UNIVERSITY OF EDUCATION, WINNEBA

INVESTIGATING THE INFLUENCE OF STUDENTS' PERCEPTION IN THE LEARNING OF MATHEMATICS AND ITS EFFECTS ON PERFORMANCE AMONG GIRLS' AT THE SHS LEVEL

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A thesis in the Department of Mathematics Education, Faculty of Science Education submitted to the school of Graduate Studies in partial fulfilment of the requirements for the award of the degree of Master of Philosophy (Mathematics Education) in the University of Education, Winneba

MARCH, 2023

DECLARATION

STUDENT'S DECLARATION

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

Signature:.....

Date:……

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of the Thesis were supervised in accordance with the guidelines on the supervision of Thesis as laid down by the University of Education, Winneba.

Name of Supervisor: Prof. Christopher Adjei Okpoti

Signature:.....

Date:……

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"I AM, BECAUSE YOU ARE"!

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DEDICATION

This thesis is dedicated to my dear wife Hannah Asiedu Ofori and my lovely children –Kwame Ofori, Kwadwo Nyarko and Akosua Odeibea for their love, care and support throughout the programme.

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ACRONYMS

SHS: Senior High School

E. P. SHS: Evangelical Presbyterian Senior High School

TLMs: Teaching and Learning Materials

EVT: Expectancy-Value Theory

WASSCE: West African Senior Secondary Certificate Examination

WAEC: West African Examinations Council

ICCESSES: International Conference on Contemporary Education, Social Sciences and Ecological Studies

SPSS: Statistical Package of the Social Sciences

CSSPS: Computerized School Selection and Placement System

GES: Ghana Education Service

MAT: Mathematics Achievement Test

SPMSIL: Students Perception Mean Scores Interpretation Level

OR: Odds Ratio

CI: Confident Interval

LR: Likelihood Ratio

ABSTRACT

This study investigated perception and its effects on academic performance in the study of Mathematics among girls' at the SHS level in the Hohoe Municipality of the Volta Region of Ghana. The study employed Convergent Parallel survey Design which used mixed method approach to collect data for investigation. The design was concerned with describing the degree of relationship among the independent variables and the dependent variable. Convenient and purposive sampling techniques were used to select Hohoe E.P Senior High School and participants of the study respectively. A total number of 320 students' were selected from second and third-year groups in the school, however, 296 questionnaires were properly responded, representing 92.5% response rate. The study used structured and semi-structured interview guide questionnaires, to investigate the effect and impact of perception on performance in the study of Mathematics among girls'. The quantitative data collected were analyzed using descriptive and inferential statistics and interview data was analyzed qualitatively. The students' perception towards Mathematics was determined on the basis of 35 self-evaluative statements involving five points Likert scale questionnaire categorizing into seven perception constructs in the study of Mathematics to answer the research question guiding the study. Among the seven perception constructs were; perceived difficulty, perceived interest, perceived peer influence, perceived misconceptions, perceive cultural beliefs and perceived value (usefulness) were considered as perception determinants on students' academic performance. The study concluded that performance of female students' in the study of Mathematics is a function of perception as well as teacher related factors. The analysis of the qualitative data collected for the study suggest respondents admittedly perceived Mathematics to be difficult and felt nervous during Mathematics lessons. The study recommended for Mathematics educators in practice to employ teaching methods that inculcates motivation to help reduce negative perception to optimize performance.

CHAPTER 1

INTRODUCTION

1.0 Overview

This chapter is the introduction of the study which discusses the background of the study, statement of the problem, purpose of the study, research objectives, research questions, research hypothesis, and significance of the study, scope of the study, assumptions of the study, delimitation of the study, limitations of the study and organization of the study.

1.1 Background of the Study

Mathematics occupies a privileged position in the Ghanaian school curriculum. In that, it is not only because of the ability to cope with it that improves one's chances of social advancement, but because it is a core subject which every learner must at least learn up to the Senior High School level (Fletcher, 2009). The core nature of Mathematics makes it so essential that learners at the pre-tertiary level have no choice of doing away with the subject. According to Kalhotra (2013), Mathematics is one of the most important subjects which act as a bridge to all source of knowledge. Due to the relevance of Mathematics and its application, it is widely regarded as one of the most important school subjects and a central aspect of the school curriculum in every society (Atteh *et al,* 2020). This is because Mathematics skills are essential in understanding other disciplines including engineering, sciences, social sciences and even the arts (Patena & Dinglasan, 2013; Phonapichat, Wongwanich, & Sujiva, 2014). Abe and Gbenro (2014) point out that Mathematics plays a multidimensional role in science and technology of which its application outspread to all areas of science, technology as well as business enterprises. According to Ngussa & Mbuti (2017), Mathematics curriculum is intended to provide students' with knowledge and skills

that are essential in the changing technological world (Mazana, Montero & Casmir, 2019).

Nonetheless, performance of students' in Mathematics, relative to other subjects, has generally been low. Such low achievements in Mathematics have been attributed largely to the perception students' have towards the subject. Arthur, Asiedu-Addo and Assuah (2017) assert that this perception is because of experiences that learners went through at the early stages of their educational lives. Aguilar, Rosas & Zavaleta (2012), assert same that, perception about Mathematics are believed to originate from past experiences. For instance, while some students' think of Mathematics as a difficult and uninteresting subject (Zakaria *et al*., 2010), others have stereotyped the subject to be for males, and this has generated a Mathematics-phobia for female students' (Sam, 2002). In addition, some students' have the perception that Mathematics, as a subject, is suitable for only engineering and the natural sciences students' (Ampadu, 2012). Again, students view Mathematics as an abstract subject, although they attest to its important development in science and technology in any society (Kiwanuka, *et al*, 2015).

In addition, Mathematics is commonly perceived to be difficult (Fritz *et al*. 2019). Moreover, many believe "it is ok" and not everyone can be good at Mathematics" (Rattan *et al*. 2012). With such perception, many students' stop studying Mathematics soon after it is no longer required of them and so in Ghanaian situation. Giving up learning Mathematics may seem acceptable to those who see Mathematics as "optional", but it is deeply problematic for society as a whole. Mathematics is a gateway to many scientific and technological fields. Leaving it limits students' opportunities to learn a range of important subjects, thus limiting their future job

opportunities and depriving society of a potential pool of quantitatively literate citizens (Li & Schoenfeld, 2019).

According to Pasch (2021) in a study on how the perception of female students' of people interested in Mathematics influences their willingness to pursue Mathematics in future study and career, assert that, females are getting driven away from careers with a high level of Mathematics, this is sometimes compared to a leaking pipeline (Makarova, Aeschlimann, & Herzog, 2016). The leaking pipeline results in an international underrepresentation of women in mathematical careers for different reasons than mathematical talent, skill and abilities (Kahn, & Ginther, 2017). The gender difference in career domains is to this day present in Ghana as well. Various studies have suggested that the current strong masculine image of mathematicians plays a role in the lack of females in career paths which need a high level of mathematical knowledge (Kahn, & Ginther, 2017; Makarova, Aeschlimann, & Herzog, 2019).

According to Watt, (2007) in a study on A trickle from the pipeline: why girls under-participate in Mathematics observed that, despite the equivalent levels of mathematical achievement, more girls' than boys choose lower levels of Mathematics in Senior High School, and fewer girls' aspire to Mathematics related careers than boys. This persistent pattern has been repeatedly identified and is currently of concern in many countries around the globe. Perhaps this may be attributable to one of the main factors in education giving the impression that men are more successful and talented in learning Mathematics than women (Tang, Chen, & Zhang, 2010). This condition has caused women to take on important roles and responsibilities mainly in family and household management (Kaygisiz, 2018). Kumcu, (2005) also observed that, since Mathematics used to be introduced as a terrifying discipline for women and

considered as a man thing, it had continued its existence only as “the world of men”(Yildiz, 2018).

According to Wadesango *et al* (2011) in South Africa, Mathematics teachers’ attitude towards girls’ is one of the reasons for the low numbers of females’ in Mathematics and Science related courses. They assert that teachers give more opportunities to boys than to girls’ in performing hands-on demonstrations in Mathematics lessons. According to them, male students’ had the opportunity of interacting with Mathematics teachers while female students’ were being ignored during Mathematics lessons, thereby placing them at a disadvantaged position. They added that, although female students’ are having the same or even higher aptitude than their male counterparts for Mathematics, female students’ are characterized by reduced interest and negative attitudes towards the study of Mathematics and other Science related courses.

In this thesis, the researcher explores the influence of students’ perception in the learning of Mathematics and its effects on performance among girls’ at the SHS level. It is targeted specifically at girls because, it is very common for girls to be under-confident in Mathematics, to think that they are not as good at it as boys, or to believe that Mathematics just not for them (Foley, 2016). The research purpose is to understand the extent to which effects of perception on performance of females in the study of Mathematics at the pre-tertiary level of formal education. Therefore, the focus of this research study is on how females view Mathematics and its effect on their performance in the learning of Mathematics. Scott, (1975) views perception as both unique and complex, and what we perceive around us is highly subjective and depends on our needs, our expectations and experiences (Acheampong, 2020).

1.2 Statement of the Problem

Female are getting driven away from careers with a high level of mathematics (Makarova, Aeschlimann, & Herzog, 2016) for different reasons than mathematical talent, skill and abilities (Kahn, & Ginther, 2017). The mindset of the girls' often impacts greatly on their performance in Mathematics (Wambui, 2018). Various studies have suggested that the current strong masculine image of mathematicians could play a role in the lack of females in career paths which need a high level of mathematical knowledge (Kahn, & Ginther, 2017; Makarova, Aeschlimann, & Herzog, 2019).

According to Wasike *et al*, (2013) girls' with negative perception towards mathematics were not performing well as their counterparts with positive attitudes. They went further to add that, this trend of affairs suggests that girls' performance will largely be shaped by their perception in the study of Mathematics. However, good academically the girl is, the perception creates an impetus into the girls' mind which creates a culture to like or dislike the subject. When these girls' perception is not strengthened towards an undertaking, they often don't do quite well academically, even though they have the ability to do well under conducive environment in the study of Mathematics. The above believe may not be different at Hohoe E. P. SHS in the Volta region of Ghana. These concerns are even prominent since WAEC results released from 2018 to 2020 (Appendix C) depicts low performance of girls' in mathematics. But it is most often difficult to answer such question that perception influence performance of girls' since there is no empirical documented research concluding in aforementioned problem in the study of Mathematics in the school.

Notwithstanding, several researchers have reported no effect of perception on performance in the study of Mathematics (Papanastasiou, 2002; Maat & Zakaria, 2010; Katrina, 2018; Atteh *et al*, 2020;). Nonetheless, others have reported a significant association between perception and performance (Wasike *et al*., 2013; Cofie, 2020; Arthur, Asiedu-Addo & Assuah, 2017; Kunwar *et al*., 2021; Mutodi & Ngirande, 2014; Fekumo & Omeka, 2022).

Given this background, it is only reasonable and logic to assume that there is no consensus as to whether girls' performance in Mathematics is influenced by their perception or not. It is this gab that has motivated the researcher to find out the perception of girls' towards the study of Mathematics and how it affects their academic performance in a Ghanaian context. Therefore this study sought to investigate the extent to which perception influence performance among girls' in the study of Mathematics at the SHS level.

1.3 Purpose of the Study

The purpose of this study was to investigate the influence of students' perception in the learning of Mathematics and its effects on performance among girls at the SHS level.

1.4 Objectives of the Study

The objectives which guided the study include:

1. To identify and investigate factors that accounts for SHS girls' perception in the study Mathematics in the Hohoe Municipality.
2. To investigate whether there is relationship between the identified perception constructs and girls' performance in the study of Mathematics in the Hohoe Municipality at the SHS level.

3. To investigate the experiences of female students' in the study of Mathematics at the SHS level in the Hohoe Municipality**.**

1.5 Research Questions

The study attempted to answer these questions;

1. What are some of the possible factors that contribute to SHS girls' perception in the study of Mathematics in the Hohoe Municipality?
2. To what extent does perception influence female students' academic performance in the study of Mathematics in the Hohoe Municipality?
3. How do the experiences of female students' influence their Mathematics learning process at the SHS level in the Hohoe Municipality?

1.6 Research Hypotheses

H_0: Female students' perception does not significantly influence their performance in the study of Mathematics.

H_1: Female students' perception influences their performance significantly in the study of Mathematics.

1.7 Significance of the Study

This study findings will be of great benefit to Students', Mathematics teachers, the school administrators, policy makers in education and government in the following endeavours;

- This research will be important in exposing some forms, causes, and effects of weaknesses on the part of both students' and teachers about our dispositions of Mathematics.
- The information from this study could be used to organize seminars, conferences and workshops for teachers' in Hohoe E. P. SHS.

- This study will also help school teachers and students' and other related organizations who deal and care with students' girls' perception about Mathematics.
- This study will give a clear picture of girls' perception and its effects on performance in Mathematics learning process in Hohoe E. P. SHS.
- This study will serve as literature for reference purposes and also contribute to the existing body of knowledge for policymakers.

1.8 The Scope of the Study

The study was carried out in Hohoe E. P. Senior High School in the Hohoe Municipality, Volta Region of Ghana. The research involved girls' only. The study sought to collect data on the possible factors of perception and its effects, and gender-related issues on SHS girls' towards the study of Mathematics, in the Hohoe E. P. SHS in the Hohoe Municipality.

1.9 Assumptions of the Study

a) Students' in all cases are of similar learning backgrounds and that any difference in learning is a direct result of the classroom experience with which students' interact.

b) Every student has innate ability for high achievement.

c) All the Mathematics teachers had been trained

d) Students' perception and attitudes affect their performance.

1.10 Delimitations of the study

The study aims at establishing the effects of perception of female students' on performance in the study of Mathematics at the Hohoe E. P. SHS in the Hohoe Municipality, Volta Region of Ghana. The study thus delimits itself to Hohoe E. P. SHS because of proximity and convenience.

This study was anchored on descriptive survey design with mixed method approach. This design is normally used to systematically gather factual quantifiable information necessary for decision-making (Wasike *et al.,* 2013). In this study, the researcher hopes to establish the relationship between perceived difficulty, perceived anxiety, perceived interest, perceived peer influence, perceived cultural beliefs and perceived value(usefulness) on the academic performance of female students' in the study of mathematics at the SHS level.

1.11 Limitations of the study

The researcher faced non-cooperation from some of the respondents due to fear of breach of confidentiality on the information they were to give. The researcher assured respondents of confidentiality citing that the study was strictly meant for academic purposes and that their identity will not be revealed.

As a result of time and financial constraints, the study was limited to Hohoe E.P SHS in the Hohoe Municipality of Volta Region of Ghana. Respondents were sampled from second and third year groups of the school. Therefore, findings from the study cannot be generalized for all SHS students' in same region or across Ghana. But since students' were admitted through Ghana Education Service, Computer School Selection Placement System (GES's CSSPS) from all parts of the country, this makes population for the study in terms of students' abilities, cultural and social economic background rich. Therefore, the SHS girls' sampled represented the characteristics of Ghanaian SHS girls' across the country.

1.12 organization of the study

The study was organized into five chapters. Chapter One, comprised of the background of the study, statement of the problem, purpose of the study, research objectives, research questions, research hypothesis, significance of the study, scope of

the study, limitations of the study, and assumptions of the study. Chapter Two, looks at the review of relevant literature to the study. Chapter Three is about methodology of the study. Chapter Four, presents data analysis, the results and discussions of major findings of the study. Finally, Chapter Five covers the summary of the study, conclusions and recommendations.

CHAPTER 2

LITERATURE REVIEW

2.0 Overview

This chapter of the study is a review of relevant literature on the perception of girls' towards the study of Mathematics as a subject. The researcher refers to studies already conducted in this regard as well as the findings made, and assesses them to help give a thorough understanding of what has been done in the past to get a better view of the findings to be produced by this study. The review of literature cover areas including the concept of perception, academic performance, perceived value, perceived difficulty, perceived interest, perceived anxiety, perceived peer influence, perceived misconceptions, perceived cultural beliefs, and parents motivation (family background). The chapter finally presents theoretical and conceptual frameworks and Summary of the entire chapter.

2.1 The concept of perception

In our interaction with the physical outside world, it is necessary to process information from it for the purpose of making sense of the world and also making ourselves safe and reassured. And since human beings enjoy the abilities to hear, see, smell, touch and taste, we are able to sense the outside and be aware of what happens around us-this process of sensing the outside world is completed by our perception, which, with our sensory organs, which allow us to recognize and identify the existence of all kinds of stimuli and then evaluate and give meaning to them (OU Qiong, 2017).

According to Perreault & McCarthy, (2005), *perception is how we gather and interpret information from the world around us*. Since we constantly gather and interpret information from our environment, it is accurate to say therefore that perception is a process and not an action.

According to Luthans (2005);

> The key to understanding perception is to recognize that it is a unique interpretation of a situation, not necessary an exact recording of it. In short, perception is a very complex cognitive process that yields a unique picture of the world, a picture that may be quite different from reality.

He goes further to explain that perception is largely learned and no one has the same learning experience. In fact, every individual possesses a unique filter, and the same situation or stimuli may produce very different reactions and behaviors.

Cell-assembly-phase-sequence theory also suggests that perception is a product of learning. Thus, one's acquaintance with anything new in the world helps to form perception. The theory states that initial reactions to a visual presentation (exposition) give rise to exploratory motor components that play a significant role of sequentially building up activities of small groups of brain cells into a larger sequence of activity during the process of learning (Bartley, 1969). Therefore, the process of learning involves interpreting information about anything discovered. What this highlights for our attention is that the opinion one forms about another person depends on the amount of information available to him or her and the extent to which he or she is able to correctly interpret the information the person has acquired.

One major idea crystallized in the definitions above is that perception is highly individualistic. Perception is formed by an individual as a result of the information he or she chooses to expose him or herself to, the way he or she chooses to interpret them, and for how long he or she chooses to retain them, all depending on his or her

past history and previous exposure to similar information. The individualistic tendency of perception is what makes it difficult to predict the ability of another person to interpret one's message the way the one intends it (Amodu, 2006).

In this study, the term 'perception of Mathematics' is conceptualized as a mental representation or view of Mathematics, apparently constructed as a result of social experiences, mediated through interactions at school, or the influence of parents, teachers, peers or mass media. It also refers to some kind of mental representation of something, originated from past experience as well as associated beliefs, attitudes and conceptions (Aguilar, 2012; Moreau, Mendick & Epstein, 2010; Mutodi & Ngirande, 2014).

According to Begg (2004), cited in Lucas & Fugitt, (2007) in a study investigated on the perception of Mathematics and Mathematics education in the rural Midwest, Ohio, in an introduction of a paper concerning Mathematics and Mathematics education, upon which one Mathematics educator observed, "The need to popularize Mathematics and to change the public perception of our subject seems axiomatic as there is no doubt that many people regard Mathematics unfavorably and this has an impact on our work in Mathematics education".

According to Ajai & Imoko (2015) in Nigeria, the world view of many students' about Mathematics is wrong. Whiles some perceive Mathematics as a subject of many formulae, others see it as a non-lively and a never changing subject. They added that some learners have perceived Mathematics as a subject for "nerds and loners, and hence, a subject of study for boys' and men and not for girls' and women". These perception about the subject have contributed greatly to the gender differences in Mathematics, Science and Engineering professions in Nigeria and Africa as a whole (Salifu, 2017).

On the other hand, another area of concern of students' perception is the individual life histories that each student brings to Mathematics learning. These life histories influence the way the students' position themselves in the classroom, the way they engage with Mathematics, teachers and peers and the way they interpret mathematical experiences. Besides, there are contextual factors that students' of the same class share with each other. These are, for example, the personality of the teacher, quality of teaching and learning support material, interests in Mathematics, self-confidence and general proficiency in the subject. These influence all students' in a class and are the origin of shared experiences. Moreover, also students' individual experiences are partly shaped by the shared events in the classroom (Mutodi & Ngirande, 2014).

But for the purpose of this study, students' perception can be described as students' beliefs, mental image, dispositions and emotions regarding their knowledge of Mathematics and their competence in learning Mathematics. It also includes how they view the subject and the way they respond to the learning process of the subject and its related issues (Daud *et al* 2020).

2.2 Academic Performance

Performance is defined as the observable or measurable behaviour of a person or an animal in a particular situation usually experimental situation (Simpson & Weiner, 1989). This means that performance measures the aspect of behaviour that can be observed at a specific period. To determine performance, a performance test is conducted. Singer (1999) defined performance test as the type of mental test in which the subject is asked to do something rather than to say something. Performance test is the type of test which throws light on the ability to deal with things rather than symbols (Drever, 1981). According to Bhat & Bhardwaj, (2014) the word performance generally indicates the learning outcome of the students'.

According to Narad & Abdullah (2016), in a study investigated on academic performance of Senior Secondary School Students' influence of parental encouragement and school environment, stated that academic performance of students' is the centre around which a whole education system revolves. The success and failure of any educational institution is measured in terms of academic performance of students'. Not only the schools, but parents also have very high expectations from students' with respect to their academic performance, as they believe that better academic results may lead to better career options and future security.

Kumar *et al*, (2021) in a study investigated on defining and measuring academic performance, affirms this assertion that, academic performance of students' is the key feature (Rono, Onderi & Owino, 2014) and one of the important goals (Narad and Abdullah, 2016) of education, which can be defined as the knowledge gained by the student which is assessed by marks by a teacher and/or educational goals set by students' and teachers to be achieved over a specific period of time. In fact, academic performance can be understood as the nucleus, around which a whole lot of significant components of education system revolve, which is why the academic performance of students', specifically belonging to Higher Education Institutions (HEIs) and has been the area of interest among researchers, parents, policy framers and planners (Kumar *et al*, 2021).

In educational context, academic performance is the educational goal to be achieved by a student, teacher or institution over a certain period and is measured either by examinations or continuous assessments and the goal may differ from one individual or institution to another. Academic performance is the outcome of education, the extent to which a student, teacher or institution has achieved their educational goals

(Narad & Abdullah, 2016). Yusuf, Onifade & Bello (2016) also defined Academic performance as the quantifiable and apparent behavior of a student within a definite period and are an aggregate of scores fetched by a scholar in various evaluations through class tests, mid and end of semester examinations, etc. Martinez (2007) also added that Academic performance has been defined as the product outcome portrayed by a student as a result of exposure to learning and training and has been usually articulated through grades.

