors responsible to poor performance of girls in science

Psychological factors and their role in students' performance cannot be underrated. Psychological as it is entails factors related to the mental or students' mindset towards academic work, specifically science as a subject in school. (Kena et al., 2015) indicated that the problem of underachievement in science and mathematics among students generally, despite the fact that it is one of the core subjects recommended in the National Policy on Education has

been a growing cause of concern amongst parents, teachers, researchers and the entire society.

According to Arung (2016), researches have shown that the behaviour of students especially in relation to the sciences, generally and mathematics in particular is greatly influenced by certain psychological or non-cognitive factors. In a study, Apple (2017) found out that self-concept, attitude towards mathematics, sex-stereotyping, confidence, motivation and problem solving habits are all related to students' achievement in science. It is noted that other psychological factors which are responsible for students in science and mathematics include self-concept, locus of control, study habit, career plan / aspiration, test anxiety, attitude towards mathematics, motivation, interest in schooling (Livingstone, 2018).

Adetula (2015) in a study reported that positive self-concept has a direct link to improved performance of students in any subject including science. The child who views himself and his abilities positively is the one who can maximally benefit and achieve good results in school learning experiences and several investigations have also revealed that the attitude of the student to any particular subject may determine his/her performance in that subject (Eduwem, Joy Dianabasi, Umoinyang, Imo E., & Diwa, 2017; Ozkan & Ozaslan, 2018). For instance, in a comparative study of factors influencing Mathematics achievement, (Eduwem et al., 2017; Ozkan & Ozaslan, 2018) found that there is a direct link between students' attitude towards Science and Mathematics and their outcomes. Therefore, students who have a poor attitude towards mathematics will show a high degree of inconsistency in overt action.

According to Eduwem et al., (2017) test anxiety as a psychological factor can cause girls to have low performance in science. To Eduwem et al., (2017) test anxiety is a learned behaviour, which can be unlearned. It is developed when students fail to prepare adequately for evaluative programmes and some things that can create test anxiety are parents, friends or teachers that may pass their bias to the student to make them believe that there is a connection between grade and self-worth, fear of alienating parents, family or friends due to poor grades, anxiety that may be due to not feeling that they are not in control.

It is believed that cognitive test anxiety causes poor performance in cognitive tasks that includes science as touted by Amuaful (2011). The study report of Umoinyang (as cited in (Steinmayr, Crede, McElvany, & Wirthwein, 2016) confirmed that test anxiety has a significant impact on academic achievement of students. In his study, (Amidu, 2016) espoused the experimental research design and about 80 final year students were randomly sampled from public schools in Calabar municipality in Nigeria. Results indicated that test anxiety independently is a significant predictor of mathematics achievement of students.

The sense of control or locus of control as the extent to which an individual believes that he or she has control over an outcome in any activity the person engaged. Wymer (2011) justified in his findings that locus of control as a psychological factor was decisively related to academic achievement and stated that more than 40 studies had investigated the relationship between perceptions of locus of control and students' academic achievement.

Brook and Willoughby (2015); Steinmayr et al., (2016) in their studies postulated that both internal and external locus of control are important predictors of academic achievement of students. Also Ifamuyiwa and Akinsola, (2008) in her study discovered that there is a significant influence of locus of control on J.S.S. 3 students' performance in science and that locus of control is a significant factor in students' classroom learning especially in subjects like science and mathematics. The study further revealed that students with an internal locus of control performed significantly better than those with external locus of control.

Studies conducted by Sampa (2017) examined locus of control, interest in schooling and self-efficacy as predictors of academic achievement of Junior Secondary School Students. The results indicated that locus of control, interest in schooling and self -efficacy jointly and relatively contribute significantly to the prediction of academic achievement of the Junior Secondary School Students.

The view held about someone cannot be written off when it comes students' achievement. Researches have supported the belief that there is a persistent and significant relationship between self-concept and academic achievement, and the change in one seems to be associated with a change in other Eduwem et al., (2017). Agrawal and Teotia (2015) showed that students who have positive self-concept of themselves performed well in mathematics. Studies have also shown that better self-concept is associated with better scholastic achievement test Emmanuel, Adom, Josephine and Solomon (2014) Kim and Sax (2018) and has a significant relationship with academic achievement (Agrawal & Teotia, 2015; Kirmizi, 2015).

The urge to succeed is of great importance in academia with respect to students' performance. The more motivated a students' is about a subject, the more successful the student becomes in that subject. Motivation has been found to affect attitudes by causing students to have more positive attitudes and confidence in themselves as reported by Burris, Heubert and Levin (Eduwem et al., 2017). According to Ellis (as cited in Eduwem et al., 2017), motivation positively affects achievement with the two existing in a cycle so that as one increases the other increases. In a research comprising several field studies and laboratory experiments, it was revealed that achievement motivation positively influenced academic performance (Emmanuel et al., 2014). According to (Kirmizi, 2015), there is a significant correlation between academic achievement and motivation, and females are highly motivated compared to their male counterparts. In another study, highly motivated students performed better academically than lowly motivated students and motivation has impact on academic achievement of secondary school students in science and mathematics with respect to gender (Kumavat, 2017).

The findings from Eduwem et al. (2017) study among students' revealed that performance in science at the thinking level could be predicted by the psychological factors such as interest in schooling, attitude towards mathematics, motivation, self-concept, test anxiety, locus of control and students' performance in science at the lower cognitive levels (knowledge, understanding) using that prediction equation. From the equation, it was evident that a positive interest in schooling enhances students' achievement in science at the thinking level. Deducing from this, students' performance in science at a higher cognitive level depends on some psychological factors and

their performance at the lower cognitive levels.

Socioeconomic factors that are responsible for low performance of female students in science

Causal factors to the low performance of female students in science are believed to be many and may include the socioeconomic background of the students. Kumavat (2017) review literature on UNESCO-based information on gender disparity in science and mathematics education among girls indicated that efforts to boost female education has been made by governments, international organisations and NGOs. However, there is still a gender disparity in science education. Females still have low access to education, low participation and poor performance in many subjects, especially mathematics and science subjects and many factors which are home, community and school based, continue to restrict developments in female education (Epstein, 2018).

The socioeconomic background is noted to espouse the families, education and respect and all these by and large may have influence on performance of students in general and not only to female students. (Evensen, Lyngstad, Melkevik, & Mykletun, 2016) indicated that family background is an important determinant of school outcomes, whereas other factors like school characteristics have minimal effects on female students' academic performance. In other studies, it is argued that female students' academic achievement is influenced by background of family characteristics such as socio-economic status of parents, level of education, occupation and income (James S Coleman, 2018). According to (Evensen et al., 2016), among these factors parental level of education and income have been the most significant source of disparities in female students' performance and this is evident in the

Third International Mathematics and Science Study (TIMSS) tests, where female students from economically disadvantaged families had systematically performed worse than other students.

Coleman (2018); Mirowsky (2017); Spengler et al. (2015) were of the view that, irrespective of national context, parents who have more educated appear better able to provide their children with the academic and social support important for educational success when compared to parents with less educated. These synopses bring to bear that indeed; socioeconomic backgrounds contribute to the low performance of female students in science in schools. There is no doubt that poverty, low level of parental education, which result from disadvantaged background have significantly poor academic achievement female students (James S Coleman, 2018; Epstein et al., 2018). Female students with high level of parental education have greater access to a wide variety of economic and social resources such as family structure, home environment, parent-child interaction that can be drawn upon to help them succeed in school (Coleman, 2018).

To Ayyar (2017), poverty and unwillingness to bear the educational cost of books, uniforms and other expenses has been a bane and have contributed to lower participation of girls in science education. Abbott (2017) in a study among students in Ethiopia indicated that educational costs such as fees, uniforms, and books are also often deterring parents from educating girls and when it happens this way their male counterparts would outperform them in any subject including science. In the same vain, one of the disadvantages of the Ethiopian girls face in education is due to the low income of their families.

It is devastating to note that the decrease in girls' performance in science is not because of poverty, rather, the more expensive education is, the less likely families are to invest in education for girls. Even if parents are aware of the potential long-range benefits of science education for girls, they may be unable to afford the tuition, materials, transportation, boarding fees and other costs of sending girls to schools. Location, distance, even clothing requirements can make the effective cost of school attendance higher for girls than boys (Muralidharan & Prakash, 2017).

It is believed that parental background influences their expectations on their female children, which in turn influences girls' performance in science related subjects in school. Mirowsky (2017) was of the view that parents may contribute to girls' poor performance in science by giving them less attention or a lower quality of attention during schooling days. Girls' towards science is greatly affected by parents' attitudes as they may assume their parents' negative expectations that become self- fulfilling prophecies because girls cannot achieve in science like they do not achieve in Mathematics.

According to Mirowsky (2017), research has shown that factors within the classroom are not the only cause of gender imbalances in science education and that home based factors which include family size, household income, parents' education, cultural and traditional beliefs all contribute substantially to poor female enrolment and performance in science subjects in school. Girls are pulled out of school and boys left in school when the family income dictates that all children cannot be educated. Girls miss school when there are chores to be done at home or there is a sick family member to nurse. Girls are taken out of school when they mature to prepare them for marriage or

to help supplement the family income by selling, farming or performing other money earning activities.

Kalil (2015) indicated that parents' occupation influences the students' achievement in academic works due to levels of their investments in their carriers that determine their level of purchasing capacity. So therefore, students' academic achievement is negatively correlated with the low level of parental socio-economic status (SES) because it hinders the individual in gaining access to sources and resources of learning. Muller (2018) asserts that low SES level strongly affects the achievement of students, dragging them down to a lower level and (Barrow, Richburg-Hayes, Rouse, & Brock, 2014) perceived that the financially deprived parents are less likely to afford the cost of education of their children at higher levels and consequently do not work at their fullest potential. The socioeconomic backgrounds effects on female students in science cannot be disregarded as (David, 2014) in his study revealed that the relationship between income and poor academic performance is statistically significant at $p < 0.05$, of which low income status of parents has a greater contribution to poor academic performance.