According to Otoo (2007) academic performance constitutes what a student is capable of achieving when he or she is tested on what he or she has been taught (Baidoo-Anu, 2017). Students' who score less or below a given standard of test are regarded as performing poor academically(Okoye, 1982). Bakare (1994) described poor performance as any performance that falls below a desired standard.

In this regard there are several components of the complex unit called performance (Lamas, 2015). And this is seen in the myriad of explanations given above. But for our purposes we shall limit ourselves to output usually defined in terms of students' achievement as defined by Yusuf, Onifade & Bello (2016).

2.3.0 Potential Sources (Origins) of Perception

2.3.1 Perceived Value in Mathematics

Universally, mathematics is virtually dominant in almost every aspect of man's life such that in our world of science and technology, it has played an important role and continues to be relevant to other various fields of study. It cannot be overemphasized that the study of mathematics disciplines the mind, and equips one to develop critical thinking ability and reasoning. Mathematics occupies a privileged position in the Ghanaian school curriculum. In that, it is not only because of the ability to cope with it that improves one's chances of social advancement, but because it is a core subject

which every learner must at least learn up to the Senior High School level (Fletcher, 2009).

At its best, mathematics is a rewarding, compelling and powerful subject. In the words of mathematician Marcus du Sautoy in an interview reported online, 'Mathematics has beauty and romance. It's not a boring place to be, the mathematical world. It's an extraordinary place; it's worth spending time there' (Gold, 2006). Unfortunately, this mathematical world is not always recognizable either in portrayals of mathematics in society or the experiences of females in school (Foley, 2016). This beauty is mostly overshadowed by fear and misconceptions in the world of the feminine. Dweck (2007) believes that low female interest in math work in tandem to diminish pursuit of mathematics skills among females.

As observed by Aguele and Agwagah (2007), there can be no science without mathematics, consequently there can be no technology without science hence there can be no modern society without technology. Thus, mathematics is the cornerstone of national development without which no nation can excel scientifically and technologically. As a result, nations that aspire to develop scientifically and technologically should give great attention to the teaching of mathematics at all the levels of education (Mandina *et al*., 2013). And the female cannot be left out in this pursuit. As observed by the late Kwagyir Aggrey, "When you educate a man, you educate individual, but when you educate a woman you educate a whole nation".

The importance of mathematics is woven throughout and across arenas and careers, from health care, interpreting data in the media and personal finance through to occupations involving estimating, pattern spotting and proportional reasoning (Allen 2011; Hennessey, Highley, & Chesnut, 2012). This assertion provides a modern-day

equivalent of the starting point of the seminal Cockcroft report (1982), that living without mathematics was virtually impossible in the twentieth century, and more than ever before, more relevant in our time. The importance of mathematics, both as a subject in its own right and as a tool for economic well-being, international competitiveness and logical thinking (Vorderman *et al*., 2011) cannot be underestimated.

Furthermore, Mathematics is widely regarded as one of the important subjects for entry into various careers and further training. This is because it shapes the mind and prepares student for pure and social sciences. The students are taught to think logically, creatively and independently. For this reason, it is important that all students have the opportunity and support necessary to learn Mathematics in depth and with understanding (Kane & Mertz, 2012).

2.3.2 Perceived difficulty in Mathematics

Mathematics is commonly perceived to be difficult (Fritz *et al*., 2019). Moreover, many believe "it is ok-not everyone can be good at mathematics" (Rattan *et al*., 2012). With such perception, many students stop studying mathematics soon after it is no longer required of them (LI, 2019).

The phrase difficulties in learning mathematics have different meanings in the literature. Morgan *et al*., (2009) relate difficulties in learning mathematics to gaps in mathematics proficiency and low numerical processing skills. In contrast, Karagiannakis *et al*., (2014) describe difficulties in learning mathematics as various obstacles that lead to difficulties in processing numbers. In general, difficulties in learning mathematics relate to deficits in developing mathematical skills, dyscalculia, or difficulty in learning or comprehending arithmetic relationships (Baccaglini-Frank

& Di Martino, 2020; Kaufmann & Von Aster, 2012). Hamukwaya and Haser (2021) considered the concept to refer to any limitations that hinder students' mathematical learning. From a psychological point of view, difficulties in learning mathematics hinder the cognitive learning processes necessary for understanding mathematics (Mazzocco, 2007). These deficits are believed to affect students' abilities in their academic performance in mathematics (Hamukwaya, 2022).

One of the problems in mathematics arises from its very nature. When learning mathematics, one goal is that students can conduct procedures in order to obtain correct answers (Akhter & Akhter, 2018). , Brown *et al*. (2008) noted the widespread opinion among learners that mathematics is difficult, with students opting out whenever possible. Khan (2012) noted that mathematics is not usually a popular subject and is a subject where students face many problems, with many opting out as they are allowed.

By its very nature, mathematics makes high conceptual demands on students. It involves procedures that may appear to be abstract and unrelated to life. It has been shown again and again that this places high demands on the limited working memory capacity in learners (Reid, 2009). Working memory is part of the brain that helps learners in thinking, comprehension and problem solving skills. It has limited capacity for individuals and help to control comprehension (Akhter, 2018).

According to Atteh *et al*., (2020), some students view Mathematics as their waterloo; as result, students perform poorly in Mathematics. This perception toward Mathematics and Mathematics learning and their implications for Mathematics instructions have long received much attention from both Mathematics educators and

mathematicians. They further mention that in fact the poor performance of students globally in Mathematics is mostly linked to perception than any other variable.

Students with difficulties in learning mathematics struggle in the subject, complete their work at a slow pace, have difficulty representing mathematical concepts (Wang, Du, & Liu, 2009), and perform lower than their peers (Jitendra *et al*., 2013). Scholars have identified some reasons for students' difficulties in learning mathematics: a poor foundation, unwillingness to learn, teachers' incompetence (Montague, 1992: Voigts, 1998), and the language of instruction (Siyepu, 2013). Furthermore, some scholars argue that fear resulting from past experience, math avoidance, and the myth of math being a difficult subject might hinder one's success (Bekdemir, 2010). To address the needs of students who have difficulties in learning math, Torbeyns *et al*. (2004) suggest the need for effective teaching techniques at a slower pace to attain students' learning goals. According to Kember (1997), teachers should also design appropriate and inclusive demanding tasks that influence the quality of the learning outcomes. These tasks may positively impact students who have a poor background in mathematics and poor mathematical knowledge (Hamukwaya, 2022).

2.3.3 Perceived interest in Mathematics

According to Spelke (2005), competing statistics have been reported, and research has focused on identifying experiences that might explain the lack of interest among females despite the fact that they and males demonstrate equal aptitude for mathematics (Amelink, 2012). Spelke (2005) found that sociocultural factors play a major role in students' perception about the degree to which females and males are good at mathematics and the utility of studying the subject. Negative views held by influential individuals such as parents and teachers underscore these messages and are internalized by girls, negating their interest in mathematics. When considering the

long-term impact, lack of interest in mathematics among girls is directly related to fewer women pursuing degrees in math-related careers, including science, technology, and engineering (Linver *et al*., 2002; Spelke, 2005; Watt, 2006).

Furthermore, Dweck (2007) posit that negative gender stereotypes about female interest in mathematics work in tandem to diminish pursuit of math skills among females. Dweck, (2007) noted that sociocultural forces impart false beliefs that boys are born with a greater aptitude for mathematics. Environments such as mathematics classrooms and households that are heavily influenced by beliefs that girls may be disadvantaged genetically when it comes to mathematics ability can have a serious negative effect on math interest among girls. Usher (2009) discovered that, these beliefs negatively impacts female attitudes because girls see mathematics as something in which they will experience little success and consequently disengage from further study of the subject (Amelink, 2012).

Aside, pervasive social, cultural, and historical messages that mathematics is not useful to women, mathematics careers are masculine, and women are more interested in social fields (Barnett & Rivers, 2004) are communicated explicitly and implicitly to girls from a very young age. For instance, parents tend to view math as a more masculine field and buy more math-related products for their sons than for their daughters (Bleeker & Jacobs, 2004; Nosek *et al*., 2002). These messages, although unfounded scientifically, start with influential adults such as parents and teachers, are picked up and furthered by peers (Barnett & Rivers, 2004), and are reinforced by media, including magazines, television, and textbooks used in schools. In this study, interest is defined as expressed curiosity in or attitudes toward mathematics as a subject for study and a career choice (Amelink, 2012).

2.3.4 Perceived Anxiety

Ashcraft (2002) defined Mathematics anxiety as feelings of fear, tension, and apprehension that some people feel when dealing with mathematical issues (Ersozlu & Karakus, 2019). Ma & Xu (2004) and Gunderson *et al* (2018) found evidence that poor Mathematics skills and lower levels of Mathematics achievement have adverse effects on students' self-efficacy levels and cause them to develop Mathematics anxiety. There are many research studies demonstrating the negative effect of Mathematics anxiety on Mathematics performance and Mathematics achievement (Ma, 1999). Most of the scholars in this area argue that the adverse impact of Mathematics anxiety on Mathematics performance is mediated by a transient reduction in the cognitive resources (i.e., working memory) that everyone needs to complete the cognitive tasks in Mathematics (Ramirez, Shaw, & Maloney, 2018). Pletzer *et al*. (2015) found evidence that high Mathematics anxiety levels reduce the neural efficiency of the individuals and thus they are not able to effectively use the cognitive resources that they need to operate for Mathematics success.

Mathematics phobia is currently considered as the intense undesirable emotional retort (branded by nervousness, tension, concern, doubt, fear, impatience, irritability, mental blockage and confusion). This is a hindrance to performance in mathematical problems in both daily lives and/or in school (Villamizar *et al*, 2020). Besides, Daud *et tal*. (2020) also posit that, "Mathematic anxiety and low confidence level in learning Mathematics among students' result in confused thinking, incompetence, low level of interest towards the subject, and non-participation in class". Inappropriate instructional strategies, and teachers' passion and commitment in the Mathematics classroom management can also contribute significantly to Mathematics anxiety and phobic among students' (Rozgonjuk *et al*, 2020).

To address the above issue, Sarkar *et al* (2014) found that the students' who can overcome their affective concerns stemming from Mathematics anxiety could improve their working memory efficiency and Mathematics performance (Ersozlu & Karakus, 2019). It is important that pre-service teachers are given the needed help to reduce it if not overcome their own Mathematics phobia and anxiety. This could help a great deal in reducing to the barest minimum students' Mathematics phobia and anxiety (Rozgonjuk *et al*, 2020). Creating an interactive classroom, where the teacher is seen as a facilitator of learning, guiding learners to discover knowledge etc, could also reduce Mathematics phobia and anxiety (Cooper *et al*, 2018; Mireku, 2021).

2.3.5 Perceived Misconceptions (Myths)

Another area of challenge is misconception about Mathematics. According to Arthur, Asiedu-Addo and Assuah (2017) the greatest misconception about Mathematics is the notion that Mathematics is about formulas and computations that need to be memorized. They went further to state that, this view has trifled and thwarted the efforts of students' more than anything else. This misconception has further made girls' identifying Mathematics as a male subject in the basic and second cycle schools in the Ghanaian society.

This view or opinion most students' have about Mathematics, especially girls' are incorrect. The bases for this misconception are faulty thinking or understanding which had created difficulties and poor performance in the learning of Mathematics. When an idea is wrong all other knowledge that follow would be wrong as well, and this would lead to failure in understanding this knowledge. Mental picture of whatever we have learnt is difficult to be corrected if not constructed properly, which always lead to wrong understanding. This problem may be due to lack of interest in the subject

Mathematics as a result of faulty thinking or wrong withholding of fact which had to be corrected (Ubi & Odiong, 2018).

In a study conducted by Natalia and Nuria (2017) on "Let the Girls Learn! It is not only about Mathematics… It's about Gender Social Norms", reiterated that, girls' relative underperformance in Mathematics could be the result of cultural beliefs on the role of women in society affecting girls' beliefs in their own Mathematics abilities ("as I am a girl, I am not good at Mathematics"); their beliefs in the institutional constraints she may face ("as I am a girl, Mathematics will not help my career prospects"); their anxiety on performing in Mathematics ("as I am a girl, I am told Mathematics is not for me, which generates anxiety and reduces performance in Mathematics"); or girls' preferences regarding Mathematics ("as I am a girl, I dislike Mathematics").

According to Ubi & Odiong (2018) non-mathematics belief is that, Mathematics is only about memorization. When students' learn Mathematics primarily through memorization they miss out on developing critical thinking skills that are vital to being successful in Mathematics late on. Star & Rittle-Johnson (2016) argued that, "Students' need to have the ability to memorize a formula, but they also need the understanding of the concept behind it. He further observed that, symbol need to be understood before moving into complex mathematics concept, when student are stuck with only one way of solving, they are only memorizing and not developing critical thinking skills. Student appreciates the learning of mathematics when numerous approaches are involved.

Misconceptions are but one facet of faulty, inaccurate, or incorrect thinking. These are all intertwined causing students' unlimited trouble in grasping with Mathematics from the most elementary concepts through a mathematics topic.

2.3.6 Perceived Peer Influence in Mathematics

It is a common belief that children will thrive if educated amongst better schoolmates, and this belief guides many parents in their choice of school. Many studies have tried to measure this peer-group effect. Peer-group influences are a distinct class of influences arising from 'social interactions'-a broad term which encompasses any type of individual behaviour that involves interdependency with the behaviour or characteristics of others (Misanya, 2013). Regardless of socio-economic status, parents want their children to be surrounded by the best possible social networks, especially during adolescence, when youth are increasingly independent from parents. During these formative years, educational goals take form, and youth make a series of decisions that shape their educational trajectories, even as their friendship networks gain influence upon these decisions (Misanya 2013).

Salvador (2009)**,** defines peer as a person who is equal to another in ability, qualification, age, background and social status. Peer is a person who belongs to the same age group or social group (Okorie, 2014). According to Hartney, (2011) cited in Wachukwu & Amadi (2021) in a study on the *Peer pressure as a contemporary issue in teenage upbringing in Obio/Akpor LGA of Rivers State, Nigeria,* explains peer pressure as the influences that peers can have on each other. Peer pressure may be emotional or mental forces from people belonging to the same social group (such as age, grade or status) to act or behave in a manner similar to themselves (Weinfied, 2010). Jones (2010) also defined peer pressure as the ability of people from the same social rank or age to influence one another of same age bracket. Peer pressure is usually associated with teens although its influence is not confined to teenagers alone. According to Okorie (2014) peer pressure is an influence that a peer group, observers

or individuals exert to encourage others to change their attitudes, values or behaviours and conform to the group norms.

Boobies Elhaney, (2005) also indicate that peer pressure refers to the way people of the same social group act or believe in order to influence one another, often in negative ways. Peer pressure is commonly associated with episodes of adolescent risk taking (such as delinquency, drug abuse, sexual behaviours), because these behaviour commonly occur in the company of peers. It can also have positive effects when youth are pressured by the peer toward positive behaviour, such as volunteering for charity or excelling in academics (Kellie, 2013).

However, in most cases, they can encourage each other to skip classes, steal, cheat, use of drugs or alcohol, or become involve in other risky behaviours. Majority of adolescents with substance abuse problems began using drug or alcohol as a result of peer pressure. Negative peer pressure may be influence in various ways like joining group who drink alcohol, smoke cigarette and Indian hemp among others. It may also lead to the decision to have a boyfriend/girlfriend. Peer pressure indulges youth into loitering about in the streets, watching films and attending parties during school hours, taping as alternative to stealing which may eventually graduate into armed robbery. (Arief & Martin, 2011).

Peer pressure has been getting a bad repute of late and with good reason but the fact remains that it is the same peer pressure that plays a critical role in shaping the lives of so many teenagers and can help set them on a path to self-discovery (Kellie, 2013). Positive effects of peer pressure on teenagers are also evident by the example of a student who is motivated to get good grades because his friends are getting good grades-an action that can be attributed to positive peer pressure. Other examples of positive peer pressure include support to get good grades and encouragement to do

well in a sport (Okorie, 2014). Okorodudu (2010) also reiterated that positive peer pressure can be a force for good and beneficial change in a youngster's life. Positive peer pressure occurs when someone's peers try to influence him or her to do something positive or uplifting or proactive or growth-building which affects his or her behavior and attitude for the better. According to Hardcastle (2002), peer pressure is something everybody has to deal with at some time in one's life. How successful one handles peer pressure depends to a greater extent on the individual's self-concept and position in the world (Okorie, 2014). Ryan, (2000) also defined peer pressure as when people of one's age encourages or urges one to do something or to keep off from doing something else, irrespective of the person's desire to or not to (Uche, 2010).

2.3.7 Perceived Parents Motivation in Mathematics

Thompson and Thornton (2002) found that when students are intrinsically motivated they are eager to learn. They argue that, "Students' interest in what they learn, and their sense of enjoyment while learning, are highly correlated with the outcomes of learning". Motivation enhances cognitive processing and can lead to improved performance (Ormrod, 2006). According to Wigfield *et al*., (2006) in a study on using Expectancy-Value Theory to explore aspects of motivation and engagement in Inquiry-Based learning in primary Mathematics, and observed from EVT perspective that, motivation is considered to be under the control of the individual and entails cognitive, conscious, and affective processes (Fielding-Wells *et al*, 2017).

According to Butakor & Dziwornu (2018), Okyerefo *et al*. (2011) observed that the home plays diverse roles in the facilitation of academic performance of students' at school. The main role is played by parents, with support from other significant household members such as siblings, uncles, aunts among others. Different parenting

styles lead to various means of interaction with children, each of which forms an important component in shaping the child's worldviews. For example, some studies have shown that parents spend less time with their children between the ages of six and ten years because they are then normally at school.

Another critical aspect of the home environment is socio-economic status which is most commonly determined by a combination of factors such as; parents' education level, occupation and income level (Jeynes, 2002). Unsurprisingly, in most studies on the academic performance of students' socio-economic status is identified as a major indicator of academic performance. For instance, parents who provide materials such as Mathematics textbook and employ after- school strategies such as engaging their children after school to study Mathematics tends to perform better in Mathematics (Stipek *et al.*, 2017). Burt (2017) pointed out that most parents show negative attitudes towards Mathematics education and some parents have weak Mathematics background and this has made it impossible to help their children in the home. This is affirmed by Maloney *et al* (2015) who found that parents with high levels of Mathematics anxiety trigger their children to develop Mathematics anxiety, including teachers' with high Mathematics anxiousness (Markovits, 2011; Ramirez *et al*, 2018). According to Sattin-Bajaj *et al*., (2018) the occupation of parents also has effects on the academic performance of students'. Students' from well resource families are more likely to register in schools early and are given the best in terms of educational needs. But students' from less deprived homes are faced with a lot of difficulty such as inability to pay school fees, exercise books, and inadequate textbooks, uniform, etc. All these emotionally depress the child and reduce the zeal to perform well in academics (Butakor & Dziwornu 2018).

Schiller *et al*. (2002) also argued that parents who have more education appear better able to provide their children with the academic and social support important for educational success when compared to parents with less educated. This means that parents who fail to provide academic and social support for their children puts their wards in difficult situation resulting in their inability to perform better. The number of siblings that a pupil has is assumed to have an influence on his or her academic achievement (Askhia, 2010). The larger the family size the less the attention and devotion from parents to the child and the more the difficulties encountered by the parents in meeting the needs of the children both physically and emotionally particularly in this austerity period when the prices of food and commodities are skyrocketing (Askhia, 2010).

According to Dampson & Dominic (2010) the unrelenting parental courage and determination to persevere despite all odds has a ripple effect on children's attitudes toward education and a challenge. A study conducted by Etsey (2005) revealed that the inability of parents to provide the basic needs of students'; attend Parent Teacher Association (PTA) meetings and interact with their children's teachers among others are some of the causes of low academic performance of some public schools in Ghana. Inability to provide basic school needs like textbooks, supplementary readers, food to eat when coming to school, and school uniforms among others, have ripple effects on the child's performance (Butakor & Dziwornu, 2018).

As far as parents are concerned, Mutodi and Ngirande, (2014) confirmed that students', who accredited their success to their interest, self-confidence, as well as family background, have a chance to come up with higher achievements than those who point their academic success to chance and natural talent. Indeed, Haque & Farhana, (2017) and Makeo (2013) have investigated and found out that parents'

perception of Mathematics has bearing on their children's perception, and hence influence their performance. According to Schoenfeld, (1989) there is no contradiction between Mathematics that takes place in the classroom compared to that one that takes place outside the classroom (Rahman *et al* 2012).

2.3.8 Perceived Cultural Beliefs in Mathematics

Women in Ghana are generally perceived as second to men hence are always given certain treatments which are purported to commensurate with their perceived status in the society. In the traditional Ghanaian home, when there is a boy and a girl, preference in most cases is given to the boy in the area of education neglecting the girl (Sekyere 2009). According to Apusigah, (2002) cited in Rubio (2018) on factors that impact girls' education in Ghana-the role of cultural mind-set mentions that people within the community do not see the importance of female education since a girl is expected to manage the house as a wife. She further observed in interviews conducted as part of her research with some families, and found extreme negative perception of fathers not to send their daughters to school because they believe that girls are not part of the family in the same way as boys; their daughters will not stay permanently in the family because they will get married and live in the husband's parents' house, so investing in their education is a waste of money. Other parents mentioned that they preferred daughters to stay at home because it was the best way for young girls' to not get spoilt and to respect the traditional rules of the community. Apusigah went further to say that, "Parents can even withdraw a girl from primary school to marry. Even if a girl is trying to "push" herself through they will never help with fees and other things because they want the girl to get married". And this predominantly found in the northern part of Ghana.

Salm & Falola, (2002) also observed that children's role varies according to their gender. Boys are more required for agriculture jobs, while girls' perform domestic chores. They further observed that, there are not any legal barriers that impede girls' to attend school, although many girls' in secondary school are forced to drop out because they have multiple duties and responsibilities at home. Before going to school, a young girl has to perform many domestic activities and help her younger brothers and sisters. After school, girls' have to cook, wash dishes, and perform any domestic activities. Because of this, girls' do not have enough time to dedicate themselves to study or do homework. In contrast, boys do not have many activities and they are allowed to play. Parents argue that girls' must know how to manage a house, because they must get a husband and have children; at the same time, their help is needed at home. Many parents reject sending their daughters to school because they believe if a woman is educated, no man will want to marry her (Rubio, 2018).

Pandey (2007) emphasized that, the barriers to girl`s participation in education are a maze of socio-cultural, economic and other realities that vary by community and even by family. When family choose which children will or will not be educated or which will have better educational opportunity, sons are preferred. Educating a son is investing in his ability to look after his aging parents while educating a daughter is considered a no-return investment. The study further suggests that, in parts of India, "A female must be dependent on her father in her childhood, in youth, with her husband and on her son later in life. A woman never seeks independence". The society truly runs under these dictums as women are never ever allowed to seek freedom. Boys are sent to school earlier, but as a rule girls' spent their time at homes learning the household chores (Bhattarai, 2015).

According to Rautta (2013) on factors influencing girls' performance in Mathematics and Science subjects in the Kenya Certificate of Secondary Education in Public Secondary Schools, affirms that, most of the factors that militate against the girl-child access to education are socio-cultural. The girl-child appears to be the most vulnerable and most undervalued member of the world society. The right to education, which is a fundamental human right, is frequently denied to girls' in some African countries. The then United Nations Secretary General, Kofi Annan, stated that in Africa, when families have to make a choice, due to limited resources of educating either a girl or a boy child, it is always the boy that is chosen to attend school, he also added his voice. In Africa, many girls' are prevented from getting the education entitled to them because families often send their daughters out to work at a young age, so that they can get the additional income they may need to exist beyond subsistence level, and finance the education of sons.

In Ethiopia, Rautta (2013) also observed that, girls' are sometimes abducted for marriage when they are no more than eight years. In West Africa, they are recruited from poor rural families to work as domestic servants in coastal cities or even neighbouring countries.

2.4.0 Theoretical Underpinnings (Framework)

According to Kivunja, (2018) a theoretical framework comprises the theories expressed by experts in the field into which you plan to research, which you draw upon to provide a theoretical coat hanger for your data analysis and interpretation of results. As Grant & Osanloo (2014) put it, "It is a blueprint that is often 'borrowed' by the researcher to build his/her own research inquiry" (Mensah *et al*, 2020). This means that, the theoretical framework serves as the foundation upon which a research

is constructed. This study will be guided by the *Atkinson's Expectancy-Value Theory (**EVT**).*

2.4.1 Expectancy-Value Theory (EVT)

Expectancy-value theory, a widely accepted model of motivation, posits that expectations of success on a learning task and the individual value placed on the task are central determinants of motivation to learning (Choi *et al*, 2010). Atkinson (1957) attempted to address two forms of behavior: why an individual chooses a certain path among others and what accounts for the vigor or persistence the individual applies to a task. Atkinson (1957) postulated that there are three variables that affect motivation: *motive*, *expectancy*, and *incentive* (Jones & Hite, 2020). Expanding on the groundwork of Atkinson, the EVT posits that *choice*, *persistence*, and *performance* are all linked to how well an individual believes they will perform and how they value the activity (Eccles & Wigfield, 2002; Wigfield & Eccles, 1992; Wigfield & Eccles, 2000). According to Eccles, (2009) and Wigfield & Eccles, (2000) choices made by students, then, are directly impacted by expectations of success and a subjective task value, both of which relate to a students' personal Mathematics identity (Jones & Hite, 2020).

EVT as a basic and integrated paradigm helps researchers and teachers to understand learners' motivations and behaviors, and it has proved to be very helpful in understanding cognitive processes used by learners, as well as their achievement. EVT can be viewed as a lens through which the aspects of motivation can be seen by Mathematics educators (Wang & Xue 2022). The application of the expectancy-value theory posits that students' achievement and their career choices are mostly determined by two factors; expectancies for success, and subjective task values (Sax, 2005).

2.4.2 Expectancies

Expectancies refer to how confident an individual is, in his or her ability to succeed in a task. Expectancies are concerned with an individual's prediction for achievement or beliefs about how well an individual will deal with a prospective task. As pointed out by Eccles and Wigfield (2002), expectancy for success serves as a contributor to driving performance, attempts, and perseverance regarding tasks. This type of expectancy is often assessed through questionnaires of self-efficacy or perceived ability (Wigfield *et al.*, 2006). According to Eccles *et al.* (1983), expectancies consist of one's perceived ability; perceived difficulty of a task, a mentality of expectations raised by others, attribution of causes, and locus of control. Indeed, ability and efficacy principles are sources in the expectancy model (Eccles and Wigfield, 2002). Ability self-concept was described as learners' mental judgment of the degree of their ability to accomplish the task, whereas perceived difficulty of tasks was characterized as learners' mental judgment of the difficulty involved in the successful completion of the task (Flake *et al*., 2015; Rosenzweig *et al.*, 2019). Leaners who enjoy a positive perception of their ability are convinced that they can be successful in learning Mathematics (because they had previous successful experience), whereas learners who perceive the task to be highly difficult deem their course to be challenging and hence the tendency to avoid Mathematics. Self-concept ability in combination with the perceived difficulty of the task is at play to answer the question "Can I do this task?", elicits an individual's beliefs about *competence, self-efficacy* and their *expectancies for success* (Schunk *et al.*, 2007).

2.4.3 Value

Value beliefs refer to the degree of importance and value placed by the learners on a task (Eccles et al., 1983; Meece et al., 1990). In order words, *values* refer to how significant, valuable, or pleasurable the individual perceives the task or reasons for doing the activity (Wigfield & Cambria, 2010). Values are shaped by a student's prior experiences, beliefs, and individual goals. Asking the question, "Do I want to do this task and why?", connects to individual students' values and interests, their perceived sense of control and autonomy over their environment, and the often influential role that individual values play in deploying energy and attention. A sense of control or autonomy can fuel one's connection to a task and therefore their choice to engage in a task (Grolnick *et al*, 2002). Values can be strongly predictive of the learning related choices that students' make (Eccles et al., 1998; Feather, 1992).

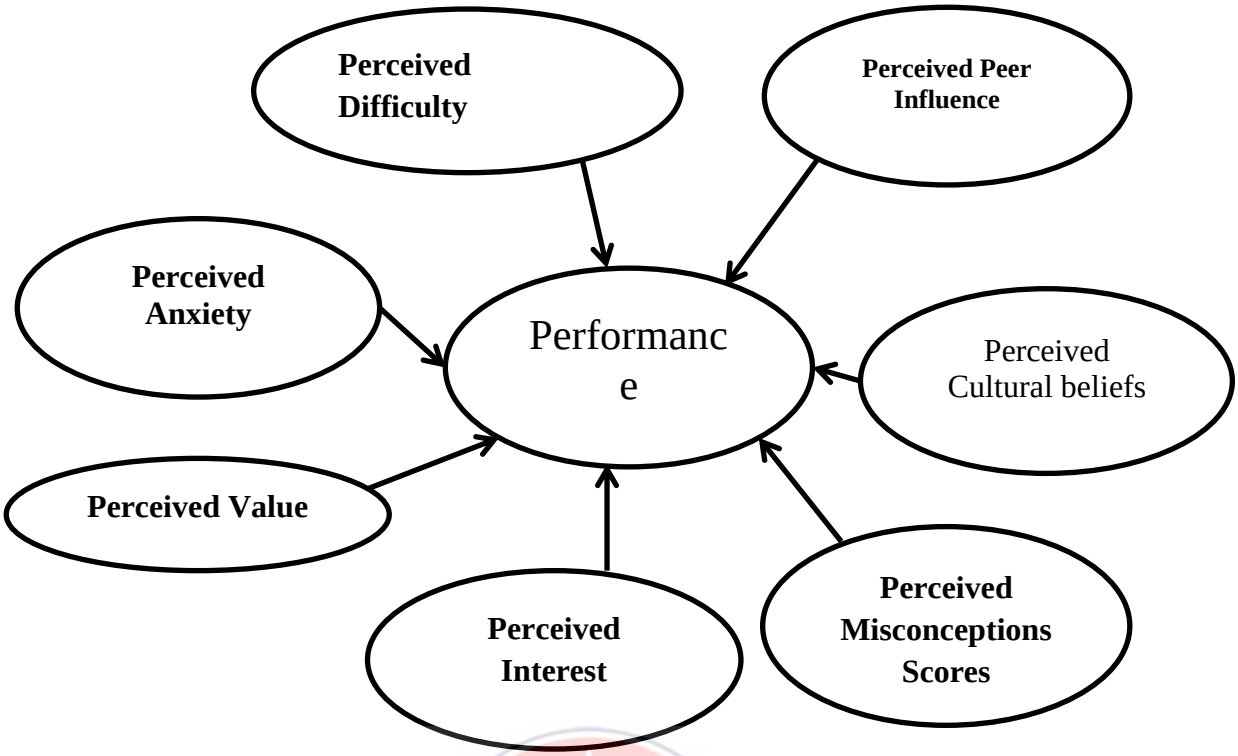
In view of the above, to ensure students' expectation for success, task difficulty must be scaled accurately so that the task is not so difficult that the students' believe that they will fail, nor so that the task is not so easy they will find little value in it. Raising the perceived value of academic activities involve creating a link between the activity and the student through personal interests, prior knowledge, proving the activity's utility, and/or showing the task's value. Therefore, Mathematics educators ought to structure Mathematics lesson in line with students' perceived cognitive and affective dimensions. Therefore, Expectancy-Value Theory (Eccles & Wigfield, 2002) provides a framework through which students' beliefs about their mathematical competency and their expectation of success, are able to be examined and interpreted, alongside students' perception of task value (Fielding-Wells *et al*, 2017).

According to Rosenzweig *et al.*, (2019) the expectancy-value theory is a useful framework through which one can understand how learners perceive themselves and their abilities, as well as how others see them. EVT was chosen as a validated model to understand how students' perceived Mathematics and the choices which influence the value and future participation in Mathematics activity. Moreover, this framework aimed to deal with learners' motivation, perseverance, and achievement.

2.5 Conceptual Framework

According to Ravitch & Riggan, (2017) in a study on distinguishing between theory, theoretical framework, and conceptual framework: A systematic review of lessons from the field, posit that, "A conceptual framework is the total, logical orientation and associations of anything and everything that forms the underlying thinking, structures, plans and practices and implementation of your entire research project". So, the conceptual framework comprises your thoughts on identification of the research topic, the problem to be investigated, the questions to be asked, the literature to be reviewed, the theories to be applied, the methodology you will use, the methods, procedures and instruments, the data analysis and interpretation of findings, recommendations and conclusions you will make (Kivunja 2018).

Using expectancy-value theory (EVT) as an interpretive framework, this paper reports on a descriptive and inferential statistics in a study conducted within Hohoe E. P. SHS, in the Hohoe Municipality, Volta Region of Ghana to illuminate factors that influenced students' perception and its effects on performance among girls' in Mathematics. EVT was chosen as a validated model to understand how students' perceived Mathematics and its influence regarding the value and expectancies in participating in Mathematics activity.



Determinants model of students' Perception
Source: Adapted, Ayot and Patel (1987)

2.6 Summary of Literature Review

The literature review considered perception as a concept in the context of Mathematics and academic performance. These were followed by some Mathematics perception determinants which include teacher factors, teacher teaching methods, school factors, Mathematics anxiety, students' attitudes, students' perceived self-confidence, and perceived misconceptions, perceived peer influence, parents' motivation, perceived cultural beliefs, and its effects on academic performance of students'.

In this study, the term Students' Mathematics perception was conceptualized as students' beliefs and emotions regarding their knowledge of Mathematics and their competence in learning Mathematics. It also includes how they view the subject and the way they respond to the learning process of the subject (Daud *et al* 2020). It can

also be referred to as a mental representation or view of Mathematics, apparently constructed as a result of social experiences, mediated through interactions at school, or the influence of parents, teachers, peers or mass media(Aguilar *et al*. 2012; Moreau, Mendick & Epstein, 2010). The aim of the study was to investigate the extent to which perception influence performance of girls' in the study of Mathematics at the SHS level.

Besides the above, the literature reviews also covered theoretical framework of the study which adopted Atkinson's Expectancy-Value Theory and finally, the chapter concluded on conceptual framework with an adapted model. This study will either agrees with some of the findings discussed in this chapter or reject them where necessary and make some suggestions for future research work.

CHAPTER 3

METHODOLOGY

3.0 Overview

This is the introduction of the chapter which describes the methodology that was used in the study. It outlines the systematic way in which the research problem was solved. It entails the research design, target population, sample and sampling techniques, research instruments and administration of instruments. The rest are validity and reliability of instruments, data collection, pilot study, data analysis and ethical considerations to investigate the factors that influence Senior High School girls' perception in the study of Mathematics and its effects on performance.

3.1 Research Design

Kombo and Tromp (2006) suggested that design is used to structure the research, to show how all the major parts of the research project work together to address central research questions. Orodho & Kombo (2002) defined research design as a scheme, outline or plan that is used to generate answers to research problems. According to Babbie, (2002) it constitutes the blue print for collection, measurement and analysis of data.

The study used mixed method approach with descriptive convergent parallel research design to investigate girls' perception in the study of Mathematics. Descriptive research looks at beliefs, points of views, or attitudes that are held by individuals or groups in order to describe, compare, classify, analyze and interpret the attribute (Fraenkel &Wallem, 2000). The purpose of the mixed method (quantitative and qualitative) approach was to provide a better understanding of the research problem or issue than either research approach alone (Creswell, 2008; Gay *et al*, 2012).

The study employed Convergent Parallel Design to collect data for the problem under investigation (Light *et al*., 2009). Demir & Pismek (2018), posits that, a convergent parallel design entails that the researcher concurrently collects the quantitative and qualitative data in the same phase of the research process, weighs the methods equally, analyzes the two components independently, and interprets the results together (Creswell & Pablo-Clark, 2011). The Purposes for the Convergent Design was to obtain a more complete understanding from two databases (Light *et al*., 2009).

3.2 Target Population

Mugenda and Mugenda (2003) described population as, the entire group of individuals or items under consideration in any field of inquiry and have a common attributes. The target population for the study was female students' in the Hohoe Municipality at the SHS level. However, the study focused on second and third year female students' of the Hohoe E. P. SHS. The rationale for the focus on the school is in two-folds. Firstly, the researcher, following a review of existing studies, found that studies about attitudes and perception of students' have been mostly carried out on students' in the Greater Accra, Central, Northern and Ashanti regions respectively. For this reason, the researcher finds it necessary to explore this research problem in different region and different school context. Again, the reason for selecting girls' for this study was as a result of the girls' conception of Mathematics in the school. The mantra is "Mathematics is difficult".

3.3 Sampling Procedure

Sampling is the procedure a researcher uses to gather people, places or objects to study (Kombo & Tromp, 2006). Sampling procedure is a process of selecting a number of individuals or objects from a population such that the selected group contains elements representative of the characteristics found in the entire population

(Orodho & Kombo, 2002). The researcher used purposive sampling technique to select second and third year female students' as the participants for the study. According to Etikan *et al*., (2016) purposive sampling technique is one in which the researcher deliberately chooses a participant due to the qualities possessed by the participant (Cofie, 2020). The use of this technique aided the researcher to identify and select proficient and well-informed students' abreast with the phenomenon of interest.

A convenient sampling technique was employed to select Hohoe E.P Senior High School for the study. This sampling technique was employed to select the school because the researcher was a teacher in the Hohoe E.P Senior High School. Therefore, the selection of the school enhanced proximity, accessibility and availability of students' for the study (Etikan *et al*., 2015). Again, this study was conducted by the researcher in familiar school to help solve real problem experienced in the school and contribute towards improving teaching and learning, and students' performance in the study of Mathematics.

Simple random sampling technique was adopted to select participants for data collection. According to Gravetter & Forzano (2011), the straightest forward, popular and purest method for drawing a sample among a large population is the use of simple random sampling (also referred to as random sampling). Furthermore, they described it as a sampling strategy where there is equal chance of selection for each member of the population to be part of the sample, eliminating bias in the selection procedure, hence resulting in representative samples (Cofie, 2020).

3.4 Sample Size

The study adopted Yamane, (1967) Statistical Formula for finding sample size of a finite population. This method is only applicable when the numerical strength of the population is known. The formula is:

$n = N / [1 + N (e)^{2}]$

Where; n = the sample size

N = the finite population

e = the level of significance or limit of tolerable error

1 = unit or a constant

Thus, the study population for the research was 1139, with a tolerable limit of error or the level of significance at 0.05. Using the above formula, the sample size for a study population of 1139 was approximately 296, which represents approximately 25.99% of the population. Statistical theory proves that in most types of populations where statistical sampling applies, the population size is only a minor consideration (Noordzig, *et al*., 2010). According to Oribhabor & Anyanwu, (2019), a sample can be defined as a group of relatively smaller number of people selected from a population for investigation purpose. An optimal sample is important for minimizing the cost of sampling error, thus indicating the need for selecting an appropriate sample size. Specifically, Salkind, (2010) emphasized that an appropriate sample size is necessary for any research because too small sample size is not a good representative of the population. Too small sample size may lead to committing Type I error, which is the probability of wrongly rejecting a particular finding when it in fact to be accepted (Sekaran, 2013). Furthermore, Sekaran (2013) argued that too large sample size is not appropriate because of possible problem of type II error, which is accepting a particular finding when it is supposed to be rejected.

3.5.0 Research Instruments

According to Salkind, (2010) research instruments are the tools or means by which researchers' measure variables or items of interest in their data collection process (Cofie, 2020).

The researcher used the following instruments for collecting data.

(i) Questionnaire

(ii) Interview schedule

(iii) Document analysis

These instruments were selected in this study based on the nature of research questions examined.

3.5.1 Questionnaire

According to Roopa & Rani (2012), "A questionnaire is a series of questions asked to individuals to obtain statistically useful information about a given topic or phenomenon". When properly constructed and responsibly administered, questionnaires become a vital instrument by which statements can be made about specific groups or people or entire population. They are a valuable method of collecting a wide range of information from a large number of individuals, often referred to as respondents.

The researcher used questionnaire based on five point Likert scale to identify girls' perception towards the study of Mathematics. More importantly, the researcher developed the questionnaire by modifying three set of questionnaire developed by Kunwar *et al*, (2021), Rubio (2018) and Arthur, Asiedu-Addo & Assuah, (2017). The Questionnaire comprised 35 items across seven dimensions (constructs). The students' were made to respond to the statement whether *they strongly agree (**SA**), agree (**A**), neutral (**N**), disagree (**D**) or strongly disagree (**SD**)*. The questionnaire

consisted of closed-ended items which demanded respondents to tick responses that best apply to them.

The common benefits of a questionnaire is that, it include uniformity of presentation of items to the respondents, the guarantee of anonymity for the respondents, the less time it takes to administer items (Fraenkel & Wallen, 2003; Muijs, 2004) and the most common data collection instrument used in educational research which is more familiar to respondents made it appropriate for this study which was time bound to use questionnaire as one of the instruments (Apawu, 2019). The questionnaire was made up of two sections as follows; Section A: *Demographic information of respondents*, and Section B: *perception constructs of respondents*. The perception constructs adopted for the study comprised of perceived peer influence, perceived cultural beliefs, perceived difficulty, perceived value, perceived interest, perceived misconceptions(myths) and perceived anxiety. The items on the questionnaire were positively and negatively worded in order to minimize participant gratifying responses.

3.5.2 Mathematics Achievement Test (MAT)

The dependent variable used in this study was girls' end of semester examination scores. Girls' end of semester examination scores can be said to be an educational outcome for a semester that measures the extent to which a student, teacher or an establishment has achieved their educational goals within that time frame. This was made possible through the assistance of the Head of Mathematics Department of the school. The results of the investigation helped the researcher to make the necessary predictions and recommendations to those whom it may concern as well as adding to the body of knowledge.

3.5.3 Interview

According to Easwaramoorthy & Zarinpoush, (2006) in a study on interviewing for research, explain interview as "A conversation for gathering information". A research interview involves an interviewer, who coordinates the process of the conversation and asks questions, and an interviewee, who responds to those questions. They went further to say that; interviews are an appropriate method when there is a need to collect in-depth information on people's opinions, thoughts, experiences, and feelings. The interview guide was structured around the research questions and the study constructs. There were nine (9) questions on the semi-structured interview protocol. Eight girls' were selected through simple random sampling technique to be interviewed to illicit information on girls' perception at the said school.

3.5.4 Document Analysis

Documentary analysis is the use of outside sources, documents, to support the viewpoint or argument of an academic work (Omari, 2011). This method consists of analyzing various types of documents including books, newspaper articles, academic journal articles, and institutional reports (Morgan, 2022). Any document containing text is a potential source for qualitative analysis (Patton, 2015).

Document analysis is often used in combination with other qualitative research methods as a means of triangulation which is, 'the combination of methodologies in the study of the same phenomenon' (Denzin, 2017). According to Rapley (2007), the importance of triangulation is to ensure reliability and validity of the data and results (Fusch, Fusch & Ness, 2018).

The researcher used WAEC results from 2018 to 2020 (Appendix C) released to the school to analyze the performance of girls' to produce meaning, gain understanding and develop empirical knowledge of girls' performance.

3.6 Data Collection Procedure

This refers to the gathering of information aimed at proving or refuting some facts (Kombo & Tromp, 2006). The researcher sorts a written approval from the University Graduate School, University of Education, Winneba, before embarking on the process. The researcher took copies of the permit to the relevant Offices and the Head of the School from where data was collected. The questionnaire for students' was administered to the students' by the researcher in their classrooms. The respondents were requested to fill the questionnaires and give them back to the researcher after filling. The interview was conducted by the researcher and important notes taken.

3.7 Pilot Study

According to Arain *et al*., (2010), a pilot study is a small feasibility study designed to test various aspects of the methods planned for a larger, more rigorous, or confirmatory investigation (Lowe, 2019). The primary purpose of a pilot study was not to answer specific research questions but to prevent researchers from launching a large-scale study without adequate knowledge of the methods proposed; in essence, a pilot study is conducted to prevent the occurrence of a fatal flaw in a study that is costly in time and money (Polit & Beck, 2017). In general researchers use pilot studies to evaluate the adequacy of their planned methods and procedures (Polit & Beck, 2017).