About 83.3% of parents showed to earn income below the average income per year, while only 16.7% earned income above the mean. The parents 'low income was statistically significant to influence students 'poor academic performance at $p < 0.05$. The study showed that the majority of parents have low incomes below the mean. Parents are responsible for taking care of their children's education expenses. They are enforced to have adequate sources and resources of funds to sponsor their children not only to cover education expenses but also making provision of basic needs to their

families. Low incomes of parents in the study area may have an impact of failing to pay school fees, buying school uniforms and other scholastic requirements needed for students and eventually causing students to become truants, a factor that also links to poor academic performance (David, 2014).

Teacher factors responsible for low performance of female students in science

Performance of students in school is credited to usually many factors including teachers whether good or bad and this is not different from the low or poor performance recorded in science by female students. Teachers are undeniably that have immediate contact with students when it comes to academic work and their actions and inactions by all means have a say in the output of the students they teach. Unquestionably teachers are believed to be partly a contributory factor to female students' poor performance in science subjects in schools because there are a lot of things that entails on the part of teachers that performance can be attributed to. According to (David, 2014), the impact of the teachers on performance in any subject is very high. The teachers are the facilitators who are to impact the theories and concepts into the students. The teacher is the major manpower saddled with the responsibility of imparting the concepts considered fundamental to technology through the teaching of these basic concepts in the secondary schools.

Coleman (2018) by means using SES as a measure of disadvantage the study provides evidence that female students' relationship with teachers, perception of teacher sensitivity and the reasons for attendance are the strongest predictors of scholastic achievements in science. Female students in the lowest SES dimension very often than not, did not attend school because

of their teachers' expectation of success and for the fear of humiliation in class. The brings to the understanding that when there is poor relation as well as high expectation on female students from teachers can cause them to perform lower than expected because they may be anxious to impress and in the event might fail due to lack patience.

Another component of teachers that has bearing on female students' performance is the teacher qualification. Qualified teachers in science unequivocally stand the chance to bring about good performance than those who are less qualified. In a s study by (Durlak, 2015), it was revealed that there was a deficit of about 40% qualified teachers in the school as reported by the head of school where the high deficit of science teachers brought about poor performance among students. (Pennington & Richards, 2016) reported in a study the objectives of the education sector of any country cannot be attained when the students are taught by incompetent and unqualified teachers and as such teachers would not be able to properly and adequately disseminate the concepts to the students. Emmanuel et al., (2014) indicated that the professional qualities of a well-trained teacher include the mastery of the subject matter, sense of organisation, ability to clarify ideas, ability to motivate students, good imagination, ability to involve the students in meaningful activities throughout the period of teaching, management of the details of learning and frequent monitoring of students' progress through tests and examinations.

Although there are many teacher factors that are responsible for low performance of female students in science, but the most implicated factor is the poor teaching methods by science teachers. According to (Bandura, 2014),

the teaching styles adopted by science teachers can aid or inhibit effective learning by the students. A good teaching strategy will promote learning while a poor teaching method will inhibit learning, make the lesson boring, uninteresting to the students, and possibly, and lead to their dropping out of the subject.

Kolb (2014) in his study among teachers and students concerning factors responsible for low students' performance in science revealed lack of proper method of teaching, attitude of teachers towards science, lack of proper funding by the authorities concerned. According to Gajigo (2016) these factors are not only on low performance in science but also show clear indicators to low students' enrollments in-science subjects. It is pertinent lo note that bad teaching is one of the major factors for student's dropout in physics.

Teacher personality is equally implicated in low performance of students in science as this may enhance or ruin students' chances of enrollment in a subject. (Halder, Roy, & Chakraborty, 2017) in a study of social factors that determine career in science and technology found that the teacher's personality and general behaviour is a significant factor. Zee and Koomen (2016) in a study found that among students, the teacher behavior and attitude towards teaching are sometimes considered to be more-important than his methods in teaching. According to Rosier (2015), a dictatorial teacher creates an uninteresting classroom climate characterized by absence of students' initiative and participation. The democratic teacher on the other hand tends to induce senses of involvement in active learning amongst students.

Another school related factor that has been shown to have profound effect on girls' participation in science is the teachers' beliefs and attitude towards students (Ary et al., 2018; Baker, 2016b; Christensen, Knezek, & Tyler-Wood, 2015; Van Houtte & Demanet, 2016). According to Baker (2016c) the interpersonal interaction that takes place in science classrooms, especially between teachers and girls, is very important in understanding girls' declining interest in science careers. The question of the low participation of girls in science must include investigation into the more indirect aspects of classroom climate, which they labeled as 'chilly' for girls. Teachers facilitate the learning process through the interaction that takes place in science classrooms and have a major effect on learners' acquiring a gendered or balanced perception of science and science education (Muijs & Reynolds, 2017). However, the attitude of teachers towards boys and girls can be favourable or unfavourable (Denessen, Vos, Hasselman, & Louws, 2015).

Teachers are important influence on girls' decision to pursue science (Baker, 2016c). Therefore teacher's belief about girls can have both negative and positive effect on the rate of girls' participation in science. It has been found that the expectations teachers of students and their belief of the science and mathematics ability of girls and boys is a factor that explains the participation rate between boys and girls in science and mathematics (Baker, 2016c). (Lazarides & Watt, 2015; Mizala, Martínez, & Martínez, 2015) have observed that there is a belief among both female and male teachers that boys are academically better than girls.

Baker (2016c) have mentioned that teachers have different expectations of female and male students, which lead the teachers to overrate

the science and mathematics abilities of the males and underrate that of the females. The expectations of which teachers hold for boys and girls are shown in differential treatment on the basis of sex in the classrooms (Mizala et al., 2015). In the classroom interaction with students teachers may indirectly communicate that they have different academic expectations of boys and girls and these biased expectations of teachers may then become self-fulfilling when students respond to them (Tizard et al., 2017).

Muijs and Reynolds (2017) found that teachers have the believe that girls are less rational than boys, even among boys and girls performing at the same level, and teachers believe that girls need to work harder in mathematics than boys to achieve the same level of performance. An earlier study by (Sax, 2017) of teachers from the United States and Australian showed that they perceived girls in their classes as less interested and less confident in physical science. The teachers believed that female student' attitudes about physics were more negative than male students' attitudes. This expectation of boys and girls has been shown to be inaccurate in a number of studies (Sax, 2017).

Many studies over the years have demonstrated that teachers treat male and female students differently. Science teachers have been found to give more attention to male students than female students. On the whole teachers have been found to give more attention to boys (Fiske, 2018; Retelsdorf, Schwartz, & Asbrock, 2015; Walters, 2018). The less attention given to female science students have been shown to negatively affect the attitudes of girls towards science, their motivation, their continued participation and achievement in science (Baker, 2016a). This situation is more pronounced in co-educational institutions in both developed and developing nations. Both

male and female teachers show such biases towards their students (Boring, 2017). However, there are behavioral and attitudinal differences among teachers regarding their attitude towards students based on gender of teacher and that of the student they are interacting with (Baker, 2016c). Male teachers have been found to show more bias towards girls in the classroom by ignoring them (Tizard et al., 2017). Also male teachers asked significantly more direct questions of students than female teachers and male teachers warned boys and girls with approximately the same frequency. Female teachers, on the other hand, had significantly more warning interactions with boys than with girls (Baker, 2016d).

Student factors responsible for low performance of female students in science

Performance among students in academia cannot surpass without comments, tags or blames when it happens to be negative or poor or low. Most often, blames are apportioned to systems within school and teachers who teach the students while less attention is given to the roles played by students themselves towards the performance. Inevitably, students cannot be exonerated when there is evidence that there is low performance in their academic works in any subject including science. Students' disposition can equally cause failure in their lives because attitude is believed to have influence on things that people do on routine basis. Baker (2016d) in his study reported that notwithstanding the fact that science informs thoughts and behaviours, yet many people do not seem to place a high value on science. Studies such as (Lin-Siegler, Dweck, & Cohen, 2016) show that the general public do not generally have positive feelings towards science and scientists

and it is believed that a positive attitude towards science may improve students' academic performance not only in science classes, but also in other subjects as well.

There are instances where students, especially female students lamenting and complaining about how difficult science and other science related subjects are, and this bring about negative attitude which in the long-run reduces their performance because they have already had a negative percept about science. According to (Usher, Ford, Li, & Weidner, 2018), a number of factors have been implicated as being responsible for low performance and enrollment of students in science among girls, and the prominent among these is the perceived difficulty of science subjects.

According to Wlodkowski and Ginsberg (2017), science subjects, suffer a fall in enrollment among school pupils relative to other subjects as investigation carried out in schools of Kwara State revealed that science subjects are generally considered by students as being more than an average level of difficulty and that a high level of intelligence is required for their successful learning. This finding was corroborated by (Wang, Chow, Degol, & Eccles, 2017) that one of the reasons in the declining trend of enrollment and performance in science education by students is as a result of the perception and attitude that science education is difficult. It is understood therefore that, the perception and attitude towards science as a subject is one of the reasons why they continue to record low performances because these perceptions and attitude put up are negative.

Wlodkowski and Ginsberg (2017) was of the view that girls have a negative attitude towards science subject in the sense that they think it is

difficult and they regard it a subject for boys. There are instances when pupils dislike learning science subjects because of lack of skills in teachers which results in teachers using poor teaching methods. In addition, some teachers' especially female teachers have a negative attitude towards girls and some do not give home work.

Agrawal and Teotia (2015) revealed that science seems to be disliked as a high school subject because many girls in school appear to have unfavourable attitudes towards science as they grow and this negative attitude sometimes begins in lower grades as their foundation in mathematics is usually poor. (Baker, 2016c) in his study perceived that girls' poor science achievements and attitudes were prominent at the 7^{th}, 9^{th}, 10^{th} and 11^{th} grade levels and therefore suggested that these negative attitudes at these grade levels contributed greatly to their performance in science and implies that science achievement and attitude towards science influence each other positively.