The pilot study was carried out to check the appropriateness of the language and to determine the complexity of the instruments used in the research (Teijlingen & Hundley, 2001). According to Calitz (2009) a pilot test of questions helps to identify unclear or ambiguous statements in the research protocol while Van Wijk & Harrison (2013) believe that pilot studies can add value and credibility to the entire research project (Apawu, 2019). This helped the researcher to update the research instruments

by making corrections and adjustments to them to enhance validity before the final administration. In this study, the instruments were piloted at Akwamuman SHS in the Asuogyaman in the Eastern Region of Ghana. Akwamuman SHS was selected because it is the researcher's new working station. It was done in the said school because students' were placed through GES Computerized School Selection and Placement System (CSSPS) and thus possesses same attributes or characteristics.

Prior to the piloting process, the researcher sought permission from the headmaster of Akwamuman SHS to conduct the pilot study in the school. The researcher sampled 49 second year female students' from the General Arts department of the school for the piloting. The questionnaire was given to the students' under the guidance of the researcher himself. The piloting was conducted using nine (9) perception constructs which was made up of forty-five (45) items of five (5) each under a construct or protocol using 5-point Likert scale. Data collected during the pilot study was not used in the final data analysis. After expert (Supervisor) advice, the constructs (variables) were reduced to seven (7) with five (5) items each making a total of thirty-five (35) items.

3.8 Validity and Reliability of the Instruments

According to Dikko (2016), "With every research design, instruments chosen for the collection of data must pass the tests of validity and reliability before they can be considered as good measures" (Apawu, 2019). The questions of reliability and validity are essential in any research as the credibility of a research study depends on the reliability of the data, methods of data collection and also on the validity of the findings (Cohen *et al*., 2007). The reliability of items is achieved when it consistently, and without bias, measure the concepts and constructs it is supposed to measure (Sekaran, 2003).

Fraenkel and Wallen (2003) cautioned that it is possible to design a questionnaire that is reliable because the responses are consistent, but may not be valid because it fails to measure the concept it intended to measure. Reliability and validity in educational researches help in achieving triangulation (the combination of methodologies in the study of the same phenomenon, Denzin, 2017) of data collection methods (Patton, 2015) and in this study, the methods of data collection were through questionnaire, interview and document analysis (Apawu, 2019).

According to Apawu (2019), validity of an instrument is the extent to which the items in an instrument measure what they are set out to measure, while reliability on the other hand, is the extent to which items in an instrument generate consistent responses over several trials with different respondents in the same setting or circumstance (Cohen *et al*., 2007; Fraenkel & Wallen, 2003; Gall, Gall, & Borg, 2003; Lecompte & Preissle, 1994). One way to guarantee that validity is achieved in any research is to conduct a pilot study of research instruments (Dikko, 2016).

According to Polit & Beck (2004), the most widely approach used in checking the internal consistency of a questionnaire is the calculation of the coefficient alpha or Cronbach's alpha (Apawu, 2019). Cronbach's alpha is mostly used when the research being carried out has multiple-items measuring a concept (Tavakol & Dennick, 2011). In this study, Cronbach's alpha (α) (or coefficient alpha) was used, based on the feedback of the pilot group, to measure the internal consistency and reliability of the questionnaire. Cronbach's alpha is interpreted as the percentage of variance an observed scale would explain the hypothetical true scale composed of all possible items in the universe (Apawu, 2019).

The researcher's supervisor (an expert) at the Department of Mathematics Education in the UEW evaluated the questionnaire items as well as the semi-structured interview questions for content and construct as well as face validity. A number of discussions took place regarding the questionnaire items and the semi-structured interview items, and based on his experts' advice, several changes were made to the questionnaire instrument. The 9 perception constructs or protocol was reduced to 7 making a total thirty-five (35) Likert scale question items.

Students' perception variables were identified from literature and a 5-point Likert scale was designed by the researcher. Responses to each of the items were rated with anchors labelled: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5= strongly agree. The reliability of the questionnaire were tested using the Cronbach Alpha coefficient and a coefficient of 0.917 was achieved, hence the reliability of the instrument can be accepted based on Cooper & Schindlers (2008) who argue that any coefficient above 0.70 implies reliability of the instrument. This indicated that the instruments were 91.7% reliable and therefore reliable and consistent to answer the research questions of the study.

3.9 Data Analysis

Kothari (2010) defines data analysis as the computation of measures along with searching for patterns of relationships that exist among the data groups. Analysis is a process of inspecting, cleaning, transforming, and modelling data with the goal of highlighting useful information, suggesting conclusions, and supporting decision making.

In order to analyze the data to be able to investigate the female students' perception in the study of Mathematics at the SHS level, both descriptive and inferential statistics were employed. The data gathered were organized and keyed into Statistical Package

for Social Science (SPSS) for statistical analysis. Descriptive statistics such as simple percentages, mean, standard deviation and frequency distribution charts were used in the analysis of data from the questionnaire to make meaning out of the data collected. The frequencies of the data were interpreted based on simple percentages and mean was interpreted based on the interpretation criteria provided by Andamon & Tan (2018) and Kunwar, (2021).

In addition to the questionnaire data, eight girls' were interviewed in detailed about their experiences in Mathematics to answer research question three through simple random sampling technique. An open-ended interview schedule was used, which was made up of nine (9) items. The purpose of the interview was to probe further the interviewees' responses on factors that influence students' perception in Mathematics and its effects on performance among girls'. In addition, to interprets the results together (Creswell & Pablo-Clark, 2011) for more complete understanding from the two databases for better judgment from the results (Light *et al*., 2009). The summary of the individual interview transcripts were condensed in finding answers to the research questions posed in this study.

The study began with descriptive statistical results from the measures of girls' perception constructs. The inferential statistic model adopted Ordinal Logistic Regression Analysis (OLR) to determine the extent to which perception affects performance among girls' in the study of Mathematics. In addition, Wilcoxon Signed Rank Test was also used to calculate the effect size of perception on performance. This was used to establish the impact of perception on performance.

3.10 Ethical Considerations

Ethical consideration is very important in research work as the integrity, reliability and validity of the research results are based on ethical principles underlying the study (Creswell, 2012). Creswell (2012) further argues that participant confidentiality is of greatest significance. Creswell mentions that, "The lives and experiences of participants should be told, but the individuals from which the research was gleaned must be concealed"(Kamal, 2021).

Ethical considerations in this study included confidentiality of information and names. The researcher gave credit to all the authors that were quoted in the study. Conclusions of the study were derived from the field and not from the researcher's best guesses, intolerances or judgement. Quality, integrity and honesty were the hallmark of this research work.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Overview

The chapter focuses on the presentation of the results in both qualitative and quantitative data gathered from the research instruments based on the research questions that guided the study. The results are presented in sections. The first section is the demographic information of the respondents, followed by descriptive approach on students' perception data. The next section includes students' perception mean scores distribution, female students' perception descriptive data analysis and perception mean scores of constructs. Descriptive data on female students' performance, empirical analysis of data, effects size and interview data, discussion of results and female experiences in mathematics were the last section of the chapter.

4.1.0 Demographic information

4.1.1 Response rate

Table 4.1.1 shows the response rate of the study. The table shows the number of respondents' of the questionnaire distributed and those properly filled and collected.

Table 4.1.1: Response rate

Questionnaire	Number	Percentage (%)
Properly Responded	296	92.5
Not Properly Responded	24	07.5
Total	**320**	**100**

Source: Field work

The total number of questions distributed was 320. However, 296 respondents' properly responded to the questionnaire instrument representing 92.5% response rate. This according to Mugenda and Mugenda (2003) is excellent for a study.

4.1.2 Level of participants

This section reports on the level of respondents' and the composition of number of the students' who took part in this study. The results are shown in Table 4.2.1 below.

Table 4.1.2: Level of the respondents'

Form	Frequency	Percentage (%)
Form Two	197	66.6
Form Three	99	33.4
Total	**296**	**100**

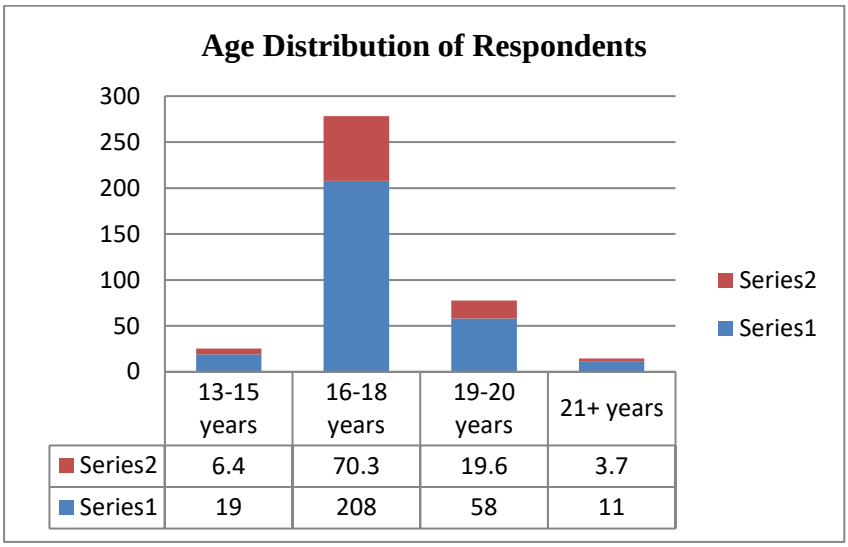
Source: Field work.

The respondents were sampled from two year groups; Forms Two and Three only. Higher numbers of the girls' were sampled from Form Two, 197 representing 66.6% as compared to Form Three 99 representing 33.4%. Second and third year students' were chosen because the students' had been in SHS for at least a period of one and a half years, and could provide a good account of their perception and interest in the study of Mathematics.

4.1.3 Age distribution of respondents

The majority of the respondents were aged between16-18 years, representing 70.3%, followed by 19-20 years 19.6% while 6.4% and 3.7% represented 13-15 and 21 plus years respectively.

Table 4.1.3: Age distribution of respondents



Source: Field Work

4.1.4 The school type and program

This section reports on the school type and the program of respondents'**.** The results are shown in the table below.

Table 4.1.4: The school type and program

School		Program							
Government	Co-education	Business		Home Economics		Visual Art		General Art	
		48	16.2%	115	38.9%	5	1.7%	128	43.2%

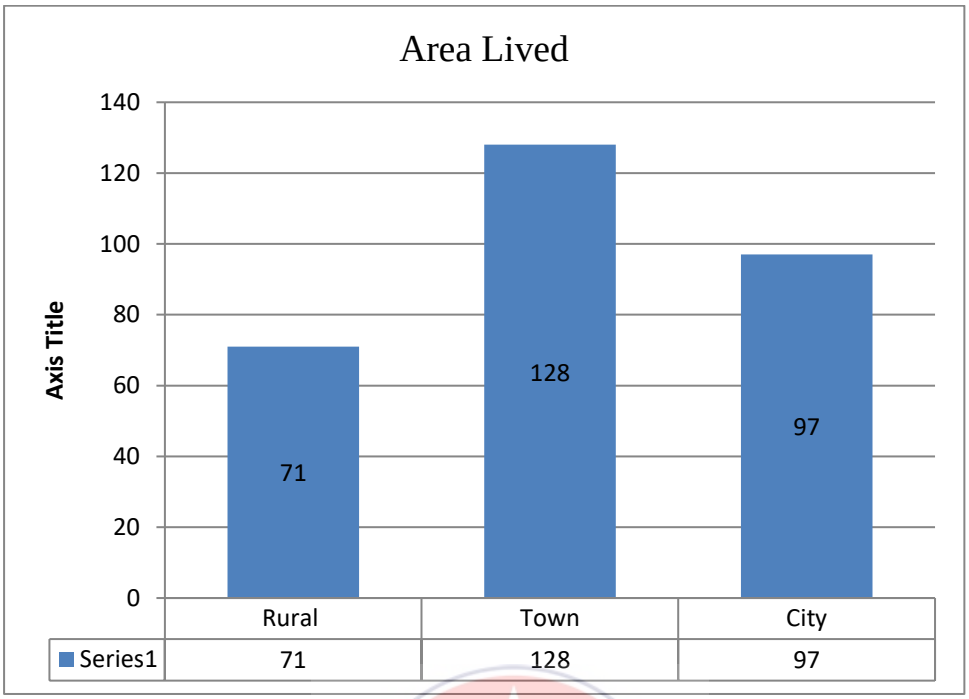
Source: Field Work.

The responds rate groupings were as follows: Business 16.2%, Home Economics 38.9%, Visual Arts 1.7% and General Arts 43.2%.

4.1.5 Area Lived by Respondents'

This section reports on the area lived by the respondents' who took part in this study and the kind of exposure or the experiences they brought into the study. The results are shown in the table below.

Table 4.1.5: Area Lived



Source: Field Work

The above output demonstrates girls' experiences brought into the study. 71 of the girls' were from rural environment representing 24%, 128 were from town environment representing 43.2% and 97 from city environment representing 32.8%.

4.2.0 Findings on female Students' Perception Towards Mathematics

This section presents data analysis and reports on the results obtained by descriptive approaches used in the data analysis to answer the research question guided the study. The section began with descriptive statistic on internal consistency of students' perception construct category, students' perception mean scores interpretation level, descriptive statistical analyses, mean perception scores of constructs and overall perception mean scores of the measures of students' perception in the study of Mathematics.

4.2.1 Internal Consistency of Perception

Reliability, which is whether an instrument can be interpreted consistently across different situations, was also considered since the credibility of a research study depends on the reliability of the data, methods of data collection and also on the validity of the findings (Cohen *et al*., 2007). According to Polit & Beck (2004), the most widely approach used in checking the internal consistency of a questionnaire is the calculation of the coefficient alpha or Cronbach's alpha (Apawu, 2019). Table 4.3.1; demonstrate the internal consistency of data collected for the study.

Table 4.2.1: Internal Consistency (reliability) of students' Perception

	Perception Category	**No. of Items**	**α- Value**
01	Perceived difficulty	5	0.927
02	Perceived anxiety	5	0.924
03	Perceived interest	5	0.945
04	Perceived peer influence	5	0.794
O5	Perceived misconceptions	5	0.936
06	Perceived cultural beliefs	5	0.883
07	Perceived value	5	0.761

Source: Field Work

As stated by Taber (2018), alpha value or the reliability coefficient of 0.70 can be considered as a sufficient measure of reliability or internal consistency of any instrument. This indicates that the perception constructs could be used without any doubt to investigate the girls' perception in Mathematics and its effects on performance.

4.3 Students Perception Mean Scores Distribution

To interpret the average scores of students' perception towards Mathematics of the participants, the *Students Perception Mean Scores Interpretation Level (*SPMSIL) was adopted and used to interpret the results of the descriptive statistics data on perception against performance (Kunwar, 2021). It shows the interpretation level of the mean scores of the girls' perception towards Mathematics adopted from Andamon & Tan (2018) and Kunwar (2021).

Table 4.3: Students Perception Mean Scores Interpretation Level

Rating	Range	Interpretation	Qualitative Description
1	1.00-1.49	Strongly Disagree	Very Poor (VP)
2	1.50-2.49	Disagree	Poor (P)
3	2.50-3.49	Neutral	Uncertain(U)
4	3.50-4.49	Agree	Good G)
5	4.50-5.00	Strongly Agree	Very Good (VG)

Source: adopted from Andamon & Tan (2018) and Kunwar, (2021).

4.4 Descriptive statistical analyses of female students' perception

This section presents data analysis and reports on the results obtained by descriptive statistics approach used in the data analyses to answer the research question guiding the study. To substantiate the effects of perception describing girls' opinion or feelings in the study of Mathematics; frequencies, percentages, mean and standard deviation were used. Thus to do this, the researcher adopted Students' Perception Mean Scores Interpretation Level(SPMSIL) by Andamon & Tan (2018), and Kunwar et al (2021) to determine the effects of perception on performance among girls' at the SHS level from Table 4.3.2.

The average value for each Likert item was calculated by summation of product of each coded value point by the number of respondents, divided by the total respondents. The mean of each construct was arrived at by summing up means of five Likert items and divided by five. These weighted means were contrasted with the SPMSIL adopted for the study. Table 4.3.3 presents the output of the girls' (respondents) responses on perception towards the study of Mathematics analyzed through the assistance of SPSS.

Table 4.4: Descriptive statistical output of female students' perception

Rating Scale: Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), Strongly Disagree (SD), Mean (M), Standard Deviation (σ).

	Perception construct items	SA (%)	A (%)	N (%)	D (%)	SD (%)	M	σ	Decision
	Perceived difficulty								
0	I do not think I can advance in Mathematics	44 (14.9)	104 (35.1)	17 (5.7)	80 (27)	51 (17.2)	3.03	1.38	U
02	Mathematics has been my worst subject	77 (26)	90 (30.4)	11 (3.7)	89 (30.1)	29 (9.8)	3.33	1.39	U
03	Everyone is capable of learning mathematics	89 (30.1)	92 (31.1)	10 (3.4)	77 (26)	28 (9.5)	3.46	1.39	U
04	Mathematics is difficult to understand	46 (15.5)	113 (38.2)	10 (3.4)	84 (28.4)	43 (14.5)	3.12	1.36	U
05	I perform poorly in Mathematics in class and end of term examinations no matter how hard I try.	77 (26)	94 (31.8)	9 (3)	93 (31.4)	23 (7.8)	3.37	1.36	U
	Students' Mathematics Anxiety								
06	I am always afraid during Mathematics lesson	55 (18.6)	104 (35.1)	7 (2.4)	85 (28.7)	45 (15.2)	3.13	1.41	U
07	Girls exhibit Mathematics nervousness than boys.	63 (21.3)	109 (36.8)	15 (5.1)	71 (24)	38 (12.8)	3.30	1.38	U
08	It is difficult to ask for explanation on concepts which have not been understood.	62 (20.9)	110 (37.2)	11 (3.7)	76 (25.7)	37 (12.5)	3.28	1.38	U
09	Thinking about upcoming mathematics test make me scared	83 (28)	93 (31.4)	9 (3)	80 (27)	31 (10.5)	3.40	1.41	U
10	I am afraid of mathematics related career choice Program	88 (29.7)	91 (30.7)	7 (2.4)	80 (27)	30 (10.1)	3.43	1.41	U
	Interest								
11	Mathematics learning is discouraging	40 (13.5)	121 (40.9)	13 (4.4)	76 (25.7)	46 (15.5)	3.11	1.35	U
12	I dislike mathematics because of my mathematics teacher	57 (19.3)	103 (34.8)	12 (4.1)	73 (24.7)	51 (17.2)	3.14	1.43	U
13	I practice a lot after Mathematics lessons.	56 (18.9)	114 (38.5)	6 (2)	104 (35.1)	16 (5.4)	3.30	1.27	U
14	I will like to pursue further studies in Mathematics.	75 (25.3)	98 (33.1)	6 (2)	83 (28)	34 (11.5)	3.33	1.41	U
15	Mathematics is my least favorite subject	50 (16.9)	118 (39.9)	11 (3.7)	94 (31.8)	23 (7.8)	3.26	1.28	U
	Peer influence								
16	I am discouraged by my peers in Mathematics.	49 (16.6)	114 (38.5)	12 (4.1)	70 (23.6)	51 (17.2)	3.14	1.40	U
17	I rely on friends for help with difficult problems.	75 (25.3)	152 (51.4)	11 (3.7)	36 (12.2)	22 (7.4)	3.75	1.18	G
18	I do not attend class regularly because of peer influence.	47 (15.9)	93 (31.4)	14 (4.5)	44 (14.9)	98 (33.1)	2.82	1.55	U

19	I get more understanding in Mathematics through my peers'	99 (33.4)	122 (41.2)	16 (5.4)	44 (14.9)	15 (5.1)	3.83	1.19	G	
20	I get more understanding during cooperate learning	110 (37.2)	138 (46.6)	13 (4.4)	28 (9.5)	7 (2.4)	4.07	1.00	G	
	Misconceptions									
21	Mathematics is only for the clever.	66 (22.3)	86 (29.1)	16 (5.4)	41 (13.9)	87 (29.4)	3.01	1.58		U
22	As a girl, I cannot succeed in Mathematics careers'	71 (24)	72 (24.3)	20 (6.8)	42 (14.2)	91 (30.7)	2.97	1.61		U
23	It is hard to believe female to be genius in Mathematics	59 (19.9)	103 (34.8)	18 (6.1)	43 (14.5)	73 (24.7)	3.11	1.51		U
24	Mathematics has no practical connection with every day's life.	74 (25)	77 (26)	9 (3)	59 (19.9)	77 (26)	3.04	1.58		U
25	Males are naturally better than females in Mathematics	89 (30.1)	85 (28.7)	17 (5.7)	41 (13.9)	64 (21.6)	3.32	1.54		U
	Cultural beliefs									
26	My Mathematics achievement depends largely on male counterpart assistance.	40 (13.5)	102 (34.5)	12 (4.1)	109 (36.8)	33 (11.1)	3.02	1.31	U	
27	At home they always say Mathematics is for male and not female.	28 (9.5)	87 (29.4)	7 (2.4)	103 (34.8)	71 (24)	2.66	1.37	U	
28	I am mostly undervalued in Mathematics at home	37 (12.5)	93 (31.4)	25 (8.4)	96 (32.4)	45 (15.2)	2.94	1.32	U	
29	My house chores affect my Mathematics practice at home.	39 (13.2)	91 (30.7)	16 (5.4)	101 (34.1)	49 (16.6)	2.9	1.35	U	
30	Preferences are given to boys in terms of schooling	44 (14.9)	85 (28.7)	17 (5.7)	95 (32.1)	55 (18.6)	2.89	1.39	U	
	Value									
31	Mathematics is a worthwhile and necessary subject	166 (56.1)	87 (29.4)	9 (3)	25 (8.4)	9 (3)	4.27	1.07	G	
32	Mathematics is practical in everyday life	191 (64.5)	64 (21.6)	13 (4.4)	24 (8.1)	4 (1.4)	4.4	0.99	G	
33	Mathematics is irrelevant in my career choice	57 (19.3)	138 (46.6)	21 (7.1)	43 (14.5)	37 (12.5)	3.46	1.30	U	
34	Mathematics is relevant in other fields of study	127 (42.9)	124 (41.9)	9 (3)	25 (8.4)	11 (3.7)	4.12	1.06	G	
35	Studying Mathematics is waste of time	40 (13.5)	129 (43.6)	22 (7.4)	21 (7.1)	84 (28.4)	3.07	1.48	U	

Source: Adopted, Arthur, Asiedu-Addo & Assuah (2017); Kunwar *et al* (2021).