According to Baker (2016a), science is not easy to learn for most people as it is also true that science becomes harder from lower to higher grades. As a result of this and perhaps other factors, girls' attitudes towards science become increasingly less favourable as they progress to higher grades. Girls have positive attitudes towards science. This means that students would exert increasingly less effort in learning or studying the subject, the result being that their science achievement would become lower. This assertion was supported by (Baker, 2016c) with the notion that girls' positive attitude towards science decline as they grow older and initially girls have more positive attitude towards science than boys do but as they continue in school,

girls' attitude become more negative. The results of Lazarides and Watt (2015) research further suggested that there existed other variables, besides students' attitude. Other effective variables such as peer-grove expectations were found to affect girls' attitude towards science and other achievement. The importance of attitude in the learning of science is further emphasized by (Ary et al., 2018) that, students' attitudes affect the willingness of individuals to take part in certain activities, and the way in which they respond to persons, objects or situations. This shows that learners will only understand or be ready to learn. Girls' attitudes to science serve as a predictor of their performance in science.

A further longitudinal study of the 13 years old group found that from ages 13 to 17 girls showed more and deeper declines in their attitudes toward science (Ardies, De Maeyer, Gijbels, & van Keulen, 2015). A large study in England was also conducted by (Grabe & Hyde, 2006) who assessed attitudes towards science among approximate 21 boys and girls aged 13 to 17 they indicated that, in general, many of the same patterns of attitude that have been reported in countries like United states can be found in England. For example, where as positive attitude towards mathematics generally declined among all pupils, the drop was more dramatic in the case of girls.

From these and similar studies (Agrawal & Teotia, 2015) noted that one of the most significant factor that affected girls' performance was the lower estimation of their own ability. They also observed that there is some indication that a girl's relative failure in science is related to their acceptance to regard science as part masculine intellectual domain.

It is possible to believe that self-concept of students is linked to how they perform any educational subject including science. Landau (2015) in his study reported that girls with a negative self-concept is more likely to have a negative attitude towards science, which is likely to lead to poor performance. It can therefore be assumed that if some girls are lazy and do not want to think as the teachers pointed out, they end up having negative self- concept and this affects their performance. Sax (2017) study findings indicated that girls have misconception about gender and science and reported that girls have a negative attitude towards science subjects in the sense that they think it is difficult and they regard it a subject for boys. The teachers lamented that girls in school have negative attitude towards science. They said that girls do not care whether they perform better or fail science. The girls do not bother to ask teachers even when they have not understood anything (Sax, 2017).

Teaching and learning materials and school factors responsible for low performance of female students in science

Students' performance is undoubtedly affected by the availability and types of teaching and learning materials and other school related factors. The physical environment of the school affects academic performance of the students and (Simmons, 2017) acknowledged that environmental influences can be a driving force towards the acquisition of knowledge and skills.

Donnelly et al., (2016) mentioned that the physical settings of the classroom and teaching aids enhance teaching, learning and students' academic achievements. It is a fact that students' performance is influenced by their surrounding environment. For instance, the quality of the school building has direct bearing on students' performance. Students perform better

academically in better buildings. Patton (2017) in a study revealed that students in old buildings scored 5-7% points lower than students in new buildings and so established in independent findings that there is a relationship between the school building condition and students' achievement. By this, it is convincing for one to accept the fact that school environment has influence on female students' performance in science related subjects. This believable because a sound and healthy environment breeds healthy mind sets for students and this in turn reflects in their academic outputs in terms of science. Conversely, unhealthy and unfriendly environment can upset and topple students to least concentrate in class and this can go a long way to negatively affect students' performance.

As been presented in Moluayonge and Park (2017) observation, the teaching of science can be affected by the unavailability of resources in the school laboratories. The design of school and limited assets assigned to many of them constrain teachers to use teaching methods which are much less effective than those that could be used if resources and materials were available in the laboratories. The inference is that girls are the ones that are affected in most cases because they cannot easily mix with the boys.

The lack of teaching materials and apparatus in science laboratory in science laboratory affect the learning of science in schools. Paulo (2017) in a study in Tanzania revealed that lack of teaching and learning materials cause female students to perform low in the sciences. The findings were that most of the schools observed had inadequate teaching and learning materials in science where about 64% of students and 83.3% of teachers' respondents indicated that schools in Tanzania have inadequate teaching and learning materials for

science and that links to poor performance among female students.

Conn, Park, Nagakura, Khalil and Corcoran (2017) reported that studies indicate that in Kenya womens' participation and performance in science, mathematics and technology subjects and courses is worse than that of men at all educational levels. This shows that women or females in general are marginalized not only in science but other fields that are science inclined. (Robinson, 2017) asserts that the low performance among females in science is as a result of inadequate time allowed for learning Science satisfactorily, inadequate instructional materials, low level and inadequate training of teachers and the nature of science curriculum which is highly abstract and seems irrelevant to the learners' immediate environment. In their study among Kenyan female students, (Robinson, 2017) concluded that teaching load, availability of teaching-learning resources and class size are a school factors were liable for low girls' performance in Science, Mathematics and Technology subjects.

The study showed that the more the number of lessons a teacher had, the lower the girls' academic performance. This means that the teaching load influenced girls' academic performance in SMT subjects at form four level in Kitui Central District. This is because the teacher was left with less time to assist the students which resulted in low girls' academic performance in SMT subjects at form four level in the district. The study depicted that students with adequate SMT teaching-learning resources at form four level performed better than those with few or no resource materials. The class size influenced girls' academic performance in SMT subjects at form four level in the district. The results obtained from the study revealed that the larger the class size the lower

the girls' academic performance in SMT subjects at form four level. This was due to the minimized interaction between teachers and female students (Robinson, 2017).

Several studies conducted in developing countries have shown that the lack of academic facilities is a persistent problem and is responsible for the low enrolment of girls, high dropout rate among girls and low participation of girls in science and mathematics (Akyeampong, 2017; Atinga et al., 2015; Robinson, 2017; Shankar, 2015). Most schools in Africa lacks the needed infrastructure for effective teaching and learning (Donohue & Bornman, 2014; McLaren, 2015; Murithi, 2017). For instance (Cuesta, Glewwe, & Krause, 2016) in a survey of schools in South Africa found that 43 of schools have no electricity, 27 have no running water, 80 have no libraries and laboratories and 78 have no computers. Most of these schools are found in urban, peri-urban and mostly rural areas.

Similarly a study of four African countries namely, Uganda, Cameroon, Tanzania, and Ghana, by (James Smoot Coleman, 2015) revealed that majority of the schools, primary and secondary, textbooks, laboratories, chemicals, tools and equipment, teaching aids, stores, and offices are either inadequate or are not there. (Wolf, Aber, Behrman, & Tsinigo, 2018) noted that in Ghana, only few senior high schools are well equipped with facilities to implement rigorous intensive science programmes and the best few can be found in the urban areas. (Akuaku, 2015) in her studies on "approaches to gender equity in Sub-Sahara Africa" indicated that owing to poverty most schools in the region lacks the needed facilities including textbooks, she noted that most of the books are not gender responsive leading to negative attitudes

towards girls in science.

Conceptual Framework

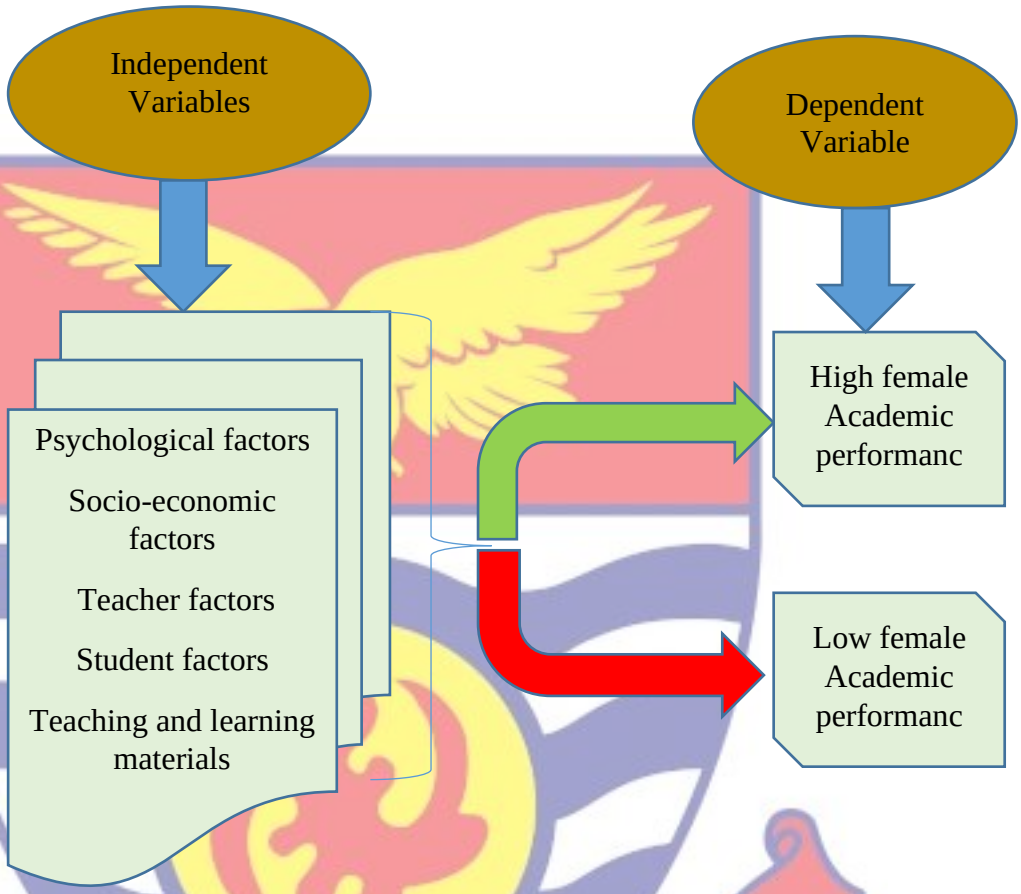

Figure 1: Conceptual Framework

Interpretation of the Conceptual Framework

Figure 1 presents an illustrative how the independent variables (Psychological factors, Socio-economic factors, and Teacher factors, Student factors and Teaching and learning materials) determine the female students' academic performance. The framework portrays that the ones performance will be dependent on how effective the factors are.