Table 4.4 above presents data analysis and reports on the results obtained by descriptive approach used in the data analysis. The table represents the output of the descriptive statistical results from the measures of students' perception, which was

computed through the assistance of Statistical Package of the Social Sciences (SPSS). The paragraphs below present the results:

The study found out whether girls' could advance in Mathematics at the highest level. The study established 50% of the total respondents agreed cumulatively that, they could not advance in Mathematics. However, 44.2% of the total participants cumulatively disagreed they can advance in Mathematics from SHS level whilst 5.7% remained neutral. This led to girls' average rating of 3.03 and a standard deviation of 1.33.

The study also investigated whether Mathematics has been respondents' worst subject. The output of the study concluded that 56.4% of the participants cumulatively agreed with the statement, "Mathematics has been my worst subject", and 39.9% of the total respondents cumulatively disagreed. 3.7% of the respondents stayed neutral with an average rating of 3.33 and a standard deviation of 1.39.

The study sought to find out from respondents whether everyone is capable of learning Mathematics. The result established 61.2% of the total respondents agreeing cumulatively that, everyone is capable of learning Mathematics with 35.5% of the respondents' cumulatively disagreed. However, 3.4% of the respondents could not decide for or against and led to average rating of 3.46 and standard deviation of 1.39.

The study investigated on the perception held by girls' on whether Mathematics is difficult to understand. 53.7% of the respondents' cumulatively agreed to the assertion that Mathematics is difficult to understand with 42.9% cumulatively dissenting. The study also established that 3.4% of the respondents remained neutral and led to an average rating of 3.12 and a standard deviation of 1.36.

The study examined whether respondents perform poorly in Mathematics in class and end of semester examinations no matter how hard they try. The study cumulatively found 57.8% of the total participants agreeing with the statement that, "I perform poorly in Mathematics in class and end of term examinations no matter how hard I try", conversely 39.2% of the total participants were cumulatively found to disagree with the statement. 3.0% of the respondents remained neutral and gave an average rating 3.37 and standard deviation of 1.36.

The study found out whether respondents are afraid during Mathematics lesson. The study found that 53.7% of the total participants cumulatively agreeing with the statement that, "I am always afraid during Mathematics lesson" with 43.9% of the participants found cumulatively to disagree with the statement. 2.4% of respondents' remained neutral. The study found an average response of the girls' to be 3.13 with standard deviation of 1.41.

The study also examined the perception that girls' exhibit nervousness than boys during Mathematics class. 'The study revealed 58.1% of the participants cumulatively agreed with the statement that, "Girls exhibit Mathematics nervousness than boys.", but 36.8% of the total respondents cumulatively disagreed. The total respondents who stayed neutral stood at 5.1%. However, the study found the average response of the participants to be 3.30 with standard deviation of 1.38 perception.

The study investigated as whether the girls' finds it difficult to ask for explanation on concepts which have not been understood. The study found 58.1% of the total participants to cumulatively agree with the statement that, "It is difficult to ask for explanation on concepts which have not been understood", conversely 38.2% of the total participants were found to disagree with the statement. 3.7% of the respondents

remained neutral and led to an average rating 3.28 and standard deviation of 1.38 perception inventory.

The study also investigated the perception about the respondents' feelings about upcoming test and its effects on them. The investigation established 59.4% of the respondents (girls) were found to agree cumulatively with the fact that, "Thinking about upcoming Mathematics test make them scared" while 37.5% of the respondents were found to disagree with aforementioned statement cumulatively. The study also found 3.0% of the total participants were without decision as to whether upcoming test make them scared and gave an average rating of 3.40 and a standard deviation of 1.41 of perception inventory.

The perception that, students are afraid of Mathematics related career program was also investigated with reference to the impact it has on their performance in Mathematics. The study found that 60.4% of the total participants were found to agree with the statement that, "I am afraid of Mathematics related career choice program" of students' perception, conversely, 37.1% of the total participants were found to disagree with the fact that, they are not afraid of any Mathematics related career choice. However, 2.4% of the respondents remained neutral and led to an average rating of 3.43 and standard deviation of 1.41.

The study investigated the students' perception that Mathematics is discouraging and how this perception affects students' performance in Mathematics. The study found 54.4% of the total participants agreed to the statement that learning Mathematics is discouraging while 41.2% of the total participants disagreed with the statement. 4.4% of the respondents' remained neutral and led to an average rating 3.11 and 1.35 standard deviation of perception.

The perception that students dislike Mathematics because of their Mathematics teacher was also examined. The study established that, 54.1% of the respondents' were found to agree cumulatively with the statement that, "I dislike Mathematics because of my Mathematics teacher" with 41.9% of the respondents' cumulatively disagreed to the statement aforementioned. The study also found 4.1% of the total respondents were without decision as to whether female students' dislike Mathematics because of their Mathematics teacher, and led to an average rating of 3.14 and standard deviation of 1.43 perception inventory.

The study also found out whether students' practice after Mathematics lessons. The study established that, 57.4% of the total respondents agreed cumulatively that, they practice after Mathematics lessons. However, 40.5% of the total participants cumulatively disagreed to the fact that they do not practice after Mathematics lessons whilst 2.0% remained neutral. The study also gave respondents' average rating of 3.30 and a standard deviation of 1.41 of perception inventory.

The study investigated whether respondents' have any intention of further studies in any Mathematics related program. The investigation established 58.4% of the female students' cumulatively agreed with the statement that, "I will like to pursue further studies in Mathematics", while 39.5% of the respondents were found cumulatively to disagree with aforementioned statement. The study also found 2.0% of the total participants were without decision as to whether they have any intentions to pursue further studies in Mathematics, and an average rating of 3.3 and a standard deviation of 1.41 of perception inventory.

The perception that Mathematics was the least favorite subject of female students' was also examined. The study established that, 56.8% of female students' cumulatively found to agree with the statement that, "Mathematics is my least favorite

subject" whilst 39.6% were cumulatively found to disagree with the statement aforementioned. The study also found 3.7% of the female students' remained neutral to the statement and led to an average rating 3.26 and standard deviation 1.28 perception inventories.

The study further investigated the perception that students' are discouraged by their peers in the study of Mathematics. The investigation established that, 55.1% of the female students' cumulatively found to agree that peers discouraged them in Mathematics whilst 40.8% of the female students' cumulatively disagreed with the statement that, "I am discouraged by my peers in Mathematics" and led to an average and standard deviation of 3.14 and 1.40 respectively. However, 4.1% of the respondents remained neutral.

The study also investigated whether respondents rely on peers for help when faced with difficult problems. The study established that, 76.9% of female students' agreed cumulatively that, they rely on peers for help when faced with difficult problems, but 19.6% of the girls' cumulatively disagreed that they do not rely on peers for help when faced with challenging problems. However, 3.7% of the total participants remained neutral. The study also found the respondents average rating of 3.75 and a standard deviation of 1.19.

The study also examined truancy as a result of peer influence and its effects on Mathematics performance of female students'. The study established that, 43.9% of the total respondents agreed cumulatively that, they do not attend class regularly because of peer influence while 51.3% of the respondents cumulatively were found to disagree with the statement that, "I do not attend class regularly because of peer influence", and led to an average and standard deviation of 2.72 and 1.52 respectively

of perception. However, 4.7% of the respondents' remained neutral to the statement aforementioned.

The study investigated whether students' comprehend concepts through their peers' assistance. The study revealed that 74.6% of the girls' cumulatively agreed with the statement that, "I get more understanding in Mathematics through my peers", but 20.0% of the female students' cumulatively disagreed. The total respondents who stayed neutral stood at 5.4%. However, the study found the average response of the girls' to be 3.83 with standard deviation of 1.19 perception inventory.

The study further investigated on the effectiveness of cooperate learning in Mathematics. The study established that, 83.8% of the girls' agreed cumulatively to the statement that, "I get more understanding during cooperate learning" while 11.9% of the girls' cumulatively were found to disagree with the statement aforementioned with 4.4% of the respondents' remained neutral to the statement. However an average and standard deviation of 4.07 and 1.003 respectively of perception inventory was obtained.

The study further investigated the perception that only clever students' can perform well in Mathematics and found that 50.4% of the female students' cumulatively agreed to the assertion that, "Mathematics is only for clever" while 43.2% of the total females were found to disagree. The study however found 5.4% of the girls' to neither agree nor disagree to the statement with mean and standard deviation of 3.01 and 1.58 perception respectively.

The study also investigated the students' perception that girls' cannot succeed in Mathematics careers and how it affects students' performance in Mathematics. The study found 48.3% of the female students' cumulatively agreed to the view that, girls'

cannot succeed in Mathematics careers; however, this was disagreed by 44.9% of the girls' in the study of Mathematics. The study also found 6.8% of the total girls' remained neutral. The study found 2.97 and 1.61 average and standard deviation respectively perception inventory of female students'.

The study also examined the perception that, "It is hard to believe female to be genius in Mathematics" and how it affects performance in the study of Mathematics. The study established 54.7% of the girls' agreed cumulatively with the statement that, "It is hard to believe female to be genius in Mathematics", but 39.2% of the girls' cumulatively disagreed with the statement aforementioned. However, 6.1% of the total girls' remained neutral to the perception inventory mentioned. The study also found the respondents average rating of 3.11 and a standard deviation of 1.51.

The study examined the perception that, "Mathematics has no practical connection with everyday life" and how it affects students' performance in the study of Mathematics. The study found that 51.0% of the girls' agreed with the views that, "Mathematics has no practical connection with everyday life", however, this was disagreed by 45.9% of the girls' that, Mathematics has practical connection with every day's life. The study also found 3.0% of the girls' remained neutral to whether Mathematics has no practical connection with everyday life. The study found the statement, "Mathematics has no practical connection with every day's life" as variable of mean 3.04 and standard deviation of 1.58 perception.

The study further investigated the perception that males are naturally better than females in Mathematics and found that 58.8% of the girls' agreed cumulatively that, males are naturally better than females in the learning of Mathematics, while 35.5% of the girls' were found to disagree with the statement mentioned above. The study

however found 5.7% of the girls' neither agree nor disagree to the statement and gave mean and standard deviation of 3.32 and 1.55 perception respectively.

The study also investigated perceived cultural belief that females achievements in Mathematics largely depends on male counterparts' assistance. The study established 48% of the girls' agreed cumulatively that, "My Mathematics achievement depends largely on male counterpart assistance", but 47.9% of the girls' cumulatively disagreed with the statement aforementioned. However, 4.1% of the girls' remained neutral to the perception inventory mentioned. The study also found the girls' average rating of 3.02 and a standard deviation of 1.37 perception inventory.

The study examined the perception about Mathematics at home where the male child is encouraged at the expense of the female child. The study established 38.9% of the girls' agreed cumulatively with the statement that, "At home they always say Mathematics is for male and not female", but 58.8% of the respondents' cumulatively disagreed with the statement aforementioned. However, 2.4% of the girls' remained neutral to the perception inventory mentioned. The study also found the girls' average rating of 2.66 and a standard deviation of 1.37 of perception.

The study also investigated the perception of females being undervalued at home in Mathematics efficacies and it bearing on performance. The study established that, 43.9% of the female students' cumulatively agreed to the statement "I am mostly undervalued in Mathematics at home" while 47.6% of the girls' cumulatively were found to disagree with the statement aforementioned. However, 8.4% of the total respondents stayed neutral to the perception inventory mentioned. The study also found the girls' average rating of 2.94 and a standard deviation of 1.32 of perception.

The study investigated the perception of household's chores effects on females practice after Mathematics lessons at home. The study established 43.9% of the girls' were found to agree cumulatively to the statement that, "My house chores affect my Mathematics practice at home". However, 50.7% of the girls' cumulatively disagreed to the fact that household's chores do not affect their revision at home whilst 5.4% remained neutral. The study also found the respondents average rating of 2.90 and a standard deviation of 1.35 of perception.

The study also examined the perception that preferences are given to boys in terms of schooling than girls'. The study found that 43.6% of the female students' agreed with the statement that, "Preferences are given to boys in terms of schooling". However, this was disagreed by 50.7% of the girls' that, "Preferences are given to boys in terms of schooling". The study also found 5.7% of the girls' remained neutral as to whether preferences are given to boys than girls' in terms of schooling. The study found the average rating of 2.89 and standard deviation of 1.39 of perception.

Besides the above, the worth of Mathematics was also examined whether it worth being studied as a subject. The study established 85.5% of the girls' to agree cumulatively with the statement that, "Mathematics is a worthwhile and necessary subject", but 11.4% of the girls' cumulatively disagreed with the statement aforementioned. However, 3.0% of the girls' remained neutral to the perception inventory mentioned. The study also found the girls' average rating of 4.27 and a standard deviation of 1.07 of perception.

The study investigated the perception that Mathematics is practical in everyday life. The study found 86.1% of the girls' to agree to the fact that, Mathematics is practical in everyday life while 9.5% of the girls' were found to disagree with the assertion that

Mathematics is practical in everyday life. The study however found 4.4% of the girls' neither agree nor disagree to the statement and led to mean and standard deviation of 4.4 and 0.99 perception inventory respectively.

Study also examined the perception as to whether or not Mathematics is irrelevant in their career choice. The study found 65.9% of the girls' cumulatively agreed with the view that, Mathematics is irrelevant in their career choice; however, this was disagreed by 27.0% of the girls' cumulatively that, Mathematics is relevant in their career choice. The study also found 7.1% of the girls' remained neutral as to whether Mathematics is irrelevant in their career choice or not. The study found the statement, "Mathematics is irrelevant in my career choice" average rating 3.46 and standard deviation of 1.30 perception inventory.

The study investigated the perception whether Mathematics is relevant in other fields of studies. The study found 84.8% of the girls' cumulatively agreed with the statement that, "Mathematics is relevant in other fields of study"; however, this was cumulatively disagreed by 12.1% of the girls' that, Mathematics is irrelevant in other fields of study. The study also found 3.0% of the girls' remained neutral to the claim that Mathematics is relevant in other fields of study. The study also established an average rating of 4.12 and standard deviation of 1.06 of perception.

The study also investigated the perception that studying Mathematics is waste of time. The study found 57.1% of the girls' cumulatively agreed to the statement that, "Studying Mathematics is waste of time", while 35.5% of the respondents' cumulatively were found to disagree to the statement that, "Studying Mathematics is waste of time". The study however found 7.4% of the girls' remained neutral to the

statement, and with mean and standard deviation of 3.07 and 1.48 perception respectively.

4.5 Perception Mean Scores of Constructs

In order to make decision of the descriptive statistics output, seven (7) perception constructs were formed from the 35 Likert scale questionnaire. Each construct was formed out of five (5) Likert items ranging from Strongly Agree(5), Agree(4), Neutral(3), Disagree(2) and Strongly Disagree(1). The constructs consisted of perceived difficulty, perceived anxiety, perceived interest, perceived peer influence, perceived misconceptions, perceived cultural beliefs and perceived value (usefulness). The frequencies of the data were interpreted based on simple percentages and mean was interpreted based on the interpretation criteria provided by Andamon & Tan (2018) and Kunwar, (2021). The table below presents the results:

	M	**σ**	**Decision**
Difficulty	3.47	0.83	**U**
Anxiety	3.21	1.10	U
Interest	3.47	0.90	U
Peer Influence	3.53	0.62	G
Misconceptions	3.03	0.94	U
Cultural Beliefs	2.55	1.02	U
Value	3.65	0.78	G
Overall Perception	3.36	0.86	U

Source: fieldwork

As presented in Table 4.5, the mean scores of the female students' perception on each statement as well as the seven (7) perception constructs of the girls' towards mathematics have been compared to the mean score interpretation in Table 4.5. The mean scores of the girls' on seven (7) aspects of perception such as perceived difficulty (3.47), perceived anxiety (3.21), perceived interest (3.47), perceived peer influence (3.53), perceived misconceptions (3.03), perceived cultural beliefs (2.55) and perceived value (3.65), shows that all aspects of the female students' perception except perceived peer influence and value lie within uncertain level of students perception (2.50-3.49). This implies majority of the female students' opinion suggest no decision.

However, the mean scores of perceived peer influence (3.53) and perceived value (3.65) lies on the good level of students' perception (3.50-4.49). This also suggest that, the response of the female students' towards the study of mathematics on perceived peer influence and perceived value were found high or positive perception towards mathematics.

Furthermore, the overall perception average of female students' lies within the range (2.50-3.49) which implies uncertain. Therefore, the descriptive data analysis appear to suggest that majority of the girls' neither agree nor disagree that perception influence performance in the study of Mathematics. This signifies that no decision was made regarding the descriptive output of girls' perception or opinion. And this calls for inferential statistics to form opinion about the study.

4.6 Descriptive Data on Female Students' Mathematics Performance

The descriptive statistical results from the measures of students performance from end of semester examination scores shows mean and standard deviation of 29.92 and 10.62 respectively.

Table 4.6: Descriptive Statistics of Test Scores on Performance

Parameter		Test Scores
N		296
Mean		29.92
Median		29.0
Mode		28.0
Standard Deviation		10.62
Range		49
Minimum		10
Maximum		59
Percentiles	**25**	22.0
	50	29.0
	75	37.0

Source: Field Work.

From the Table 4.6, the 25th, 50th and 75th percentiles of female students' performance were 22.0%, 29.0% and 37.0% respectively. The 25th percentile, also known as 1st quartile indicates that 25% of the respondents scored approximately below 22.0% marks, whiles 50th and 75th percentiles also known as the 2nd and 3rd quartiles indicate that 50% and 75% of the respondents performed approximately less than 29.0% and 37.0% marks respectively. The average score of students' shows low performance scores towards Mathematics.

4.7.0 Empirical Analysis of Data

4.7.1 Ordinal Logistic Regression (OLR) Analysis

To generalize the results from the sample chosen from the population given p-value below 0.05, an ordinal logistic regression modeling technique was used to identify the extent to which perception influence performance of female students' at Hohoe E. P. SHS. In the context of ordinal logistic regression, ordinal means order of the categories. The ordinal logistic regression is, therefore, a regression technique used

when the dependent variable is measured at the ordinal level, given one or more explanatory variables, which could be ordinal, continuous or categorical (Sesay *et al* 2021). It was used to assess the impact of (ascertain the level) of perception on performance of female students' in the study of Mathematics. Thus, logistic regression can be used to estimate the probability of the occurrence of attributes or characteristics in a given phenomenon. Under Ordinal Logistic Regression Analysis modeling technique, we can deal with Model Fitting Information, Pseudo R-Square, Parameter Estimates and Test of parallel lines.

4.7.2 Assumptions of Ordinal Logistic Regression

The following are the main assumptions that the ordinal logistic regression makes about the underlying data:

- The dependent variable is ordinal.
- One or more of the explanatory variables are continuous, categorical or ordinal.
- No multi-collinearity.
- The odds are proportional (parallel lines assumption): This means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable. The parallel line assumption implies that, there is one regression equation for each category except the last category (Sesay *et al* 2021).

4.7.3 Predictive value of the model

Table 4.4.3 shows the Model fitting information. The logistic regression analysis was performed to examine the influence of perceived difficulty, perceived anxiety, perceived interest, perceived peer influence, perceived misconceptions, perceived cultural beliefs and perceived usefulness (Value) on the dependent variable

"Performance" to predict the effects of perception on performance in the study of Mathematics. The table below shows the result of the model-fitting information.

Table 4.7.3: Model-fitting information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept only	485.358			
Final	444.379	40.979	8	0.000

Source: Field Work

Chi-Square–This is the Likelihood Ratio (LR) Chi-Square test. It tests whether at least one of the predictors' regression coefficients is not equal to zero in the model. This indicates the degrees of freedom of the Chi-Square distribution used to test the LR Chi-Square statistic and is defined by the number of predictors in the model (Bruin, 2006). The significant Chi-Square [$X^2(8)=40.979$, $p(0.000)<0.05$, $n=296$] model-fitting information means that there is association between perception and performance based on the statistical significance of the final model with p-value less than 0.05. The significant level of the output improves ability to predict the outcome.

4.7.4 Pseudo R-Square Statistic

The Pseudo R-square presented in Table 4.7.5 indicates the proportion of the variance explained by the independent variables on the dependent variables in the ordinal logistic regression model. The more variance can be explained, the better the regression model.

Table *4.7.4: Pseudo R-Square*

Cox and Snell	0.731
Nagelkerke	0.812
McFadden	0.377

Source: Field Work

The pseudo R^2 value (Nagelkerke =0.812, 81.2%) indicates that there is relatively large proportion of the variance that can be explained jointly by the independent and the dependent variables.

4.7.5 Test of parallel lines

Ordinal Logistic Regression model assumes that the relationship between the independent variables are the same "across all possible comparisons" (Osborne, 2017) involving the dependent variable-an assumption referred to as Proportional Odds. When the result of the parallel lines (ie, assumption of Proportional Odds) indicates non-significance, then we interpret it to mean that the assumption is satisfied. Statistical significance is taken as an indicator that the assumption is not satisfied.

Table 4.7.5: Test of parallel lines

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	444.379			
General	431.968	12.411	8	0.134

Source: Field Work

In the results from the analysis (Table 4.7.6), we interpret the results to mean that the assumption is satisfied[$X^2(8) = 12.411$, $p(0.134)>0.05$] (Ombui *et al* 2011).

4.7.6 Correlation estimates between predictors and performance

In the Parameter Estimates (Table 4.4.7), we see the coefficients, their standard errors, the Wald test, degrees of freedom(df) and associated p-values (Sig.), the 95% confidence interval of the coefficients and odds ratios. The p-values less than alpha levels are statistically significant; otherwise they are not.

For each Estimate (parameter) estimated in the model, one df is required, and the df defines the Chi-Square distribution to test whether the individual regression coefficient is zero given the other variables are in the model.

Table 4.7.6: Parameter Estimates.