Chapter Summary

Deducing from the empirical review, it is well articulated that school factors such as lack or inadequate teaching and learning resources, class size,

time constraints, unconducive environments and others are the major setbacks on female students' performance in science related subjects. It is prudent for educational policies to capture these challenges in their educational interventions policies in order to solve them and ensure girls participation in science education.

CHAPTER THREE

RESEARCH METHODS

Introduction

This chapter provides a detailed description of the design, instruments and procedure used to gain insights into low female performance in science subject in the Aowin District. The chapter is therefore organized under the following sub-headings: research design; population; sample and sampling technique; instruments for data collection; method of data collection and method of data analysis.

Research Design

In this study, attempt was made to investigate the causes of low female students' performance in science in the junior high schools in Aowin district of Ghana. This study therefore, used descriptive survey to investigate why the performance of female students in science at the B.E.C.E is not comparable with their male counterparts. The design was appropriate because of its flexibility and accuracy and being able to provide a picture of a situation as it naturally happens or occurs (Merriam & Tisdell, 2015).

The descriptive survey was used in this study because surveys are useful for gathering factual information, data on attitudes and preferences, beliefs and predictions, behaviour and experiences – both present and past from a wide range of participants to ascertain more general perceptions and behaviours (Green & Thorogood, 2018; Reinharz, 2017; Sekaran & Bougie, 2016). Green and Thorogood (2018), for example, noted that surveys have the

potential to provide a lot of useful information from the subjects of the study. (Brace, 2018) also noted that surveys make it possible for many subjects to be studied at one time.

The study aimed to identify determinants of low performance of female students in science in junior high schools in the Aowin Suaman District in Ghana. That is, to identify psychological, socio economic, teacher and student factors that cause low performance of female students in science and ways of improving that situation. Again, the study sought to gather female students' views about the teaching and learning techniques that can ignite their interest in science in order to improve their performance in the subject. To do this, it was appropriate to collect data from a population of science teachers and female science students in order to get a deeper understanding of the situation. To achieve this, survey was found as most suitable for the study. It was capable of providing a more complete understanding of the topic under investigation through validation and corroboration of findings from the quantitative measures (Brace, 2018).

A descriptive survey method was used where questionnaires were administered to JHS science teachers in Aowin district and female students from randomly selected schools within the district. The aim of the teachers' survey was to seek their views on psychological, socio economic and teacher and student factors responsible for the low performance of female students in science. The students' survey was also designed to gather students' views about psychological, socio economic and students' factors and their competencies and challenges detrimental to their passing in the science subject. Another important aim of the students' survey was to identify

teaching and learning strategies that can improve low performance of female students in science.

The design has advantage of describing thoroughly the causes of the low performance of female students in science at the BECE level in Aowin district. (Eriksson & Kovalainen, 2015) have noted that descriptive survey has the potential of providing a lot of useful information from the subjects of the study. Data gathering is relatively inexpensive and take up little time to conduct. Thus, it is more economical because it makes it possible for many subjects to be studied at the same time (Eriksson & Kovalainen, 2015).

However, the difficulties involved in using the descriptive survey for this study lied in: ensuring that the questions to be answered were clear and not misleading; getting respondents to answer questions thoughtfully and honestly; and getting a sufficient number of questionnaires completed and returned so that meaningful analysis could be made. Again, the design only provides a snapshot of analysis so there is always the possibility that a study could have different results if another time-frame had been chosen (Brace, 2018). Furthermore, confidentiality is a primary weakness of descriptive research (Adams & Lawrence, 2018). One limitation of this design is that subjects are often not truthful as they feel they need to tell the researcher what they think the researcher wants to hear. Participants may also refuse to provide answers to questions they view to be too personal. In spite of these, due to the nature of the research problem, the design offered the researcher the opportunity to get valuable insight about the situation the problem under study.

Population

The population of the study comprised female JHS students and JHS integrated science teachers. The target population for this study was all JHS female students and integrated science teachers in the Aowin district of Western Region of Ghana. The accessible population was students from five selected educational circuits of the Aowin district. It was limited to these schools and circuits because of resource and time constraints to reach out to students from all the educational circuits of the district.

Sampling Procedures

The sample for the study comprised 15 JHS science teachers and 375 JHS female students. The participant teachers in this study had a wide variety of educational backgrounds and experiences. Their educational qualifications ranged from Cert A to Bachelor degree for the teachers who participated in the study. The average age range of the teachers was ranged from 21 – 30, 31 – 40, 41 – 50, and 51 – 60. The student population for the study came from the schools that were selected for the study. The average age of the students was 15.

A multistage sampling technique was adopted to select the participants for the study. The schools were first stratified into seven strata, representing the seven circuits in the district a simple random sampling was then used to select five circuits from which participants for the study were selected. The five circuits were selected because the researcher was interested in five representative JHS each from one circuit to participate in the study. The random sampling technique was again use to select one JHS each from the five selected circuits, yielding a total of five JHS that participated in the study.

Based on the enrolment of the female students at the time of the study, the school register in each case was used as a sample frame to systematically select at random, a number of girls from each class in each school to form the total sample size of the female students for the study. The number of girls selected from each class depended on the total number of girls in the register and the quota for that particular school. In all, a total of 375 students were selected for the interview. The breakdown is as follows: Enchico Demonstration JHS was 88 students.

The selection was made up of 30 students from JHS One which had a total of 62 students. The first and the second persons were randomly selected before every other respondent was selected. This was done by writing the numbers 1 and 2 into two pieces of papers and shuffle before one was drawn for the two. If number 1 was selected, all students are have their names in odd numbers were selected. On the other hand if 2 was selected, all even numbers were selected from the list in the register. Through the randomization process, the second person on the register was selected and subsequently every even number on the list was selected from the register until the 32 female students were obtained from that class. Another 30 students were selected from a registered list of 58 female students in JHS Two of the same school. The last batch of 26 students was also drawn from JHS Three that had 45 registered female students in the class.

In Sewum D/A JHS 87 female students were selected from the school using the school register. The JHS One class had the highest number of female students and following the same procedure discussed above, 34 students out of 70 students were selected, 29 were chosen from a total of 48 female students

whilst in JHS Three, 24 students were selected from 50 to form part of the study.

Achimfo Anglican JHS contributed 64 female students for the study; with the same procedure, 23 students out of a total 47 female students were from JHS One, 21students were taken from JHS Two that had 44 female students on the register and the final 20 students in that school were chosen from a list of 41 students from JHS Three on the register. Catholic Experimental JHS had 68 students' representation in the study. The systematic selection procedure was again adopted to select students from the three classes. In JHS One, there were 71 students and 35 students were selected to form part of the sample. In JHS Two 18 students were selected from 34 students, and 15 students drawn from 29 registered female students in the JHS Three class. The final selection of female students took place at Boinso JHS and 68 students were selected from that school. 28 students were selected from 43 form JHS One students, 21 drawn from JHS Two that comprised of 39 students on the register. The selection followed same approach as described above. Another 19 students were drawn from JHS three that had 41 female students on the register.

Data Collection Instrument

The questionnaire items used for data collection for this study were questionnaires for teachers and students. Two closed ended questionnaires were developed and used for data collection. These were the Science Teachers' Questionnaire (STQ) and Science Students' Questionnaire (SSQ). Many people's opinions can be elicited through questionnaires and participants can respond in a place and time convenient to them (Denscombe,

2014). The SSQ was adapted from (Twumasi & Hanson, 2018). The items were modified to suit the purpose and context of this study. Particular attention was ensured that the items were unambiguous, unbiased, unloaded and relevant (Fink, 2015).

Both questionnaires were structured into sections to reflect the research questions. In both cases, the questionnaire was predominantly made up of closed - ended questionnaire items designed to elicit opinions and views from the respondents. Most of the Information from the closed-ended questions was measured by a 4-point Likert scale (Wee, Baskaran, Woon, Chow, & Mangalam, 2016). According to (Wee et al., 2016), the items that are used to collect information for a study must be carefully constructed so that those taking the survey have the ability to answer as easily and accurately as possible. To ensure precision and ease of understanding, the closed – ended items were used since they are often used to describe a person's attributes, beliefs, or attitudes (Wee *et al*., 2016). This study was designed to access opinions and views on the possible factors militating against the performance of female students in science and this made the data require more qualitative than quantitative. Therefore, for purposes of precision and ease of analysis, the Likert scale was deemed appropriate. In data analysis Likert data is often seen as a quantitative representation of a qualitative notion and qualitative scale items (strongly agree, strongly disagree etc.) can therefore be transformed to quantitative data for analysis (Stacks, 2016).

During the design, the students' questionnaire was divided into four main parts with the last three focusing on the specific objectives of the study and the first one seeking demographic information of the students. The first

section of the questionnaire (Section A) sought to collect demographic information of the respondents and as such was structured with close ended questions. The second section (Section B) sought to obtain data on psychological factors responsible for girls' poor performance in science. The third aspect (Section C) was designed to obtain information on the socioeconomic factors responsible for low girls' achievement in science. The fourth part (Section D) of the questionnaire, captured items regarding students' inherent factors responsible for their poor performance in science. The questionnaire items from section B to section D were designed in a tabular form and the four points Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree) across the three subscales.

The same design was adopted to develop the questionnaire for teachers. However, this questionnaire was divided into three parts. The first part (section A) was on demographic information, the second part (Section B) had items on teacher factors that contribute to girls' poor performance and section C was on teaching and learning materials and school factors that influence female students' performance in science.

Pre-Testing

Before the questionnaires were sent out to collect data for the main study, they were reviewed by the experienced supervisors of the researcher and some peers. After their initial assessments of the items, their suggestions were used to revise and improve the initial items. These were done to ensure the appropriateness of the items and wording for the participants concerned so the information that would be obtained could be used to make sound judgements (Jorgensen, 2015) on the issue under study.

The questionnaires were pre-tested in two selected schools in the district that did form part of the main study. About 40 female students and three science teachers representing about 10% of the sample size participated in the pre-test activity. This was done with the help of some trained colleague teachers on the survey questionnaire.

The female students' questionnaire had three subscales which made it multidimensional in nature. After the pre–test, reliability analysis was conducted to establish the internal consistency of the test items on the scale (Jorgensen, 2015). The reliability of each scale was therefore determined to find out the internal consistency of the scales, that is, the extent to which the items that constitute the scale "hang together" (Pinsof et al., 2015). This was done using the Cronbach alpha reliability coefficient. Coefficient alpha values of 0.722 and 0.699 and 7.011 were obtained for psychological factors, socio economic factors and students' factors respectively.

Alpha provides a measure of the internal consistency of a test or scale and is usually expressed as a number between 0 and 1 (Cho & Kim, 2015). For research purposes, (Taber, 2017)indicated that alpha coefficient values ranging from 0.62 to 0.77 and exceeding the threshold of 0.60 are acceptable reliability values.

Five teacher questionnaire were administered to five teachers, at a pre-test to establish the validity and reliability of the instrument. The five questionnaire were all collected and subjected to reliability analysis. These questionnaires were in a dimensional form and was sectioned as "teacher factors responsible for low performance, and teaching and learning materials, school factors responsible for low performance of female students in science".

The alpha coefficient values obtained from two sections of the questionnaire were 0.778 and 0.726 respectively.

Data Collection Procedure

Data collection started in the first term of the schools' calendar and lasted for 3 months. Data collection commenced in 15th February to 25th May, 2018. Three assistants were taken through a short training to help in the data collection. Personal administration of questionnaire, were the basic techniques adopted for data collection. All the 375 female students and 15 science school teachers selected for this study returned their questionnaire representing a 100% response rate. The challenges that confronted the data collection were the inexperience level of the study participants especially the students regarding how to respond to the items. The second challenge was that the collection of data was often coincided with classes and at times the researcher and his team had to wait for classes to end before. Training was conducted for three assistants to help the researcher administer questionnaire to the selected schools. The questionnaires were personally administered to the sample female students in each school by guiding the participants to make their choices on the four point Likert-type scale. This was done to avoid misunderstanding of the questionnaire item on the part of student. However, all the 15 sampled teachers were given the teacher questionnaire to complete and return by the close of the day.

Data Processing and Analysis

Three major activities were performed prior to data analysis. The questionnaire collected were arranged properly by numbering and assigning codes to responses. The data was then entered into the computer software and

cleaned before editing and analysis. Based on the nature of the research design (descriptive survey designs), the data was analyzed and presented basically in descriptive manner. The demographic data of the questionnaires were analyzed using frequency and percentages and presented in tables.

All the other items captured on the two set of questionnaires were analysed using means and standard deviations and rank order of the statements that were presented and scored on the four points Likert Scale. The proposed factors affecting female students' performance in science were presented in the questionnaire for the respondents to assign scores on their level of agreement or otherwise to the statements. There was therefore the need to summarize their answers on the various items on the scales and compare to test values. As a result, to statistically assess these factors from the students, means and standard deviation served as the appropriate tools for the analysis. In likert scale, data is measured from a sample of the total population of interest, not from all members of the population and answers from the sample can be analyzed and inferred on the target population (Best & Kahn, 2016). After the data collection, the choice of analyses is imperative and because the data was nonparametric, means, standard deviation and rank order was appropriate for the analysis (Harpe, 2015).

The results of the mean ranks and the rankings were all presented in tables. The data was processed with the Statistical Package for Social Sciences (SPSS) version 22. This software provides flexibility in manipulating social data and was therefore deemed appropriate for this surveyed data.

Ethical Considerations

The consent of authorities in each school was sought before the questionnaires was administered to the students and teachers. Introductory Letter was taken from the Department of Basic Education and was often shown to the authorities before collecting data. Participants were made aware that their participation was voluntary and that they had the will to withdraw freely from the research along the study period. The participants were assured of confidentiality with regards to the information they provided.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter offers the analysis and interpretation of the findings of this study. The purpose of the study was to investigate the determinants responsible for the low performance of female students in science in Aowin District. The analysis and interpretation of data were carried out based on the results of the research questions established for the study. The analysis was based on the 100% return rate data obtained from 375 students and 5 teachers selected for the study. The data was analyzed using descriptive statistics (means, standard deviations, frequencies and percentages). The first part of this chapter was designated for the demographic characteristics of the students and teachers which were analyzed using frequencies and percentages. In the second part, the research findings are presented based on the research questions formulated for the study.

Demographic Information of the Students

This section recounts to the background information of the students who responded to the questionnaires. Demographic variables for the students included their age and class level. The excerpt from the data was analyzed using frequencies and percentages to indicate how the demographic data represented the students.

Table 1: Demographic Characteristics (gender and level) of the Students

Variables	Subscale	Freq.	Percent %
Age	12-14	153	41.1
	15-17	198	53.2
	18-20	21	5.7
Class Levels	Form 1	136	36.3
	Form 2	141	37.6
	Form 3	98	26.1

Source: Field Data, (2018) Stds. (n=375)

Table 1 presents the demographic characteristics (age and class levels) of the students. On the basis of age of the students, the results suggest that those within 15-17 were the majority (n=198, 53.2%) while those within 18-20 were least presented (n=21, 5.7%). With respect to the class levels of the students, majority of them were cluttered in form 2 (n=141, 37.6%) few of them were in form 3 (n=98, 26.1%).

Demographic Information of the Teachers

On the teachers' questionnaire, a section was dedicated to elicit background information of the teachers who were selected for the study. Demographic variables for the teachers' included their age range, educational qualification and years of service. The excerpt from the data was analyzed using frequencies and percentages to indicate how the demographic data represented the teachers.

Table 2: Demographic Characteristics (age, qualification and years of service) of the Teachers

Variables	Subscale	Freq.	Percent %
Age Range	21-30	1	33.3
	31-40	2	66.7
	41-50	0	0.00
	51-60	0	0.00
Qualifications	Certificate	0	0.00
	Diploma	1	50.0
	Bachelor	1	50.0
	Masters/PhD	0	0.00
Years of Service	1-10	1	50.0
	11-20	1	50.0
	21-30	0	0.00
	31-40	0	0.00

Source: Field Data, (2018) Trs. (n=5)

Table 2 offers the demographic characteristics (age and class levels) of the teachers selected for the study. From Table 2 the results suggest that majority of the teachers were within 31-40 years (n=2, 66.7%) while none of them were within 41-50 and 51 -60 years (n=0, 0.00%). With respect to their qualification, most of them held diploma (n=2, 50.0%) and bachelor degree (n=2, 50.0%). None of them held masters/PhD (n=0, 0.00%) and Certificate (n=0, 0.00%). Finally on the years of service, majority of the teachers had taught for 1-10 and 11-20 (n=1, 50%).

Research Question One: What psychological factors are responsible for low performance of female students in science?

The drive for the research question was to assess the psychological factors that were responsible for low performance of female students in science in the Aowin District. To statistically assess these psychological factors from the students, means and standard deviation served as the appropriate tool for the analysis. The results are presented in Table 3.

Table 3: Psychological Factors that were Responsible for Low Performance of Female Students in Science

Sn	Statements	Test Value=2.50 Means	±Std.D	Rank Order
3	Science is known to be a difficult subject to do	3.36	0.98	1st
8	I find it difficult understanding science concepts so I usually perform low in it	3.28	1.05	2nd
4	I fear science as a subject	3.13	1.04	3rd
7	I don't get any interest from doing science so I don't rely on it	2.99	0.94	4th
6	I don't think I can make good grades in science so I don't consider it doable	2.85	0.95	5th
1	Science is known to be for boys and not for girls	2.43	0.73	6th
10	I don't like school in general so I don't care about subjects like science	2.42	0.70	7h
5	I find it difficult solving science questions so I am always frightened anytime there is science test	2.27	1.06	8th
9	I think science is not the only subject that can help me so I don't pay much attention in it	2.19	1.09	9th
2	I don't think I have the power to do science so I don't force myself on it	2.01	0.97	10th
	Mean of means/Std.D	2.51	0.85	

Source: Field Data, (2018) Stds. (n=375)

The purpose of the study was to assess the psychological factors that were responsible for low performance of female students in science in the Aowin District. From the data, the results generally show that the low performance of female students in science could be attributed to psychological factors. The obtained mean of means/Std.D which is greater than the Test Value gives evidence to that effects (MM=2.51, SD=0.85, M>2.50, n=375).

Results suggest that not all the psychological factors were responsible for low performance of female students in science Just few of psychological factors were responsible for low performance of female students in science in the Aowin District. The results indicate that Science is known to be a difficult subject to do for girls and that was regarded as the first factor (M=3.36, SD=0.98, M>2.50, n=375).

In similar results, it was revealed that female students find it difficult understanding science concepts so they usually perform low in it (M=3.28, SD=1.05, M>2.50, n=375) and scored the second factor. The fear of science as a subject was also regarded as one of the psychological factors that were responsible for low performance of female students in science in the Aowin District (M=3.13, SD=1.04, M>2.50, n=375) and it scored the third factor.

The results on interest of the girls in science was not different. The female students confirmed that they do not get any interest from doing science so they do not rely on it (M=2.99, SD=0.94, M>2.50, n=375). The results further suggest the female students do not think they can make good grades in science so they do not consider it doable (M=2.85, SD=0.95, M>2.50, n=375).

On the contrary, the results proved that the factor “Science is known to be for boys and not for girls” is not a psychological factors that were

responsible for low performance of female students in science in the Aowin District. (M=2.43, SD=0.73, M<2.50, n=375). In other account, it was revealed that students do like school in general so I do care about subjects like science and as such not a psychological factors that were responsible for low performance of female students in science in the Aowin District (M=2.42, SD=0.70, M<2.50, n=375).

The accrued results from the study gives structured support to the work of (Eduwem et al., 2017), who have shown that the behaviour of students especially in relation to the sciences, generally and mathematics in particular is greatly influenced by certain psychological or non-cognitive factors.

The results support similar claims in the literature that psychological factors that could have significant impact of the performance of female students in science. For example in a study, (Afemikhe, 2007) (as cited in Eduwem et al., 2017) found out that self-concept, attitude towards mathematics, sex-stereotyping, confidence, motivation and problem solving habits are all related to students' achievement in science. It is noted that other psychological factors which are responsible for students in science and mathematics include self-concept, locus of control, study habit, career plan / aspiration, test anxiety, attitude towards mathematics, motivation, interest in schooling (Bruce, 2016).