Construct	Parameter Estimates							
	Estimates	Std Error	Wald	df	Sig.	Odds Ratio	95% Confidence Interval	
							Lower Bound	Upper Bound
Difficulty	0.414	0.152	7.396	1	0.007	1.5129	0.116	0.712
Anxiety	0.247	0.115	4.645	1	0.031	1.2802	0.022	0.472
Interest	-0.255	0.105	5.919	1	0.015	0.7749	0.049	0.460
Peer influence	0.524	0.204	6.555	1	0.010	1.689	0.123	0.924
Misconceptions	0.168	0.132	1.627	1	0.202	1.183	-0.090	0.427
Cultural Beliefs	-0.265	0.127	4.355	1	0.037	0.767	0.016	0.514
Value	-0.068	0.155	0.193	1	0.661	0.934	-0.372	0.236

Source: Field Work

From Table 4.7.6 except perceived misconceptions and value (usefulness of Mathematics), the p-values for the remaining independent variables were each less than 0.05(ie $p<0.05$). The parameter estimates under consideration were statistically significant if the confidence interval (CI) does not include or cross zero (0). From the table above, apart from misconceptions and value, the CI for the remaining independent variables did not include or crossed 0. This shows that five (5) of the independent variables were statistically significant at the 5% level of significance chosen. Significant indicates that there is difference between perception and performance, otherwise not.

From Table 4.7.6, perceived difficulty was a positive statistically significant predictor of perception on Mathematics performance. The regression coefficient or parameter estimates of perceived difficulty was 0.414 with odds ratio 1.5129 (OR=1.5129, p=0.007, 95% CI, 0.116 to 0.712). This means that, for every one-unit increase in girls' perceived difficulty, there was a predicted increase of 0.414 in the log odds of falling at a higher level in Mathematics performance. This indicates that as scores increase on perceived difficulty, there is an increased probability of falling at a higher level in Mathematics performance among girls'.

From Table 4.7.6, students' perceived anxiety was a positive statistically significant predictor of perception with coefficient, 0.247 with odds ratio 1.2802 (OR=1.2802, p=0.031, 95% CI, 0.022 to 0.472). This implies that, for a unit increase in female students' perceived anxiety, we expect a 0.247 increase in the ordered log odds of being in a higher level of academic performance given that, all of the other variables in the model are held constant among girls'.

From table 4.7.6, female students' perceived interest was a statistically negative significant predictor of perception on Mathematics performance. The regression coefficient or parameter estimate of perceived interest was -0.255 with odds ratio 0.7749 (OR=0.7749, p=0.015, 95% CI, 0.049 to 0.460). This indicates that, for every one-unit increase on perceived interest, there is a predicted decrease of 0.255 in the ordered log odds of female students' falling at a higher level in Mathematics performance. This indicates that as scores of perception increase on Mathematics interest, there is a decreased probability of falling at a higher level in Mathematics performance scores among girls'.

From Table 4.7.6, perceived peer influence on Mathematics was a positive statistically significant predictor of perception on Mathematics performance with coefficient value of 0.524 and odds ratio of 1.6888 (OR=1.6888, p=0.010, 95% CI, 0.123 to 0.924). This means that, for every one-unit increase on perceived peer influence, there is a predicted increase of 0.524 in the log odds of falling at a higher level of Mathematics performance scores. Generally, this indicates that as scores increase on perceived peer influence, there is an increased probability of falling at a higher level in Mathematics performance scores among girls'.

From Table 4.7.6, students' perceived misconception in Mathematics was a positive non-significant predictor of perception on Mathematics performance. The regression

coefficient or parameter estimates of perceived misconceptions on Mathematics was 0.168 with odds ratio 1.1829 (OR=1.1829, p=0.010, 95% CI, -0.090 to 0.427). This means that, for every one-unit increase on misconceptions, there is a predicted increase of 0.168 in the ordered log odds of falling at a higher level in Mathematics performance scores. Generally, this indicates that as scores increase on perceived misconceptions, there is an increased probability of falling at a higher level on performance.

In the case of perceived cultural beliefs as perception construct, recorded a negative coefficient value of -0.265, with a statistical significant odds ratio 0.7672 (OR=0.7672, p=0.037, 95% CI, 0.016 to 0.514). This implies that for a unit increase in the level of cultural beliefs, we expect a 0.265 decrease in the ordered log odds of being in a higher level of academic performance given that all the other variables in the model are held constant. This indicates that as scores increase on perceived cultural beliefs, there is a decreased probability of falling at a higher level in Mathematics performance among girls'.

For value (usefulness of the subject) in Mathematics reported negative non-significant predictor of perception on Mathematics performance with coefficient 0.068, and odds ratio 0.9343(OR=0.9343, p=0.661, 95% CI, -0.372 to 0.236). This means that, for every one-unit increase on value, there is a predicted decrease of 0.068 in the log odds of falling at a higher level of the dependent variable. This indicates that as scores increase on value, there is a decreased probability of falling at a higher level on usefulness of Mathematics among girls'.

4.7.7 Overall Perception on performance

The overall perception of female students' perception on performance was also measured. The table below shows the overall influence of perception on Mathematics performance among girls'.

Table 4.7.7: Overall Perception on Performance

Overall Perception	**Estimates**	**Std Error**	**Wald**	**df**	**Sig.**	**Odds Ratio**	**95% Confidence Interval**	
							Lower Bound	**Upper Bound**
Overall Perception	-0.420	0.143	8.596	1	0.003	0.6570	0.139	0.701

Source: Field Work.

Overall perception of female students on Mathematics performance was also measured with negative statistically significant predictor of perception with coefficient value of -0.420 and odds ratio 0.6570 (**OR**=0.6570, p=0.003, **CI**, 0.139 to 0.701). This means that, for every one-unit increase in perception as an independent variable, there is a predicted decrease of 0.420 in the ordered log odds of falling at a higher level of Mathematics performance scores. This indicates that as scores increase on perception, there is a decreased probability of falling at a higher level in Mathematics performance.

4.7.8 Test for Multicollinearity

Multicollinearity can be detected using variance inflation factor (VIF). In testing for multicollinearity using the variance inflation factor (VIF), a VIF value greater than 10, implies there is multi-collinearity. In the result presented in Table 4.7.9, none of the VIF values is greater than 10. Hence multi-collinearity is not a problem here. Therefore, the assumption of no multicollinearity is satisfied.

4.7.8 Variance Inflation Factor (VIF) Test Output to Check for Multi-Collinearity

Difficulty	Anxiety	Interest	Peer Infl.	Misconceptions	Cult. Belief	Value
1.089	1.073	1.010	1.074	1.052	1.117	1.026

Source: Field Work

4.8 Effect Size

Effect size is a quantitative measure of the magnitude of a phenomenon. Effect sizes provide information about the magnitude, or the substantive significance, of results. Effect sizes provide information about the size of the differences and the strengths of the relationships (Zientek *et al*, 2012). Kelly & Preacher (2012) defined effect size as a quantitative reflection of the magnitude of some phenomenon that is used for the purpose of addressing a question of interest.

4.8.1: Wilcoxon Signed Rank Test output

	N	Mean	SD	z-scores	p-value	Effect size
Perception Scores	296	20.380	3.243	13.804	0.000	0.5673
Achievement scores	296	29.919	10.642			

Source: Field work.

Wilcoxon Signed Rank Test is a non-parametric alternative to Paired Samples T-Test. In order to ascertain or evaluate the effect (extent) of perception on performance in the study of Mathematics among girls' at the SHS level, the Wilcoxon Signed Rank Test revealed a statistically significant influence of perception on performance, $z=13.804$, $p=0.000<0.05$ and with large effect size $r=0.5673$, indicating a large effect size using Cohen (1988) criteria of 0.1(small effect), 0.3(medium effect) and 0.5 and above (large effect).

4.9 Interview Data

Female students' perception towards Mathematics and its effects on performance was gathered through a semi-structured interview protocol from the selected respondents. As said above, eight of the females' were interviewed in detail about their Mathematics identity (perception) and how their experiences in Mathematics affect their learning outcomes. The interview was conducted for about 10-15 minutes with each respondent and a recording of each interview was made. The interview protocol was tested on one female student to ensure that it contained relevant issues to seek the expected information from the students'. The eight girls' were given the codes: A, B, C, D, E, F, G and H respectively. Creswell (2012) argues that participant confidentiality is of greatest significance. He went further to add that, "The lives and experiences of participants should be told, but the individuals from which the research was gleaned must be concealed"(Kamal, 2021).

The researcher audiotaped the process of the interview and also took a brief note of the responses to serve as a backup. The researcher probed the students' for more clarification to get the desired information and assured them of confidentiality of their contributions. The qualitative data of participants were transcribed and analyzed to help the researcher explained the quantitative data results.

The female students' were asked questions on perception and experiences in Mathematics and its effects on academic performance. When asked to talk about their Mathematics identity (perception) and experiences in the study of Mathematics up to SHS level, the female student **A,** who happened to be in third year said:

> *For me Mathematics is about calculations, and technical in nature. I have not gotten grade **A** in Mathematics before and it is because I have no respect for Mathematics. I think, I could not get the right foundation from primary school and that is the bases for my perception of the subject. I have always believed that Mathematics is difficult and this perception sometimes make me scared during*

> *Mathematics lessons….worse of all is the tendencies of some Mathematics teachers selecting few of the students' they perceived to be brilliant in the class and forgetting about those of us they perceived to be weak in class. If Mathematics teachers' can concentrate a little on the weak ones, the better for all of us…we are also part of the class…..*

It appears from the above that respondent **A** attributes her plight not only on the nature of the subject, but also got scared about Mathematics. She also believed that. Mathematics educators have not lived up to expectation on their job by selecting few of the learners they perceived to "clever" in class and forget about the supposedly "weak ones" in class.

Female student **C,** who also was a third year student about to write WASSCE also remarks:

> *Mathematics is a calculation subject. For me my primary school Mathematics was ok, but in JHS, I perceived Mathematics to be difficult because of my Mathematics teacher and could not excel at all in Mathematics….it is even worse at the SHS level where Mathematics teachers' select those they perceived to be clever in class and forget about those of us they perceived to be weak in Mathematics….let me admit that, I depend on peers often times in Mathematics….*

It seems from above that, female student **C** shares the same sentiment with respondent A-Selective teaching in class during Mathematics lessons and its implication…. She also admitted depending a lot on peers for help in the study of Mathematics.

Interviewee **D** was a second year female student, and said this about her situation:

> *I will say that Mathematics is about calculating and solving problems involving numbers. I can say that Mathematics is difficult as I am moving up in my academic pursuit…. I should admit that, it was a book I read that encouraged me to study Mathematics. But my performance has not been the best probably because of the perception I have that conclusion of any Mathematics problem is an answer which make me scared because of the possibility of not getting the right answer. It is much worse during end of semester examinations…*

Female student **D** seems to appreciate the usefulness of Mathematics but still perceived Mathematics to be difficult and thereby affecting her performance negatively. She also admitted some form of anxiety during examinations.

Interviewee **E** was a second year female student and said this about her situation:

> *I will say that Mathematics is about calculations and reasoning. I try my possible best in Mathematics but still cannot make it in Mathematics…. Mathematics is difficult and should not be treated as subject. Teachers I have met are always effective but it is the subject that is difficult…*

Its appear female student **E** acknowledges that Mathematics is not only about calculations but also involves reasoning as well. It looks as if she attributed her plight of not performing to the nature of the subject (Mathematics) itself.

When interviewee **F** was asked about her Mathematics identity (view) and experiences about Mathematics, she had these to share:

> *I see Mathematics as calculation of numbers. Mathematics is difficult, Sir!... I am always nervous during Mathematics lessons. To me, Mathematics is not practical and should not be part of our subjects…I went to private school and my school have been changing Mathematics teachers most often. Perhaps, this has informed my perception of the subject…in fact, I dislike Mathematics…*

It appears, interviewee **F** attribute her nervousness and dislike of the subject to perhaps changing of Mathematics teachers most often in her school. Perhaps the use of unqualified Mathematics educators in majority of our private schools could also be looked into at pre-tertiary level.

Interviewee **H** was a second year female student, and when asked about her Mathematics identity and whether boys perform better than girls' in Mathematics, she had these to say about her situation:

> *Mathematics is a subject which involves calculation of numbers. For me, Mathematics is not difficult, but getting the understanding of concept is the problem. My performance has been average…boys are better than girls' in Mathematics. I must admit! And this is because boys are not good at English Language…I wish that Mathematics teachers will always tailor their teaching towards the average in class…*

It seems female student **H** appreciates the fact that, Mathematics is not difficult but her inability to understand Mathematics concepts was her challenge. She seems to also affirm "selective teaching". She went further to admit that boys are better than girls' in the study of Mathematics.

4.10 Discussion of Results

Research Question 1: *What are some of the possible factors that contribute to SHS girls' perception towards the study of Mathematics?*

In order to gather the information regarding students' perception towards the study of Mathematics, an instrument 'Students' Perception Towards Mathematics Inventory (SPTMI) was developed by the researcher involving a five point Likert scale. It was adopted from three already tested different questionnaires related to students' perception towards Mathematics. The SPTMI was formed by using the seven different categories of variables related to students' perception towards the study of Mathematics. The inventory or constructs or variables comprised of perceived difficulty, perceived anxiety, perceived interest, perceived peer influence, perceived misconceptions, perceived cultural beliefs and perceived value (usefulness) in the study Mathematics. Four categories namely, perceived difficulty; perceived anxiety, perceived interest and perceived value in Mathematics were adopted from Kunwar (2021). On the other hand, perceived peer influence, perceived cultural beliefs and perceived misconceptions were adopted from Rubio (2018), and Arthur, Asiedu-Addo

& Assuah (2017) respectively. Each category or dimension contains 5 question items; given a total of thirty-five (35) items all relating to students' perception towards Mathematics were used in the data collection. The 5-point Likert-type had response score ranging from *strongly agree (**5**), agree (**4**), neutral (**3**), disagree (**2**), and strongly disagree (**1**)* for positive statement, and response scores for the negative statement were just in reverse order.

4.10.1 Parameter Estimates

Research Question 2*: To what extent does perception of female students' impact on their academic performance in the study of Mathematics?*

The parameter estimate under consideration is statistically significant if the confidence interval (CI) does not include or cross zero (0). From Table 4.7.6, the confidence interval (CI) for each of the independent variables did not include or crossed zero (0) except perceived misconceptions and value (usefulness of Mathematics). This is just a confirmation of the result presented in Table 4.7.6.

4.10.2 Perceived difficulty in Mathematics

Perceived difficulty in Mathematics was positive statistical significant predictor of female students' performance in the study of Mathematics (OR=1.5129, 95% CI, 0.116 to 0.712, $p<0.05$, n=296). The positive co-efficient (value of 0.414) shows that for every one-unit increase in perceived difficulty in Mathematics, there is a predicted increase of 0.414 in the log odds of being on a higher level of female students' performance in the study of Mathematics. This indicates that for a unit change in proportional odds of female students in the study of mathematics, we see increasing levels of difficulty among girls'. This means that girls' perceive mathematics to be difficult and such position undermines performance in the study of Mathematics. This is consistent with some of the interviewees who admitted that, "I have always

believed that Mathematics is difficult and this perception sometimes makes me scared during Mathematics lessons". This may also be attributable to teacher factors which confirm items eight (8) and fifteen (15) of the descriptive statistics in Table 4.4 According Wang, Du, & Liu, (2009) students' with difficulties in learning mathematics struggle in the subject, complete their work at a slow pace, have difficulty representing mathematical concepts and perform lower than their peers (Jitendra *et al*., 2013).

4.10.3 Perceived anxiety in Mathematics

Perceived anxiety in Mathematics was positive significant predictor of female students' performance in the study of Mathematics (OR=1.2802, 95% CI, 0.022 to 0.472, $p<0.05$). The positive co-efficient (value of 0.247) indicate that for every one unit increase in perceived anxiety in Mathematics, there is a predicted increase of 0.247 in the log odds of being at a higher level on female students' performance in the study of Mathematics. This suggests increase levels of anxiety in the study of Mathematics among girls'. This confirms interviewee **F** who admitted that, "I am always nervous during Mathematics lessons". This is consistent with Pletzer *et al*. (2015) who found evidence that high Mathematics anxiety levels reduce success in the study of Mathematics. The results is in line with Goetz *et al*., (2013) which assert that research has further shown that mathematics anxiety negatively predicts course enrollment, career choices, and lifelong learning in mathematics related fields, thus contributing to the underrepresentation of females in many domains of science, technology, engineering, and mathematics (Eccles, 2012; Halpern *et al*., 2007).

4.10.4 Perceived interest in Mathematics

Perceived interest in Mathematics was negative significant predictor of female students performance in the study of Mathematics (OR=0.7749, 95% CI, 0.049 to 0.460, $p<0.05$). The negative co-efficient (value of -0.255) shows that for every one unit increase in perceived interest in Mathematics, there is a predicted decrease of 0.255 in the log odds of being on a higher level of female students' performance in the study of Mathematics. This suggests female students' low interest in the study of Mathematics. This is consistent with the study by Mireku (2021) who contend that such perception contributes significantly to a dwindling interest among female students' in the study of Mathematics. Usher (2009) assert that, low interest impacts female attitudes because girls see mathematics as something in which they will experience little success and consequently disengage from further study of the subject (Amelink, 2012).

4.10.5 Perceived Peer Influence in Mathematics

Perceived peer influence in Mathematics was positive significant predictor of female students' performance in the study of Mathematics (OR=1.6888, 95% CI, 0.123 to 0.924, $p<0.05$). The positive co-efficient (value of 0.524) indicate that for every one unit increase in perceived peer influence in Mathematics, there is a predicted increase of 0.524 in the log odds of being at a higher level on female students' performance in the study of Mathematics. This confirms items seventeen, nineteen and twenty of the descriptive statistic where 76.7%, 74.6% and 83.8% of the respondents respectively (from Table 4.3.3), agreed cumulatively that they depend largely on peers for more understanding in the study of Mathematics. This suggest that group and cooperate studies should be encouraged during teaching and learning of Mathematics. As Misanya (2013) identified, "It is a common belief that children will thrive if educated

amongst better schoolmates, and this belief guides many parents in their choice of school".

4.10.6 Perceived Misconceptions in Mathematics

Perceived misconceptions in Mathematics was positive non-significant predictor of female students' performance in the study of Mathematics (OR=1.1829, 95% CI, -0.090 to 0.427, $p>0.05$). The positive co-efficient (value of 0.168) indicate that for every one-unit increase in perceived misconceptions in Mathematics, there is a predicted increase of 0.168 in the log odds of being at a higher level on female students' performance in the study of Mathematics. But the result was statistically insignificant and therefore cannot be said to influence performance in the study of Mathematics among girls'.

4.10.7 Perceived Cultural Beliefs in Mathematics

Perceived cultural beliefs in Mathematics was negative significant predictor of female students' performance in the study of Mathematics (OR=0.7672, 95% CI, 0.016 to 0.514, $p<0.05$). The negative co-efficient (value of -0.265) shows that for every one unit increase in cultural beliefs in Mathematics, there is a predicted decrease of 0.265 in the log odds of being on a higher level of female students' performance in the study of Mathematics. This is consistent with Apusigah (2002) who observed in an interview conducted as part of her research with some families, and found extreme negative perception of fathers not to send their daughters to school because they believe that girls' are not part of the family in the same way as boys; their daughters will not stay permanently in the family because they will get married and live in the husband's parents' house, so investing in their education is a waste of money in the Northern parts of Ghana (Rubio, 2018).

4.10.8 Perceived Value in Mathematics

Perceived value in Mathematics was negative non-significant predictor of female students' performance in the study of Mathematics (OR=0.9343, p=0.661>0.05, 95% CI, -0.372 to 0.236, n=296). The negative co-efficient (value of -0.068) indicate that for every one unit increase in perceived value in Mathematics, there is a predicted decrease of 0.068 in the log odds of being at a higher level on female students' performance in the study of Mathematics. But the result was statistically insignificant and therefore cannot be said to influence performance in the study of Mathematics among girls'.

4.10.9 Overall perception on performance

The overall perception in Mathematics was negative significant predictor of female students' performance in the study of Mathematics (OR=0.657, p=0.003<0.05, 95% CI, 0.139 to 0.701, n=296). The negative co-efficient (value of -0.420) indicate that for every one-unit increase in perception in Mathematics, there was a predicted decrease of 0.420 in the log odds of being at a higher level in female students' performance in the study of Mathematics among girls'. From the output (Table 4.7.8), it is 42.0% likely that female students' performance would decrease based on perception in the study of Mathematics among girls'. This may be myriad of factors as Tobias (1989) observed that girls' may have less interest in mathematics because of the way teachers communicate with students, often interacting more with boys than with girls' during mathematics lessons. The results also is consistent with Arthur, Asiedu-Addo and Assuah (2017) who noted that, negative perception resist learning and enquiries since learning and enquiries depended on perception and beliefs. Wasike *et al* (2013) also assert that, there is need to address negative perception

among girls' because of the far reaching negative consequences that it can have on the performance in the study of Mathematics.

4.11 Effect Size

Finally, to measure the extent of effect of perception on performance among girls' in the study of Mathematics, Wilcoxon Signed Rank Test model was adopted to calculate the effect size for further clarity and confirmation. The Wilcoxon Signed Rank Test revealed a statistically significant influence of perception on performance among girls', [z=13.804, p (0.000**)]** and with large effect size r=-0.5673, indicating a large effect size using Cohen (1988) criteria of 0.1(small effect), 0.3(medium effect), and 0.5 and above (large effect). The study therefore concluded that students' perception in the study of Mathematics significantly predicted students' performance in the study of Mathematics and explains by 56.73% jointly of female students' performance in the study of Mathematics (See Tables 4.5). The finding is consistent with the results from some studies (Wasike *et al*., 2018; Asiedu-Addo, Arthur & Assuah, 2017). For instance, Wasike *et al* (2018) concluded that girls' perception significantly and positively related to performance in the study of Mathematics, and therefore there is the need to address negative perception among girls' because of the far reaching negative consequences that it can have on the performance in the study of Mathematics.

From the output presented in Table 4.8, the p-value for the dependent and independent variables is jointly less than the significance level of 5%. This leads to the rejection of the null hypothesis in favor of the alternative hypothesis for the pair of variables. Rejecting the null hypothesis from the Wilcoxon Signed Rank Test (Table 4.8) revealed a statistically significant influence of perception on performance among

girls', [z=13.804, p(0.000)<0.05] which means that there exist significant relationships between perception and performance in the study of Mathematics.