In alike results, Eduwem *et al.*, (2017) asserted that test anxiety as a psychological factor can cause girls to have low performance in science. To Eduwem *et al.*, (2017) test anxiety is a learned behaviour, which can be unlearned. It is developed when students fail to prepare adequately for evaluative programmes and some things that can create test anxiety are

parents, friends or teachers that may pass their bias to the student to make them believe that there is a connection between grade and self-worth, fear of alienating parents, family or friends due to poor grades, anxiety that may be due to not feeling that they are not in control.

Studies conducted by (Sampa, 2017) examined locus of control, interest in schooling and self-efficacy as predictors of academic achievement of Junior Secondary School Students. The results indicated that locus of control, interest in schooling and self -efficacy jointly and relatively contribute significantly to the prediction of academic achievement of the Junior Secondary School Students and this support the current findings.

Research Question Two: What socio-economic factors are responsible for low performance of female students in science?

The ambition for the research question was to explore the socio-economic factors that were responsible for low performance of female students in science. To statistically explore these socio-economic factors, means and standard deviation served as the suitable tool for the analysis. The results are presented in Table 4.

Table 4: Socio-Economic Factors that were Responsible for Low Performance of Female Students in Science

Sn	Statements	Test Value=2.50 Means	±Std.D	Rank Order
6	I am not able to meet all demands of science because I help my mother at home with chores sometimes during schooling days	2.98	0.99	1st
3	My parents are not concern about my education so I also feel it same way and do what I feel is good for myself in school	2.89	1.02	2nd
4	My community culture and beliefs place less value on education among girls and this go against my performance in science too	2.82	0.97	3rd
2	Because my parents are poor they are not able to buy me science that textbooks to aid my learning	2.57	1.13	4th
1	Because my parents are not educated they help me in science related information	2.33	1.15	5th
5	Because my siblings are many, concentration is on the males than the females that is why I am not able to perform in science and others in school	1.89	0.93	6th
	Mean of means/Std.D	2.58	1.03	

Source: Field Data, (2018) Stds. (n=375)

The results on the socio-economic factors that were responsible for low performance of female students in science are presented in Table 4. The results show that generally the low performance of female students in science could be as a results of some socio-economic factors of students in the Aowin District. This was evident after the responses of the students scored a mean higher the Test Value (MM=2.58, SD=1.03, M>2.50, n=375).

The results on the individual factors suggest that majority of the socio-economic factors were responsible for low performance of female students in science. Some of the factors include the fact that the female students in the Aowin District are not able to meet all demands of science because they help their mother at home with chores sometimes during schooling days (M=2.98, SD=0.99, M>2.50, n=375).

In comparable results, the female students revealed that their parents are not concern about their education so they also feel it same way and do what they feel is good for them in school (M=2.89, SD=1.02, M>2.50, n=375). This results was not different from the fact that female students community culture and beliefs place less value on education among girls and this go against their performance in science too (M=2.82, SD=0.97, M>2.50, n=375).

The economic position of parents in the Aowin District also accounted for socio-economic factors were responsible for low performance of female students in science. The students clearly indicated that because their parents are poor they are not able to buy them science that textbooks to aid their learning (M=2.57, SD=1.13, M>2.50, n=375).

The low performance of female students in science, was not depended on the parents education (M=2.33, SD=1.15, M>2.50, n=375). The students do not feel that because their parents are not educated they not able help them in science related information. Lastly, the students clearly rejected the claims that because their siblings are many, concentration is on the males than the females that is why they am not able to perform in science and others in school (M=1.89, SD=0.93, M<2.50, n=375).

To give evidence to the current claims, Ary *et al.*, (2018) review literature on UNESCO-based information on gender disparity in science and mathematics education among girls indicated that efforts to boost female education has been made by governments, international organisations and NGOs. However, there is still a gender disparity in science education. According to the study of Ary *et al.*, (2018), females still have low access to education, low participation and poor performance in many subjects, especially mathematics and science subjects and many factors which are home, community and school based, continue to restrict developments in female education (Kumavat, 2017).

In further evidence, (Kumavat, 2017) found that the socioeconomic background is noted to espouse the families, education and respect and all these by and large may have influence on performance of students in general and not only to female students. (Kumavat, 2017) indicated that family background is an important determinant of school outcomes, whereas other factors like school characteristics have minimal effects on female students' academic performance.

In other studies, it is argued that female students' academic achievement is influenced by background of family characteristics such as socio-economic status of parents, level of education, occupation and income (Aziabah, 2018); (James S Coleman, 2018). According to (Kumavat, 2017), among these factors parental level of education and income have been the most significant source of disparities in female students' performance and this is evident in the Third International Mathematics and Science Study (TIMSS) tests, where female students from economically disadvantaged families had systematically performed worse than other students.

The results further agrees with the findings of (Kumavat, 2017), who revealed that poverty and unwillingness to bear the educational cost of books, uniforms and other expenses has been a bane and have contributed to lower participation of girls in science education. (Abbott, 2017) in a study among students in Ethiopia indicated that educational costs such as fees, uniforms, and books are also often deterring parents from educating girls and when it happens this way their male counterparts would outperform them in any subject including science. In the same vain, one of the disadvantages of the Ethiopian girls face in education is due to the low income of their families.

Further, (Mirowsky, 2017) was of the view that parents may contribute to girls' poor performance in science by giving them less attention or a lower quality of attention during schooling days. Girls' towards science is greatly affected by parents' attitudes as they may assume their parents' negative expectations that become self- fulfilling prophecies because girls cannot achieve in science like they do not achieve in Mathematics.

Research Question Three: What teacher factors are responsible for low performance of female students in science?

To accomplish the purpose of the study, the researcher sought to investigate teacher factors that were responsible for low performance of female students in science in the Aowin District**.** To statistically investigate these teachers' factors, means and standard deviation served as the suitable tool for the analysis. The results are offered in Table 5.

Table 5: Teacher Factors that were Responsible for Low Performance of Female Students in Science

Sn	Statements	Test Value=2.50		Rank
		Means	±Std.D	Order
9	The workload on teachers seem to be too much and this go against effective teaching in science, hence low performance among the females	3.54	1.11	1st
7	My science teacher cane a lot when you get something wrong so I don't have interest in that subject	3.26	1.10	2nd
4	My science teacher is always shouting on us so I feel afraid and don't have interest in his subject	3.16	1.12	3rd
1	It looks as if my teachers are not qualified to teach us and so it affects my understanding of science and eventually I perform low	2.99	1.10	4th

Table 3: Continue

5	My science teacher is always unfriendly and frown his face so I usually don't attend his classes and performance is always low	2.79	1.01	5th
2	The science teachers in my school are not many so they are not able to teach all of us and this affect our performance	2.56	1.07	6th
10	It is sometimes boring teaching science and this affects teacher output, hence low performance among students	2.28	1.10	7th
3	The way my science teacher teaches is boring and it makes feel unsatisfied, which in turn affect my performance	2.15	1.03	8th
6	My science teacher don't allow us to contribute in class so it makes the class boring	1.91	1.06	9th
8	My science teacher like the males than the female so it makes feel like I am not of science I don't put in much effort in the science subject	1.91	1.07	10th
	Mean of means/Std.D	2.65	1.07	

Source: Field Data, (2018) Stds. (n=375)

Table 5 presents the teacher factors that were responsible for low performance of female students in science in the Aowin District. The results show that on a whole, the low performance of female students in science in the Aowin District could be ascribed to teacher factors. The overall computed mean and Std.D which is greater than the test value suggest that fact (MM=2.65, SD=1.07, M>2.50, n=375).

The results indicated the workload on teachers seem to be too much and this go against effective teaching in science, hence low performance among the females (M=3.54, SD=1.11, M>2.50, n=375) and this factor was recorded as the first factor. The students further recounted that their science teacher cane a lot when you get something wrong so they do not have interest in that subject (M=3.26, SD=1.10, M>2.50, n=375) and this was considered as the second teacher factor.

The results further suggest that it looks as if the science teachers in the Aowin District are not qualified to teach us and so it affects their understanding of science and eventually they perform low (M=2.99, SD=1.10, M>2.50, n=375). The female students accepted the fact that their science teacher is always unfriendly and frown his face so they usually do not attend his classes and performance is always low (M=2.79, SD=1.01, M>2.50, n=375).

Nevertheless, in the Aowin District, the female students suggested that is not sometimes boring in teaching and learning science and this does not affects teacher output, hence it does not bring about low performance among students (M=2.28, SD=1.10, M<2.50, n=375). The way the science teacher teaches is boring and it makes feel unsatisfied, which in turn affect my

performance was not considered as teacher factors that were responsible for low performance of female students in science in the Aowin District (M=2.15, SD=1.03, M<2.50, n=375).

The lend support to the current findings, Capel and Whitehead (2015) by means using SES as a measure of disadvantage the study provides evidence that female students' relationship with teachers, perception of teacher sensitivity and the reasons for attendance are the strongest predictors of scholastic achievements in science.

Coleman et al, (2018) further averred that female students in the lowest SES dimension very often than not, did not attend school because of their teachers' expectation of success and for the fear of humiliation in class. The brings to the understanding that when there is poor relation as well as high expectation on female students from teachers can cause them to perform lower than expected because they may be anxious to impress and in the event might fail due to lack patience.

From the literature, another component of teachers that has bearing on female students' performance is the teacher qualification. The current results support the assertion that qualified teachers in science unequivocally stand the chance to bring about good performance than those who are less qualified. In a study by (Durlak, 2015), it was revealed that there was a deficit of about 40% qualified teachers in the school as reported by the head of school where the high deficit of science teachers brought about poor performance among students.

Similarly, results from the Aowin District support the claims (King'aru, 2014) who reported in a study the objectives of the education sector

of any country cannot be attained when the students are taught by incompetent and unqualified teachers and as such teachers would not be able to properly and adequately disseminate the concepts to the students.

The claims of Onabanjo (2000) cannot be hiding from the present findings. According to the findings of Onabanjo (2000) where his study examined teachers and students concerning factors responsible for low students' performance in science revealed lack of proper method of teaching, attitude of teachers towards science, lack of proper funding by the authorities concerned.

Additionally, according to Onocha and Okpala (1995) these factors are not only on low performance in science but also show clear indicators to low students' enrollments in-science subjects. It is pertinent lo note that bad teaching is one of the major factors for student's dropout in physics.

In another study, Umezuruike (2008) in a study found that among students, the teacher behavior and attitude towards teaching are sometimes considered to be more-important than his methods in teaching. According to Umezuruike (2008), a dictatorial teacher creates an uninteresting classroom climate characterized by absence of students' initiative and participation. The democratic teacher on the other hand tends to induce senses of involvement in active learning amongst students.

Research Question Four: What student factors are responsible for low performance of female students in science?

Assessing the student factors that were responsible for low performance of female students in science in the Aowin District was paramount to the achieving the purpose of the study. To statistically probe into

these student factors (from both teachers and students), means and standard deviation with rank order served as the fit statistical tool for the analysis. Table 6 depicts the obtained results from the field.

Table 6: Student Factors that are Responsible for Low Performance of Female Students in Science

Sn	Statements	Test Value=2.50		Rank
		Means	±Std.D	Order
	Students Responses			
2	I think I cannot make it in science	3.87	0.88	1st
3	I always feel some kind of laziness in me during science periods	3.08	1.06	2nd
4	Science is meant for boys and not girls	2.55	0.93	3rd
1	I see science to be a difficult subject	2.54	1.08	4th
	Mean of means/Std.D	2.98	0.98	

Source: Field Data, (2018) Stds (n=375)

In the literature, it quite clear that student factors could be responsible for low performance of female students in science. This made the researcher to explore some of these factors in the case of Aowin District. The obtained results from the students' perspective were not different from that of existing literature (MM=2.98, SD=0.98, M>2.50, n=375).

The students indicated that they think they cannot make it in science and this affect their performance in science (M=3.87, SD=0.88, M>2.50, n=375). They further recounted that always feel some kind of laziness in them during science periods (M=3.08, SD=1.06, M>2.50, n=375). The female

student had the noting that science is meant for boys and not girls and this affect their performance in science (M=2.55, SD=0.93, M>2.50, n=375). The eventually see science to be a difficult subject (M=2.54, SD=1.08, M>2.50, n=375).

Table 7: Student Factors that are Responsible for Low Performance of Female Students in Science

	Teachers Responses	Means	±Std.D	Rank Order
8	My students think science is meant for boys not girls	2.90	1.09	1st
7	My students always feel some kind of laziness in me during science periods	2.80	0.84	2nd
5	My students see science to be difficult subject	2.60	0.55	3rd
6	My students think they cannot make it in science	2.56	1.30	4th
	Mean of means/Std.D	2.72	0.94	

Source: Field Data, (2018) Trs (n=5)

The researcher sought it imperative enquire the student factors could be responsible for low performance of female students in science from teachers perspective. The results give evidence to admit that teachers in the Aowin District believe the low academic performance of female students in science could be attributed to students attitudes toward science (MM=2.72, SD=0.94, M>2.50, n=5).

The results on the individual items means that largely attribute the low academic performance of female students to the female students attitudes. For example it was evident that students think science is meant for boys not girls (M=2.90, SD=1.09, M>2.50, n=5). The teachers in similar account pointed out that the female students always feel some kind of laziness in them during science periods (M=2.80, SD=0.84, M>2.50, n=5).

In results on the fact students see science to be difficult subject was not different from the usual (M=2.60, SD=0.55, M>2.50, n=5). The students think they cannot make it in science was also one of the factors (M=2.56, SD=1.30, M>2.50, n=5).

The results from the Aowin District confirm Studies such as (Snyder et al., 2016) show that the general public do not generally have positive feelings towards science and scientists and it is believed that a positive attitude towards science may improve students' academic performance not only in science classes, but also in other subjects as well.

Adding to the above, according to (Usher et al., 2018), a number of factors have been implicated as being responsible for low performance and enrollment of students in science among girls, and the prominent among these is the perceived difficulty of science subjects. The further support the results of the current findings from the Aowin District, (Wlodkowski & Ginsberg, 2017) indicated that, science subjects, suffer a fall in enrollment among school pupils relative to other subjects as investigation carried out in schools of Kwara State revealed that science subjects are generally considered by students as being more than an average level of difficulty and that a high level of intelligence is required for their successful learning. This finding was

corroborated by (Wang et al., 2017) that one of the reasons in the declining trend of enrollment and performance in science education by students is as a result of the perception and attitude that science education is difficult. It is understood therefore that, the perception and attitude towards science as a subject is one of the reasons why they continue to record low performances because these perceptions and attitude put up are negative.

In another alike study, the results of Lazarides and Watt (2015) research further suggested that there existed other variables, besides students' attitude. Other effective variables such as peer-grove expectations were found to affect girls' attitude towards science and other achievement. The importance of attitude in the learning of science is further emphasized by (Ary et al., 2018) that, students' attitudes affect the willingness of individuals to take part in certain activities, and the way in which they respond to persons, objects or situations. This shows that learners will only understand or be ready to learn. Girls' attitudes to science serve as a predictor of their performance in science.

From these and similar studies Agrawal and Teotia (2015) noted that one of the most significant factor that affected girls' performance was the lower estimation of their own ability. They also observed that there is some indication that a girl's relative failure in science is related to their acceptance to regard science as part masculine intellectual domain.

Research Question Five: What teaching and learning materials factors responsible for low performance of female students in science?

The last research question was to ascertain the teaching and learning materials factors responsible for low performance of female students in

science in the Aowin District. To statistically give evidence to the obtained data, means and standard deviation with rank order aided the analysis. Table 8 illustrate the obtained results from the field.

Table 8: Teaching And Learning Materials Factors that are Responsible for Low Performance of Female Students in Science

Sn	Statements	Test Value=2.50		Rank
		Means	±Std.D	Order
3	The school I teach has no science centre for practical work	3.40	1.34	1st
4	The school I teach does not make provisions that will attract girls to participate actively in the sciences programmes	3.20	0.84	2rd
2	The school I teach lacks the aids that can be used to teach science better	3.01	0.71	3rd
5	The teaching and learning materials for science in my school are inadequate and sometimes not available	3.00	1.26	4th
6	The class size is big and this goes against the teacher and students ratio so it is difficult to effectively reach out to all students	2.40	1.34	5th
1	The classroom setting is not appropriate for teaching and learning science	2.20	1.09	6th
	Mean of means/Std.D	2.86	1.09	

Source: Field Data, (2018) Trs. (n=5)

The selected teachers for the study were to respond to statements on teaching and learning materials factors responsible for low performance of female students in science in the Aowin District. The results from the teachers' subjects that teaching and learning materials factors play a major in determining the academic performance of female students in science in the

Aowin District (MM=2.86, SD=1.09, M>2.50, n=5).

Dwelling on the individual items, it could be articulated that almost the all the individual items contributed to the low performance of female students in science in the Aowin District. For example, the teachers indicated that the school they teach has no science centre for practical work (M=3.40, SD=1.34, M>2.50, n=5). They indicated that the school they teach does not make provisions that will attract girls to participate actively in the sciences programmes (M=3.20, SD=0.84, M>2.50, n=5).

The results further show that the school they teach lacks the aids that can be used to teach science better (M=3.01, SD=0.71, M>2.50, n=5). The teachers further recounted the teaching and learning materials for science in their school are inadequate and sometimes not available (M=3.00, SD=0.71, M>2.50, n=5).

Class size was not recounted as one of the teaching and learning materials factors responsible for low performance of female students in science in the Aowin District. The teachers openly indicated that class size is not big and this does not goes against the teacher and students ratio so it is difficult to effectively reach out to all students (M=2.40, SD=0.71, M>2.50, n=5). The classroom setting was also not described as one of the teaching and learning materials factors responsible for low performance of female students in science in the Aowin District (M=2.20, SD=1.09, M>2.50, n=5).

The results support previous studies, for example (Simmons, 2017) in his study touched on the fact that physical environment of the school affects academic performance of the students (Simmons, 2017) acknowledged that environmental influences help in the acquisition of knowledge and skills.

The results on the effects of teaching and learning materials on the low performance of female students in science in the Aowin District support the evidence presented in David (2014). In Farrant observation, the teaching of science can be affected by the unavailability of resources in the school laboratories. The design of school and limited assets assigned to many of them constrain teachers to use teaching methods which are much less effective than those that could be used if resources and materials were available in the laboratories. The inference is that girls are the ones that are affected in most cases because they cannot easily mix with the boys.

The results lend evidence to the claims that the lack of teaching materials and apparatus in science laboratory in science laboratory affect the learning of science in schools. Paulo (2017) in a study in Tanzania revealed that lack of teaching and learning materials cause female students to perform low in the sciences. The findings were that most of the schools observed had inadequate teaching and learning materials in science where about 64% of students and 83.3% of teachers' respondents indicated that schools in Tanzania have inadequate teaching and learning materials for science and that links to poor performance among female students.

It was not surprise in the study of Conn et al. (2017) who reported that studies indicate that in Kenya womens' participation and performance in science, mathematics and technology subjects and courses is worse than that of men at all educational levels, 2002. In similar account Robinson (2017) asserts that the low performance among females in science is as a result of inadequate time allowed for learning Science satisfactorily, inadequate instructional materials, low level and inadequate training of teachers and the

nature of science curriculum which is highly abstract and seems irrelevant to the learners' immediate environment. In their study among Kenyan female students, Robinson (2017) concluded that teaching load, availability of teaching-learning resources and class size as a school factors were liable for low girls' performance in Science, Mathematics and Technology subjects. The study showed that the more the number of lessons a teacher had, the lower the girls' academic performance. This means that the teaching load influenced girls' academic performance in SMT subjects at form four level in Kitui Central District.

CHAPTER FIVE

SUMMARY CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter covers the summary of the findings of the study as well as the conclusions, recommendations, and directions for further research. Thus, the chapter focuses on the implications of the findings from the study for policy formulation and further research. The recommendations are made based on the key findings and major conclusions arising from the study.