4.12 Female students' Experiences in Mathematics

Research Question 3: How do the experiences of female students' affect their Mathematics learning process at the SHS level?

Students' perception towards Mathematics and its effects on performance was gathered through semi-structured interview protocol from the sampled girls'. Questions related to students' perceived difficulty, interest, peer influence, misconceptions, cultural beliefs and value in Mathematics were posed to each chosen female students'.

The analysis of the qualitative data collected for the study has shown that the female students' perceived ability as well as their interest in Mathematics was the greatest source of influence when it comes to perception and hence its effects on performance in the study of Mathematics. The analysis of qualitative data collected for the study suggest negative perception towards the study of Mathematics admittedly; where respondents agreed that Mathematics is difficult, and felt nervous during Mathematics lessons.

When asked about respondents Mathematics identity (views), almost all the interviewees defined Mathematics as a subject involving calculations of numbers (arithmetic). This confirms studies by Crawford *et al*., (1994) and Mendick *et al*., 2008).

Furthermore, most of the female students' interviewed attributed the kind of perception they have about Mathematics to educators (teacher factors). The girls' interviewed acknowledged teachers selective tendencies in teaching Mathematics where few supposedly "Brilliant students" in the class are considered at the expense

of the majority supposedly "Weak in class" during Mathematics lessons. According to Singh *et al* (2020), in a study of students' perception on Mathematics in first year undergraduate course, posit that, "Students' understanding about Mathematics and their perception are crucial in the sense of success and competence they develop. The anxiety for the subject influences the learning of Mathematics and the academic performance. Sometimes due to low self-esteem and fear of failure leads to Mathematics anxiety". They went further to conclude that, "Past experiences, attitude and motivation towards Mathematics can affect students' performance. Effective teaching involves more than the teaching of mathematical concepts: it also includes helping students' developing interest, confidence and positive disposition towards Mathematics". Thus, it can be said that students' who perceive Mathematics as a difficult subject, tend to have low interest in the subject and by extension low performance, they added.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Overview

This chapter covers the last section of the study. The chapter has a summary of findings of the study, major findings and the study conclusions. There is also a section on recommendations of the study and lastly a section on the suggestions.

5.1 Summary of the Study

The study investigated the extent to which perception in the learning of Mathematics affect performance among girls' at the SHS level in the Hohoe Municipality. The study sought to answer the following research questions:

1. What are some of the possible factors that contribute to SHS girls' perception towards the study of Mathematics?
2. To what extent does perception of female students' impact on their academic performance in the study of Mathematics?
3. How do the experiences of female students' affect their Mathematics learning process at the SHS level?

The study was guided by Expectancy-Value Theory (EVT) which posits that expectations of success on a learning task and the individual value placed on the task are central determinants of motivation to learning (Choi *et al,* 2010). The study employed survey research design with mixed method approach to investigate female students' perception and its effects on performance. Convergent Parallel Design was employed to collect data for the investigation. Purposive sampling and simple random sampling techniques were used to select 296 and 8, second and third year female respondents from Hohoe E. P. SHS to answer 35 closed-ended and 9 semi-structured interview questions respectively on students' perception statements in the study of

Mathematics. Questionnaire, interview and Mathematics achievement tests scores were the instruments used to collect data for investigation. Data collected from the questionnaire were analyzed using descriptive statistics and inferential statistics (Ordinal Logistic Regression Analysis**).** In addition, individual interviews were analyzed to supplement some of the quantitative findings.

5.2 Findings

Several factors were initially considered as potential determinants of female students' perception on performance at Hohoe E. P. Senior High School in the Hohoe Municipality, Volta Region of Ghana. However, seven(7) perception constructs or protocol were considered in the study; perceived difficulty, perceived anxiety, perceived interest, perceived peer influence, perceived misconceptions, perceived cultural beliefs and perceived usefulness of the subject(Value).

The results of the descriptive statistics revealed overall perception mean score of 3.365 with standard deviation 0.0.861 on performance which falls within **(**2.50-3.49**)** of interpretation level adopted for the study in Table 4.3.

The results of the ordinal logistic regression analysis revealed the following inferential statistics of perception on performance in the study of Mathematics (Table 4.7.7):

perceived difficulty(Estimate=0.414**,** OR=1.5129, p=0.007, 95% CI, 0.116 to 0.712), perceived anxiety(Estimate=0.247, OR=1.2802, p=0.031, 95% CI, 0.022 to 0.472), perceived interest(Estimate=-0.255**,** OR=0.7749, p=0.015, 95% CI, 0.049 to 0.460), perceived peer influence(Estimate=0.524, OR=1.6888, p=0.010, 95% CI, 0.123 to 0.924), perceived misconception(Estimate=0.168, OR=1.1829, p=0.202, 95% CI, -0.090 to 0.427), perceived cultural beliefs(Estimate=-0.265**,** OR=0.7672, p=0.037,

95% CI, 0.016 to 0.514) and perceived value (usefulness of the subject) (Estimate=-0.068, OR=0.9343, p=0.661, 95% CI, -0.372 to 0.236).

In a nut shell, the major findings from this study include:

- Negative statistically significant relationship between perceived difficulty and performance with OR=1.5129.
- Positive statistically significant relationship between perceived anxiety and performance with OR=1.2802.
- Negative statistically significant relationship between perceived interest and performance with OR=0.7749.
- Positive statistically significant relationship between perceived peer influence and performance with OR=1.6888.
- Positive statistically non-significant relationship between perceived misconceptions and performance with OR=1.1829.
- Negative statistically significant relationship between perceived cultural beliefs and performance with OR=0.7672.
- Negative statistically non-significant relationship between value (usefulness of the subject) and performance with OR=0.9343.

The findings from OLR established that, female students' performance in Mathematics is dependent on perception do exist. The overall result of the ordinal logistic regression analysis showed a statistical negative significant predictor coefficient value of -0.420 with 95% CI of 0.139 to 0.701 from Table 4.7.8. This revealed 42.0% likelihood that students' performance would decrease based on perception in the study of Mathematics among girls' at the SHS level. The measure of extent of perception on performance using Wilcoxon Signed Rank Test model

revealed a statistically significance of 56.73 percentage effect size from table 4.8, indicating a large effect size using Cohen (1988) criteria of 0.1(small effect), 0.3(medium effect), and 0.5 and above (large effect) of perception on performance, jointly explained among girls' in the study of Mathematics. Therefore, there was enough evidence to reject the null hypothesis for the alternative hypothesis. The study therefore establishes that, there is statistically significant influence of students' perception on performance in the study of Mathematics among girls'.

The analysis of the qualitative data collected for the study suggest negative perception towards the study of Mathematics admittedly; where respondents agreed that Mathematics is difficult and felt nervous during Mathematics lessons. The data further established teachers tendencies of selecting few of the students' they perceived to be brilliant in the class and forgetting about those they perceived to be weak in class during Mathematics lessons. Again, almost all the interviewees identify Mathematics as a subject involving calculation of numbers (arithmetic).

5.3 Conclusion

The study investigated the effect of female students' perception on performance in the study of Mathematics at the SHS level, and came out with the following conclusion:

- The perception that Mathematics is difficult was found statistically significant predictor on performance among girls' in the study of Mathematics.
- The perceived anxiety was found statistical significant in the study of Mathematics among girls' and therefore relate with performance.
- The study produced a statistically negative significant perceived interest among girls' in the study of Mathematics. This indicates that greater majority of the participants (girls') have less interest in the study of Mathematics.

- Perceived misconceptions were a positive statistically insignificant predictor on performance of female students' in the study of mathematics.
- The perception about cultural mind-set was a statistically negative significant predictor on performance in the study of Mathematics among girls'. This indicates that Ghanaian customs and traditions impedes or influence girls' development in the study of Mathematics.
- Perceived peer pressures related significantly and positively in the learning of Mathematics and hence be harnessed for the good of the girl-child in the study of Mathematics.
- Perceived value was a negative statistically insignificant predictor of female students' performance.
- The overall perception in the study of mathematics was negative statistical significant predictor on performance of female students'.

In this context, it can be said that, negative perception towards Mathematics is more responsible for students' low performance in the study of Mathematics rather than the subject itself. Thus, female students' perception towards Mathematics has greater effects on their performance. From the above, the study concluded that performance of female students' in the study of Mathematics is a function of perception as well as teacher related factors.

5.4 Recommendations of the Study

Based on the findings, discussion and conclusion, the following recommendations are given to female students', educators and parents/guardians regarding performance in the study of Mathematics at the SHS level.

1. The study recommends that, mathematics educators should make mathematics lessons more of student-centred than teacher-centred.

2. The study recommends that, Mathematics educators should be encouraged to identify innovative ways of inculcating positive perception in female students' to improve their perception, abilities and performance.
3. The study also recommends that, Mathematics educators are encouraged to employ group learning in their teaching endeavours since respondents cumulatively agreed that their performances are improved through peer assistance.

5.5 Suggestions for further research study

- Further studies be done on cultural mind-set, perceived difficulty and perceived nervousness in the study of Mathematics since it has impact in the study of Mathematics among girls' at the SHS level.
- The study suggest further studies in other areas of the region by employing other methodological approaches to expand the body of knowledge of perception and its effects on female students' interest and performance in the study of Mathematics at the pre-tertiary level.

REFERENCES

Abe, T. O. & Gbenro, O. S. (2014). A Comparison of Students' Attitudinal Variables towards Mathematics between Private and Public Senior Secondary Schools. *Journal of Educational Policy and Entrepreneurial Research*, 1(1), 32-39. Retrieved from https://jeper.org/index.php/JEPER/article/viewFile/4/4.

Acheampong, K. (2020). Perceptions of Students on Introductory University Mathematics: Perspective Study on First Year Undergraduate Students. *Journal of Education and Practice*, 11(25), 1-6. DOI: 10.7176/JEP/11-25-01.

Aguele L. I., and Agwagah U. N. A. (2007). Female participation in science, technology and mathematics (STM) education in Nigeria and national development. Journal of Social Sciences, 15(2), 121-126.

Aguilar, M. S., Rosas, A., & Zavaleta, J. G. M. (2012). *12th International Congress on Mathematical Education Topic Study Group 27*. COEX, Seoul, Korea.

Ajai, J.T., & Imoko, I.I. (2015). Gender Differences in Mathematics Achievement and Retention Scores: A Case of Problem-Based Learning Method. *International Journal of Research in Education and Science* (IJRES), 1(1), 45- 50.

Akhter N. & Akhter N., (2018). Learning in Mathematics: Difficulties and Perceptions of Students. Journal of Educational Research. 21(1), 147-162.

Allen, K. (2011). Mathematics as thinking: a response to 'democracy and school math'. Democracy and Education, 19(2), 13-44. http://democracyeducationjournal.org/home/vol19/iss2/.

Amelink T. C., (2012). Research Overview: Female Interest in Mathematics. Apply Research to Practice. 5(1) 1-11. https://www.engr.psu.edu/AWE/ARPResources.aspx.

Amodu, L. O. (2006). Perception: A Determinant for Effective Communication. Sophia: *An African Journal of Philosophy*, 9(1), 148-153.

Ampadu, E. (2012). Students' perceptions of their teachers' teaching of Mathematics: The case of Ghana. *International Online Journal of Educational Sciences*, 4(2), 351-388.

Andamon, J. C., & Tan, D. A. (2018). Conceptual understanding, attitude, and performance in mathematics of Grade 7 Students. *International Journal of Scientific & Technology Research*, 7(8), 96-105.

Apawu, J. (2019). *Investigating Preservice Mathematics Teachers Perception On Cognitive Needs*, Tpack Levels And Altruism, 1-103.

Apusigah, A. A. (2002). *Reconsidering women, development and education in Ghana:* Toward critical transformation. Retrieved from https://ezproxy.viu.ca/login?url=http://search.proquest.com.ezproxy.viu.ca.

Arain, M., Campbell, M. J., Cooper, C. L. & Lancaster, G. A. (2010). What is a pilot or feasibility study? *A review of current practice and editorial policy*. BMC Medical Research Methodology, 10(1), 67-80. https://doi.org/10.1186/1471-2288/10/67.

Arief, G. I. & Martin, A. J. (2011). Peer Relationship and adolescents academic and non-academic outcomes: same-sex and opposite sex and peer effect and the role of school engagement. *British Journal of Educational Psychology*, 81(5), 183-206.

Arthur, Y. D, Asiedu-Addo, S, Assuah, C. (2017). Students' Perception and Its Impact on Ghanaian Students' Interest in Mathematics: Multivariate Statistical Analytical Approach. *Asian Research Journal of Mathematics*, 4(2), 1-12.

Ashcraft, M. H. (2002). Math anxiety: Personal, educational, and cognitive consequences. Current directions in psychological science, 11(5), 181-185. https://doi.org/10.1111/1467-8721.00196.

Askhia, O. A. (2010). Students and teachers' perception of the causes of poor academic performance in ogun state secondary schools. *European Journal of Sciences*, 13(1), 229-42.

Atkinson, J. W. (1957). Motivational determinants of risk-taking behavior. Psychological Review, 64(6), 359-372.

Atteh, E, Ekow, J. H, Amoaddai, S, Terkwor, V. L. (2020). Students' Perception towards Mathematics and Its Effects on Academic Performance. Asian Journal of Education and Social Studies, 8(1), 8-14.

Babbie, E. (2002). *The practice of social research, Belmont*: Wadsworth.

Baccaglini-Frank A., & Di Martino P., (2020). Mathematical learning difficulties and dyscalculia. In Lerman S. (eds) Encyclopedia of Mathematics Education. Springer, Cham.

Baidoo-Anu, D. (2017). Perceived factors responsible for poor academic performance. 10-30. https://erl.ucc.edu.gh/jspui.

Bakare, C. G. M. (1994). *Mass failure in public examinations:* Some psychological perspectives. Ibadan: University of Ibadan Press.

Barnett, R., & Rivers, C. (2004). Same difference: How gender differences are hurting our relationships, our children, and our jobs. New York, NY: Basic Books.

Bartley, H. S (1969). *Principles of perception*, (2nd Ed.). New York: Harper and Raw Publishers.

Begg, A. (2004). Rethinking the image of mathematics. Public Understanding of Mathematics and Mathematics Education. ICME. 10(2), 30-71.

Bekdemir M., (2010). The pre-service teachers' Mathematics anxiety related to depth of negative experiences in Mathematics classroom while they were students. Educational Studies in Mathematics, 75(3), 311-328.

Bhat, N. H. & Bhardwaj, R. (2014). The Concept of Academic Achievements. *International Journal of Education and Science Research Review*, 1(6), 93-94.

Bhattarai, P. (2015). *Causes of Low Achievement of Girls in Mathematics at Secondary Level*, 7-37.

Bleeker M. M., & Jacobs J. E. (2004). Achievement in math and science: Do mothers' beliefs matter 12 years later? Journal of Educational Psychology, 96(1), 97–109.

Boobies & Mc Elhaney (2005). *The two face of adolescent's success with pears Adolescent popularity, social adaptation, and deviant behaviour*. Child Development Meg – ha and Jinrika, 76, 757-760.

Brown M., Brown P., & Bibby T. (2008). I would rather die: Reasons given by 16-years-olds for not continuing their study of mathematics. Research in Mathematics Education, 10(1), 3-18.

Bruin, J. (2006). newtest: command to compute new test. UCLA: Statistical Consulting Group. https://stats.oarc.ucla.edu/stata/ado/analysis/.

Burt, R. S. (2017). *Structural holes versus network closure as social capital*. Social capital, 31-56.

Butakor, P. K. & Dziwornu, M. (2018). Teachers' Perceived Causes of Poor Performance in Mathematics by Students in Basic Schools. The Journal of Social Sciences Research, 4(12), 423-431. https://arpgweb.com/journal/journal/7.

Calitz, M. (2009). Chapter 5 pilot study 1 introduction. [online]. Retrieved from http://uir.unisa.ac.za/bitstream/handle/10500/1648/06chapter5.pdf.

Choi, J., Fiszdon, M. J. & Medalia, A. (2010). *Expectancy-Value Theory in Persistence of Learning Effects in Schizophrenia:* Role of Task Value and Perceived Competency, 36(5), 957–965. doi:10.1093/schbul/sbq078.

Cockcroft, D. W. (1982). Mathematics counts: Report of the Committee of Inquiry into the Teaching of Mathematics in Schools under the Chairmanship of Dr WH Cockcroft. London.

Cofie, A. A., (2020). Students' *Perception of Mathematics and the impact on their achievement, 1-100*. http://ugspace.ug.edu.gh.

Cohen L., Manion L. & Morrison K., (2007). Research Methods in Education(6th Edition). Routledge Taylor & Francis Group. 133-164. Retrieved from https://islmblogblog.files.wordpress.com/2016/05/rme-edu-helpline-blogspotcom.pdf.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd Ed.). Lawrence Erlbaum Associates, 1-144.

Cooper, D. R., & Schindler, P. S. (2008). Business research methods (10th ed.). New York: McGraw-Hill.

Cooper, K. M., Downing, V. R., & Brownell, S. E. (2018). The Influence of Active Learning Practices on Student Anxiety in Large-Enrollment College Science Classrooms. International Journal of STEM Education, 5(1), 23-35.

Crawford, K., Gordon, S., Nicholas, J., & Prosser, M. (1994). Conceptions of mathematics and how it is learned: The perspectives of students entering university. Learning and Instruction, 4(4), 331–345.

Creswell, J. W. (2008). Research design: Qualitative, quantitative, and mixed methods approaches (3rd ed.). Thousand Oaks, CA: Sage Publications.

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and Conducting Mixed Methods Research. Sage Publications*.

Creswell, J. W., & Plano Clark, V. L. (2011). Designing and conducting mixed methods research. Thousand Oaks, CA: Sage

Creswell, J.W. (2012). *Educational research: planning*, conducting, and evaluating quantitative and qualitative research (4th ed.). Upper Saddle River, N.J.: Pearson/Merrill Prentice Hall.

Dampson, D. G. & Dominic, K. D. M. (2010). *Parental involvement in home work for children's academic success:* A study in the cape coast municipality. Cape Coast University Press: Coast Cape. http://www.academi.

Daud, A. S, Adnan, N. S. M, Abd-Aziz, M. K. N, & Embong, Z, (2020). Students' Perception towards Mathematics using APOS Theory: A Case Study. *Journal of Physics: Conference Series*, 2(1), 1-8.

Demir, S. B., & Pismek, N. (2018). A convergent parallel mixed-methods study of controversial issues in social studies classes: A clash of ideologies. Educational Sciences: Theory & Practice, 18(1), 119–149. http://dx.doi.org/10.12738/estp.2018.1.0298.

Denzin, N. K. (2017). The Research Act: *A Theoretical Introduction to Sociological Methods. New York: Aldine.* https://www.taylorfrancis.com/books/mono/10.4324/9781315134543/research-actnorman-denzin.

Dikko, M. (2016). Establishing Construct Validity and Reliability: Pilot Testing of a Qualitative Interview for Research in Takaful (Islamic Insurance). *The Qualitative Report*, 21(3), 521-528. Retrieved from http://nsuworks.nova.edu/tqr/vol21/iss3/6.

Drever, J. (1981). *The penguin dictionary of psychology*. Middlesex: Penguin Books Ltd.

Dweck, C. S. (2007). Is math a gift? Beliefs that put females at risk. In S. J. Ceci & W.M. Williams (Eds.), Why aren't more women in science? Top researchers debate the evidence (pp. 47–56). Washington, DC: American Psychological Association.

Easwaramoorthy, M. & Zarinpoush, F. (2006). *Interviewing For Research. , Imagine Canada: Canada Volunteerism Initiative*, 1-2. http://www.imaginecanada.ca.

Eccles, J. (2012, April). Expectancy-value theory and gendered academic and occupational choices. Paper presented at the 2012 annual meeting of the American Educational Research Association, Vancouver, British Columbia, Canada.

Eccles, J. S. & Wigfield, A. (2002). *Motivational beliefs, values, and goals.* Annual review of psychology, 53(1), 109-132.

Eccles, J. S. (2009). *Who Am I and What Am I Going to Do with my Life? Personal and Collective Identities as Motivators of Action*. Educational Psychologist, 44(2), 78-89. http://dx.doi.org/10.1080/00461520902832368.

Eccles, J. S., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M. & Meece, J. L. (1983). *Perspectives on academic achievement and achievement motivation*. In J. T. Spence (Ed.), Expectations, values, and academic behaviors, 75-146.

Eccles, J. S., Wigfield, A., & Schiefele, U. (1998). *Motivation to succeed, Handbook of child psychology: Social, emotional, and personality development*, eds W. Damon and N. Eisenberg (Hoboken, NJ: John Wiley and Sons). 1017–1095.

Ersozlu, Z. & Karakus, M. (2019). Mathematics Anxiety: Mapping the Literature by Bibliometric Analysis. *EURASIA Journal of Mathematics, Science and Technology Education*, 15(2), 1-12.

Etikan, I., Musa, S. & Alkassim, R. (2015). Comparison of convenience sampling and purposive Sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1-4.

Etikan, I., Musa, S. A. & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1-4.

Etsey, K. A. (2005). *Assessing performance in schools:* Issues and practice. Ife Psychologia, 13(1), 123- 135.

Feather, N. T. (1992). Values, valences, expectations, and actions. *Journal of Social Issues,* 48(2), 109- 124.

Fekumo, B. & Omeka, O. F. (2022). Influence of Students' Perception of Mathematics on Junior Secondary School Students' Academic Performance. An International/Multidisciplinary Journal of Network for Grassroots Science and Mathematics Education (The VillageMath Network), 3(1), 53-71. https://ngsme.villagemath.net/journals/ver/v3i1/fekumo-omeka.

Field, A. (2018). "Discovering Statistics Using IBM SPSS Statistics". 5th Edition, SAGE Publications Ltd., London.

Fielding-Wells, J., O'Brien, M. & Makar, K. (2017). *Using Expectancy-Value Theory to Explore Aspects of Motivation and Engagement in Inquiry Based Learning in Primary Mathematics.* Mathematics Education Research Journal, 29(1), 1-16.