Summary of the Study

The study set out to investigate the determinants responsible for the low performance of female students in science in the Aowin District. To achieve the purpose, the study was guided by five objectives which include to: examine psychological factors contribute to low performance in science by female students, investigate economic factors contribute to the low performance of female students, explore some teacher factors that contribute to low performance in science by female students, assess student factors contribute to low performance in science by female students and finally, to find out the teaching and learning materials influence performance in science by female students. Methodologically, descriptive research design was adopted for the study. The study employed quantitative approaches through the use of self-developed questionnaires. The female students in the five educational circuits in the Aowin District participated in the study via responding to the developed questionnaires. In all, 375 female students were

selected for the study using stratified and purposive sampling techniques. The obtained quantitative data was analyzed using descriptive (means and standard deviations).

Key Findings

The following were the main findings of the study:

Research question one which basically assess the psychological factors that were responsible for low performance of female students in science in the Aowin District revealed that the low performance of female students in science could be attributed to psychological factors (MM=2.51, SD=0.85, M>2.50, n=375). Some of these predominant psychological factors include: Science is known to be a difficult subject to do for girls, female students find it difficult understanding science concepts so they usually perform low in it and female students do not think they can make good grades in science so they do not consider it doable.

Research question two aimed at exploring the socio-economic factors that were responsible for low performance of female students in science. The result indicated that generally the low performance of female students in science could be as a results of some socio-economic factors of students in the Aowin District (MM=2.58, SD=1.03, M>2.50, n=375). Some of these identified socio-economic factors were female students in the Aowin District are not able to meet all demands of science because they help their mother at home with chores sometimes during schooling days, parents are not concern about their education so they also feel it same way and do what they feel is good for them in school and The economic position of parents in the Aowin

District also accounted for socio-economic factors were responsible for low performance of female students in science.

Research question three set out to examine teacher factors that were responsible for low performance of female students in science in the Aowin District. The results proved that the on a whole, the low performance of female students in science in the Aowin District could be ascribed to teacher factors (MM=2.65, SD=1.07, M>2.50, n=375). Some of these factors were workload on teachers, science teachers' punishment (canning), and qualification of science teachers in the Aowin District.

Research question four was devoted to looking at some of the student factors that were responsible for low performance of female students in science in the Aowin District. The obtained results give evidence to believe that both students (MM=2.98, SD=0.98, M>2.50, n=375) and teachers (MM=2.72, SD=0.94, M>2.50, n=375) shared the view that low academic performance of female students in science could be attributed to students attitudes toward science.

The last research question was to ascertain the teaching and learning materials factors responsible for low performance of female students in science in the Aowin District. The results from the study show that the teaching and learning materials factors contributed to the performance of female students in science (MM=2.86, SD=1.09, M>2.50, n=5)

Conclusions

Based on the findings of the study, it can be concluded psychological factors significantly influence the performance of female students in science.

There are also some socio-economic factors that are responsible for low performance of female students in science in the district.

Teacher factors such as workload on teachers, science teachers' punishment (canning), and qualification of science teachers are notable teacher factors that does not promote the teaching and learning of science and consequently affect performance in science, especially among girls in Aowin District.

It can also be concluded that the attitude of the students (girls) inherently affect their effective participation and performance in science in the district. In most schools too, science is taught on abstract due to inadequate teaching and learning materials and this have an effect on the teaching and learning of science hence the resultant poor performance of girls in science at the Aowin District.

Recommendations

To improve the performance of science education among female students, the following recommendations are proffered by the researcher;

1. To handle the problem of psychological factors that affect girls' participation and performance in science, the researcher recommends that every school should employ the services of profession counsellors to advice and encourage students in the area of science.
2. Parents are also advised to reduce the workload of their wards, especially in farming and other house chores and encourage them to take their studies serious especially in the area of science. They should instill some believe in their wards and let them know they can do well in science.

3. Qualified professional teachers should be made to handle science in Junior High Schools in the district in order to enhance the teaching pedagogy of science. Science teachers should also be admonished to limit if not avoid, the use of cans during science lessons in order not to cause fear and panic among girls in the class.
4. Gender activists in the country especially those that have the interest in girls education must endeavour to organize periodic seminars in the district to encourage girls to change their negative attitudes towards the learning of science.
5. Finally, the Ghana Education Service in the Aowin District should be endeavour to source for sufficient science teaching-learning resource materials so that during science lesson, they have access to simple teaching and learning aids to promote the teaching and learning of science.

Suggestions for Future Research

The following were recommended for further studies

Future studies should consider a larger sample spread across a wider scope of student across the other faculties so as to ensure adequate representation and generalisability. This will ensure a more robust and consistent findings.

Future studies should also consider a more robust method of analysis such as the quantitative approach. Further studies could consider mixed method approach.

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APPENDICES

APPENDIX A

UNIVERSITY OF CAPE COAST

COLLEGE OF EDUCATION STUDIES

FACULTY OF EDUCATIONAL FOUNDATIONS

DEPARTMENT OF BASIC EDUCATION

STUDENT QUESTIONNAIRE

Dear Respondent,

I am embarking on a study that seeks to find out "***Determinant of Low Performance of Female Students in Science Subject".*** I would be grateful if you could answer the questions below. There is no right or wrong answer. I am interested in your personal experience and opinion. The confidentiality of your information is guaranteed.

Instruction: For each item, please choose the answer which best describes your experiences by ticking [√]

SECTION A

Demographic Data

1. **Age:**
2. **Class Level:** Form 1 [ ], Form 2 [ ], Form 3 [ ]

Instruction: In the tables below for each statement mark how much you agree with a tick **[√]** in the box to the right of each statement. The responses are on the scale **1-4**, where **1** = Strongly Disagree **[SD], 2** = Disagree **[D], 3** = Agree **[A]** and **4** = Strongly Agree **[SA].**

SECTION B

Psychological factors responsible to poor performance in science

SN	Statements	SD	D	A	SA
1	Science is known to be for boys and not for girls				
2	I don't think I have the power to do science so I don't force myself on it				
3	Science is known to be a difficult subject to do				
4	I fear science as a subject				
5	I find it difficult solving science questions so I am always frightened anytime there is science test				
6	I don't think I can make good grades in science so I don't consider it doable				
7	I don't get any interest from doing science so I don't rely on it				
8	I find it difficult understanding science concepts so I usually perform low in it				
9	I think science is not the only subject that can help me so I don't pay much attention in it				
10	I don't like school in general so I don't care about subjects like science				

SECTION C

Socioeconomic factors responsible for low performance in science

SN	Statements	SD	D	A	SA
1	Because my parents are not educated they help me in science related information				
2	Because my parents are poor they are not able to buy me science that textbooks to aid my learning				
3	My parents are not concern about my education so I also feel it same way and do what I feel is good for myself in school				
4	My community culture and beliefs place less value on education among girls and this go against my performance in science too				
4	Because my siblings are many, concentration is on the males than the females that is why I am not able to perform in science and others in school				
5	I am not able to meet all demands of science because I help my mother at home with chores sometimes during schooling days				
6	Because my parents are not working and taking salary, their concentration in my education is less and this affects my performance in general				

SECTION D

Student factors responsible for low performance of female students in science

SN	Statements	SD	D	A	SA
1	I see science to be a difficult subject				
2	I think I cannot make it in science				
3	I always feel some kind of laziness in me during science periods				
4	Science is meant for boys and not girls				

APPENDIX B

UNIVERSITY OF CAPE COAST

COLLEGE OF EDUCATION STUDIES

FACULTY OF EDUCATIONAL FOUNDATIONS

DEPARTMENT OF BASIC EDUCATION

TEACHER QUESTIONNAIRE

Dear Respondent,

I am embarking on study that seeks to find out "***Determinant of Low Performance of Female Students in Science Subject".*** I would be grateful if you could answer the questions below. There is no right or wrong answer. I am interested in your personal experience and opinion. The confidentiality of your information is guaranteed.

Instruction: For each item, please choose the answer which best describes your experiences by ticking [√]

SECTION A

Demographic Data

1. **Age Range:** 21-30 [ ] 31-40 [ ] 41-50 [ ] 51-60 [ ]
2. **Educational Qualification:** Certificate A [ ], Diploma [ ], Bachelors [ ], Masters/PhD [ ]
3. **Years of Service:** 1-10 [ ], 11-20 [ ], 21-30 [ ], 31-40 [ ]

Instruction: In the tables below for each statement mark how much you agree with a tick **[√]** in the box to the right of each statement. The responses are on the scale **1-4**, where **1** = Strongly Disagree **[SD], 2** = Disagree **[D], 3** = Agree **[A]** and **4** = Strongly Agree **[SA].**

SECTION B

Teacher factors responsible for low performance of female students in science

SN	Statements	SD	D	A	SA
1	It looks as if my teachers are not qualified to teach us and so it affects my understanding of science and eventually I perform low				
2	The science teachers in my school are not many so they are not able to teach all of us and this affect our performance				
3	The way my science teacher teaches is boring and it makes feel unsatisfied, which in turn affect my performance				
4	My science teacher is always shouting on us so I feel afraid and don't have interest in his subject				
5	My science teacher is always unfriendly and frown his face so I usually don't attend his classes and performance is always low				
6	My science teacher don't allow us to contribute in class so it makes the class boring				
7	My science teacher cane a lot when you get something wrong so I don't have interest in that subject				
8	My science teacher like the males than the female so it makes feel like I am not of science I don't put in much effort in the science subject				

9	The workload on teachers seem to be too much and this go against effective teaching in science, hence low performance among the females				
10	It is sometimes boring teaching science and this affects teacher output, hence low performance among students				

SECTION C

Teaching and learning materials and school factors responsible for low performance of female students in science

SN	Statements	SD	D	A	SA
1	The classroom settings is not appropriate for teaching and learning science				
2	The school I teach lacks the aids that can be used to teach science better				
3	The school I teach has no science centre for practical work				
4	The school I teach does that not make provisions that will attract girls to participate actively in the sciences programmes				
5	The teaching and learning materials for science in my school are inadequate and sometimes not available				
6	The class size is big and this goes against the teacher and students ratio so it is difficult to effectively reach out to all students				