Flake, J. K., Barron, K. E., Hulleman, C., McCoach, B. D., & Welsh, M. E. (2015). Measuring cost: The forgotten component of expectancy-value theory. Contemp. Educ. Psychol, 41, 232–244. doi: 10.1016/j.cedpsych.2015.03.002.

Fletcher, J. (2009). *Participation of women in mathematics at the university level*. Adults Learning Mathematics, 3, 1-13.

Foley, C. (2016). Girls' perceptions of mathematics: an interpretive study of girls' mathematical identities. Unpublished EdD Thesis, University of Reading.

Fraenkel J, R & Wallen N E. (2000). How to design and evaluate research in education (4 th ed.) USA: McGraw-Hill Companies, Inc.

Fraenkel, J. R. & Wallen, N. E. (2003). How to design and evaluate research in education (5th ed.). New York: McGraw-Hill Publishing Co.

Fritz A., Haase V. G., & Rasanen P., (2019). International handbook of mathematical learning difficulties. Cham, Switzerland: Springer. Gee, J. P. (2005). What would a state of the art instructional video game look like? Innovate: Journal of Online Education, 1(6), 11-29. https://nsuworks.nova.edu/innovate/vol1/iss6/1.

Fusch, P., Fusch, E. G. & Ness, R. L. (2018). Denzin's Paradigm Shift: Revisiting Triangulation in Qualitative Research. Journal of Social Change, 10(1), 19-32.

Gall, M. D., Gall, J. P. & Borg, W. R. (2003). Educational research: An introduction (7th ed.). Boston: Pearson Education.

Gay, L. R., Mills, G. E., & Airasian, P. (2012). Educational Research: Competencies for Analysis and applications. New York, NY: Person Education.

Goetz T., Bieg M., Lüdtke O., Pekrun R., & Hall C. N., (2013). Do Girls Really Experience More Anxiety in Mathematics? Association for Psychological Science. 24(10), 2079–2087.

Grant, C. & Osanloo, A. (2014). Understanding, Selecting, and Integrating a Theoretical Framework in Dissertation Research: Creating the Blueprint for Your "House." Administrative *Issues Journal Education Practice and Research*, 12–26. https://doi.org/10.5929/2014.4.2.9.

Gravetter, F. J., & Forzano, L. A. B. (2011). *Research Methods for the Behavioral Sciences.* Cengage Learning. Stamford, CT, 147-148.

Grolnick, W. S., Gurland, S. T., Jacob, K. F., & Decourcey, W. (2002). The development of self-determination in middle childhood and adolescence. In A. Wigfield and J. S. Eccles (Eds.), The development of achievement motivation. Burlington: Elsevier Science. 147-171.

Gunderson, E. A., Park, D., Maloney, E. A., Beilock, S. L. & Levine, S. C. (2018). Reciprocal relations among motivational frameworks, math anxiety, and math achievement in early elementary school. Journal of Cognition and Development, 19(1), 21-46. https://doi.org/10.1080/15248372.2017.1421538.

Halpern D. F., Benbow C. P., Geary D. C., Gur R., Hyde J. S., & Gernsbacher M. A., (2007). The science of sex differences in science and mathematics. Psychological Science in the Public Interest, 8, 1–51.

Hamukwaya S. T., & Haser Ç. (2021). "It does not mean that they cannot do mathematics": Beliefs about Mathematics Learning Difficulties. International Electronic Journal of Mathematics Education, 16(1), 6-22.

Hamukwaya T. S., (2022). A Comparison of the Perceived Difficulties in Learning High School Mathematics from the Perspective of Teachers and Students. International Journal for Mathematics Teaching And Learning. 23(1), 46-63.

Haque, M. & Farhana, K. (2017). Behavior Relationship between Parent' s Attitude towards Math and Children' s Math Anxiety. *Journal of Child & Adolescent Behavior*, 5(4), 10–12.

Hardcastle, M. (2002). Beating peer pressure your guide to teen advise. California: Advice Book.

Hartney, E., (2011). What is Peer Pressure? https://www.agrange.edu/responses/pdf/citations/ nursing/adolescents%20self-esteem.

Hennessey, M., Highley, K., & Chesnut, S. (2012). Persuasive pedagogy: a new paradigm for mathematics education. Educational Psychology Review, 24, 187-204.

Jeynes, W. H. (2002). Examining the effects of parental absence on the academic achievement of adolescents, The challenge of controlling for family income. Journal of Family and Economic Issues, 23(2), 1-41.

Jitendra A. K., Rodriguez M., Kanive R., Huang J., Church C., Conrroy K. A., & Zaslofsky A., (2013). Impact of small-group tutoring interventions on the mathematical problem solving and achievement of third-Grade students with Mathematics difficulties. Learning Disability Quarterly, 36(21-35).

Jones, K. L. & Hite, L. R. (2020). Expectancy Value Theory as an Interpretive Lens to Describe Factors that Influence Computer Science Enrollments and Careers for Korean High School Students. International Consortium for Research in Science & Mathematics Education, 24(2), 86-118.

Jones, V. S. (2010). A guide to good practice for children is family-based school term care services. Briton: Policy press.

Kahn, S. & Ginther, D. (2017). Women and STEM. In Handbook of Research on Education and Technology in a Changing Society. Retrieved from http://nber.org.papers/w23525.

Kalhotra, S. K. (2013). A study of causes of failure in mathematics at High school Stage. Academic Research International, 4(5), 588-599.

Kamal, A. L. S. S. (2021). Dealing with Ethical issues in Qualitative Research. Turkish Online Journal of Qualitative Inquiry, 12(6), 187-196.

Kane J., M. and Mertz J., E., (2012). Debunking Myths about Gender and Mathematics Performance. 59(1), 149-198. DOI: http://dx.doi.org/10.1090/noti790.

Karagiannakis G., Baccaglini-Frank A., & Papadatos Y., (2014). Mathematical learning difficulties subtypes classification. Frontiers in Human Neuroscience, 8(57), 1-5.

Katrina, A. (2018). Students Perceptions and Students Achievement in a Higher Education Partially Flipped Classroom. 1-112.

Katrina, A. (2018). Students Perceptions and Students Achievement in a Higher Education Partially Flipped Classroom. 1-112.

Kaufmann L., & Von Aster M., (2012). The diagnosis and management of dyscalculia. Deutsches Ärzteblatt International. 109(45), 767.

Kaygisiz, E. G. (2018). Female managers in public universities. Second National Symposium on Women, Giresun University, Giresun.

Kellie, B. G. (2013). Peer Pressure for Students and Adults can be Positive. Pittsburgh Tribure Review, 5(3), 20-62.

Kelly, K. & Preacher, K. J (2012). On effect size. American Psychological Association, 17(2), 137-152. DOI: 10.1037/a0028086.

Kember D., (1997). A reconceptualization of the research into university academics' conceptions of teaching. Learning and Instruction, 7(3), 255-275.

Khan S. (2012). The rise of the tech-powered teacher. Education Week.

Kivunja, C. (2018). Distinguishing between Theory, Theoretical Framework, and Conceptual Framework: A Systematic Review of Lessons from the Field. International Journal of Higher Education, 7(6), 44-53.

Kiwanuka, H. N., Van, D. J., Van, D. N. W., Anumendem, D. N., & Namusisi, S. (2015). Factors affecting Mathematics achievement of first-year secondary school students in central Uganda. S Afr J Educ., 35(3), 1–16. doi:10. 15700/saje. v35n3a1106.

Kombo, D. & Tromp K. (2006). Proposal and Thesis Writing. Kenya. Pauline's Publications.

Kothari, C.R. (2010). Research Methodology: Methods and Techniques (3 rd Ed.): New Age International Publishers, New Delhi, India.

Kumar, S., Agarwal, M. & Agarwal, N. (2021). Defining And Measuring Academic Performance. Turkish Journal of Computer and Mathematics Education, 12(6), 3091-3105.

Kumcu, E. (2005). Female mathematicians. Math World, Spring, 54-61.

Kunwar R., (2021). A Study on Low Performing Students Perception towards Mathematics: A Case of Secondary Level Community School Students, 5(1), 125-137.

Lamas, A. H. (2015). School Performance. Propósitos y Representaciones, 3(1), 313-386. doi: dx.doi.org/10.20511/pyr2015.v3n1.74.

Lecompte, M. D. & Preissle, J. (1994). Ethnography and Qualitative Design in Educational Research (2nd ed.). London: Academic Press.

Li, Y. & Schoenfeld, A. H. (2019). Problematizing teaching and learning Mathematics as "given" in STEM education. Li and Schoenfeld International Journal of STEM Education, 6(44), 1-13.

Light, G. et al. (2009). Assessing the impact of a year-long faculty development program on faculty approaches to teaching. International Journal of Teaching and Learning in Higher Education, 20(2), 168-181.

Linver M. R., Davis-Kean P. E., & Eccles J. S. (2002). Influences of gender on academic achievement. Retrieved from http://www.rcgd.isr.umich.edu/it/New/sra02_fullpaper.doc.

Lowe, N. K. (2019). What Is a Pilot Study? JOGNN, 48(3), 117–118. https://doi.org/10.1016/j.jogn.2019.01.005.

Lucas, M. D. & Fugitt, J. (2007). Working Paper Series: The Perception of Math and Math Education in the Rural Midwest. ACCLAIM Research Initiative, 37(5), 1-10.

Luthans, F. (2005). Organizational Behavior: An Evidence-Based Approach. New York: McGraw-Hill Companies, 10(3), 135-140.

Ma, X. & Xu, J. (2004). The causal ordering of Mathematics anxiety and mathematics achievement: a longitudinal panel analysis. *Journal of Adolescence*, 27(2), 165-179. https://doi.org/10.1016/j.adolescence.2003.11.003.

Ma, X. (1999). A meta-analysis of the relationship between anxiety toward Mathematics and achievement in Mathematics. Journal for Research in Mathematics Education, 30(1), 520-540. https://doi.org/10.2307/749772.

Maat M. B. S. & Zakaria E., (2010). The Learning Environment, Teacher's Factor And Students Attitude Towards Mathematics Amongst Engineering Technology Students. International Journal of Academic Research. 2(2), 16-20. https://www.researchgate.net/publication/228837745.

Makarova, E., Aeschlimann, B. & Herzog, W. (2016). Why is the pipeline leaking? Experiences of young women in STEM vocational education and training and their adjustment strategies. Empirical Research in Vocational Education and Training, 8(1), 1–18. https://doi.org/10.1186/s40461-016-0027-y.

Makeo, E. M. (2013). Student and Teacher Perceptions of Factors Influencing Students' Performance in KCSE Mathematics in Tana River County, Kenya. Kenyatta University. Retrieved from https://ir-library.ku.ac.ke/bitstream/handle/123456789/9049/Makeo%2C Evans Mwajumwa.pdf.

Maloney, E. A., Ramirez, G., Gunderson, E. A., Levine, S. C. & Beilock, S. L. (2015). Intergenerational effects of parents' math anxiety on children's math achievement and anxiety. Psychological Science, 26(3), 1480–1488. https://doi.org/10.1177/0956797615592630.

Mandina S., Mashingaidze S. S., & Mafuta J., (2013). Increasing female participation in advanced level mathematics: A perspective from students and teachers. African Educational Research Journal. 1(3), 183-190.

Markovits, Z. (2011). Beliefs hold by pre-school prospective teachers toward mathematics and its teaching. Procedia-Social and Behavioral Sciences, 11(4), 117–121.

Martínez-Otero, V. (2007). Los adolescentes ante el estudio. Causas y consecuencias del rendimiento académico. Madrid: Fundamentos.

Mazana, Y. M., Montero, S. C., Casmir, O. R. (2019). Investigating Students' Attitude towards Learning Mathematics. International Electronic Journal of Mathematics Education, 14(1), 207-231.

Mazzocco M. (2007). Defining and differentiating mathematical learning disabilities and difficulties. In D. Berch & M. Mazzoco, (Eds.) Why is math so hard for some children? The nature and origins of Mathematics learning difficulties and disabilities. Baltimore: Paul H. Brookes Publishing. 3(2), 29-47).

Meece, J. L., Wigfield, A. & Eccles, J. S. (1990). Predictors of mathematics anxiety and its consequences for young adolescents' course enrollment intentions and performances in mathematics. *Journal of Educational Psychology*, 82(1), 60-70. doi:10.1037/0022-0663.82.1.60.

Mendick, H., Epstein, D. & Moreau, M. P. (2008). Mathematical images and identities: Education, entertainment, social justice. London: Institute for Policy Studies in Education, London Metropolitan University.

Mensah, R.O., Agyemang, F., Acquah, A., Babah, P.A & Dontoh, J. (2020). Discourses on Conceptual and Theoretical Frameworks in Research: Meaning and Implications for Researchers. Journal of African Interdisciplinary Studies, 4(5), 53-64.

Mireku, A. D. (2021). Factors That Hamper the Acquisition of Mathematics Knowledge By Females In Ghanaian Tertiary Institutions, 1-151.

Misanya, S. M. (2013). Peer Influence On Academic Performance Of Form One Students In Girls Boarding Secondary Schools, 3(3),1-21.

Montague M., (1992). The effects of cognitive and metacognitive strategy instruction on the mathematical problem solving of middle school students with learning disabilities. Journal of Learning Disabilities, 25(4), 230-248.

Moreau, M. P., Mendick, H. & Epstein, D. (2010). Constructions of mathematicians in popular culture and learners' narratives: a study or mathematical and non-mathematical subjectivities. Cambridge Journal of Education, 40(1), 25-38.

Morgan P. L., Farka G., & Wu Q. (2009). Five-year growth trajectories of kindergarten children with learning difficulties in Mathematics. Journal of Learning Disabilities, 42(4), 306-321.

Morgan, H. (2022). Conducting a qualitative document analysis. The Qualitative Report, 27(1), 64-77. https://doi.org/10.46743/2160-3715/2022.5044.

Mugenda, O.M & Mugenda, A.G. (2003). Research Methods, Quantitative and Qualitative Approaches, Nairobi: Acts Press.

Muijs, D. (2004). Doing Quantitative Research in Education with SPSS. London: SAGE Publishers Ltd.

Mutodi, P. & Ngirande, H. (2014). The Influence of Students ` Perception on Mathematics Performance. A Case of a Selected High School in South Africa. Mediterranean Journal of Social Sciences, 5(3), 431–445. https://doi.org/10.5901/mjss.2014.v5n3p431.

Narad, A. & Abdullah, B. (2016). Academic performance of senior secondary school students: Influence of parental encouragement and school environment. Rupkatha *Journal on Interdisciplinary Studies in Humanities Special Issue*, 3(2), 12-19.

Natalia, N. & Núria, R. P. (2017). Let the Girls Learn! It is not Only about Math… It's about Gender Social Norms. 3(2), 1-20.

Ngussa, B. M. & Mbuti, E. E. (2017). The Influence of Humour on Learners' Attitude and Mathematics Achievement: A Case of Secondary Schools in Arusha City, Tanzania. Journal of Educational Research, 2(3), 170 -181. Retrieved from https://www.researchgate.net/publication/315776039.

Noordzig, M., Tripepi, G., Dekker, F. W., Zoccali, C., Tanck, M. W., Jager, J. K., (2010). Sample size calculations: basic principles and common pitfalls. *Nephrol Dial Transplant*, 25: 1388–1393.

Nosek B. A., Banaji M. R., & Greenwald A. G. (2002). Math = male, me = female, therefore math ≠ me. Journal of Personality and Social Psychology, 83(1), 44–59.

Okorie, A. N. (2014). Relationship Among Peer Pressure, Time Management And Academic Performance Of In-School Adolescents, 1-75.

Okorodudu, G. N. (2010). Influence of parenting styles on adolescent delinquency in Delta central senatorial district. Edo Journal Counselling, 3(1), 58-86.

Okoye N. N. (1982). Why students fail examinations: Psychologyfor everyday living. Nigeria Journal of Applied Psychology, 11(2), 1-5.

Okyerefo, M. P. K., Fiaveh, D. Y. & Lamptey, S. N. L. (2011). Factors prompting pupils' academic performance in privately owned junior high school in accra, ghana. *International Journal of Sociology and Anthropology*, 3(8), 280-89.

Omari, I. M. (2011). Concept and Methods in Educational Research "A Practical Guide Based on Experience". Dares Salaam: Oxford University Press.

Ombui, M. G., Geofrey, M. & Gichuhi, W. A. (2011). Using Ordinal Regression Modeling to Evaluate The Satisfaction Of Jomo Kenyatta University Of Agriculture And Technology Faculty Of Science Students. JAGST, 13(1), 164-176.

Oribhabor B. C. & Anyanwu A. C., (2019). Research Sampling and Sample Size Determination: A practical Application**.** Journal of Education Research, 2(1), 47-56.

Ormrod, J.E. (2006). Educational Psychology (5 th Ed). Pearson Education: New Jersey.

Orodho, A.J. & Kombo, D.K. (2002). Research methods. Nairobi: Kenyatta University, institute of open learning.

Osborne Jason W. (2017). "Regression & Linear Modeling: Best Practices and Modern Methods". SAGE Publications Ltd., London.

Otoo, D. (2007). Comparative study of academic performance of public and private J.S.S graduates: A case study of selected schools in the Kumasi Metropolis. Unpublished thesis, University of Education, Winneba.

Ou, Q. (2017). A Brief Introduction to Perception. Studies in Literature and Language, 15 (4), 18-28. http://www.cscanada.net/index.php/sll/article/view/10055. DOI: http://dx.doi.org/10.3968/10055.

Pandey S. & Bright L. C., (2008). What Are Degrees of Freedom? Social Work Research 32(2), 119-128. doi: 107O-S3O9/O83.00 O2008.

Papanastasiou, C. (2002). School, teaching and family influence on student attitudes towards science: Based on TIMSS data Cyprus; Studies in Educational Evaluation, 28(3), 71-86.

Pasch, E. (2021). How the perception of female students of people interested in mathematics influences their willingness to pursue mathematics in future study and career, 3(1), 1-27.

Patena, A. D. & Dinglasan, B. L. (2013). Students' Performance on Mathematics Departmental Examination: Basis for Math Intervention Program. Asian Academic Research Journal of Social Science & Humanities, 1(14), 255-268.

Patton, M. Q. (2015). Qualitative research and evaluation methods. Sage.

Perreault, Jr. E. & McCarthy, J. (2005). Basic Marketing: A Global Managerial Approach. New York: McGrawHill Companies Inc.

Petrucci, C. (2009). "A Primer for Social Worker Researchers on How to Conduct a Multinomial Logistic Regression". Journal of Social Service Research, 35(2), 193 -205.

Phonapichat, P., Wongwanich, S. & Sujiva, S. (2014). An analysis of elementary school students' difficulties in mathematical problem solving. Procedia-Social and Behavioral Sciences, 116, 3169-3174. Retrieved from https://www.researchgate.net/profile/Suwimon_Wongwanich/publication/270847106.

Pletzer, B., Kronbichler, M., Nuerk, H.-C. & Kerschbaum, H. H. (2015). Mathematics anxiety reduces default mode network deactivation in response to numerical tasks. Frontiers in Human Neuroscience, 9(1), 202-220. https://doi.org/10.3389/fnhum.2015.00202.

Polit, D. F. & Beck, C. T. (2017). Nursing research: Generating and assessing evidence for nursing practice (10th ed.). Philadelphia, PA: Wolters Kluwer/Lippincott Williams & Wilkins.

Ramirez, G., Hooper, S. Y., Kersting, N. B., Ferguson, R. & Yeager, D. (2018). Teacher math anxiety relates to adolescent students' math achievement. AERA Open, 4(1), 1-13.

Ramirez, G., Shaw, S. T. & Maloney, E. A. (2018). Mathematics anxiety: Past research, promising interventions, and a new interpretation framework. Educational Psychologist, 53(3), 145-164. https://doi.org/10.1080/00461520.2018.1447384.

Rapley, T. (2007). Doing Conversation, Discourse and Document Analysis. London: Sage.

Rattan, A., Good, C. & Dweck, C. S. (2012). "It's ok – Not everyone can be good at math": Instructors with an entity theory comfort (and demotivate) students. Journal of Experimental Social Psychology, 48(3), 731-741. https://doi.org/10.1016/j.jesp.2011. 12.012.

Rattan, A., Good, C., & Dweck, C. S. (2012). "It's ok – Not everyone can be good at math": Instructors with an entity theory comfort (and demotivate) students. Journal of Experimental Social Psychology. https://doi.org/10.1016/j.jesp.2011. 12.012.

Rautta, C. A. (2013). Factors Influencing Girls' Performance In Mathematics And Science Subjects In The Kenya Certificate Of Secondary Education In Public Secondary Schools, 5(2), 1-20.

Ravitch, S.M. & Riggan, M. (2017). Reason & rigor: How conceptual frameworks guide research (2nd ed.). Thousand Oaks, CA: SAGE.

Reid N. (2009). Working memory and science education; Research in Science and Technological Education, 27(2), 245-250.

Rhaman, A. R., Mason, H. J. & Yusof, M. Y., (2012). Factors Affecting Students' Change of Learning Behaviour. Procedia - Social and Behavioral Sciences, 56(2012), 213-222. doi: 10.1016/j.sbspro.2012.09.648.

Rono, K., Onderi, H., & Owino, J. (2014). Perceptions of causes of poor academic performance amongst selected secondary schools in Kericho Sub-County: Implications for school management, 2(3), 52-80.

Roopa, S, & Rani, M. S. (2012). Questionnaire Designing for a Survey. The Journal of Indian Orthodontic Society, 46(4), 273-277.

Rosenzweig, E. Q., Wigfield, A., & Eccles, J. S. (2019). "Expectancy-value theory and its relevance for student motivation and learning," in The Cambridge handbook of motivation and learning, eds K. A. Renninger and S. E. Hidi (Cambridge: Cambridge University Press), 617–644. doi: 10.1017/978131682327 9.026.

Rozgonjuk, D., Kraav, T., Mikkor, K., Orav-Puurand, K. & Täht, K. (2020). Mathematics Anxiety Among STEM and Social Sciences Students: The Roles of Mathematics Self-Efficacy, and Deep and Surface Approach to Learning. International Journal of STEM Education, 7(46), 1-11.

Rubio, A. (2018). Factors That Impact Girls' Education In Ghana-The role of cultural mind-set, 9(1), 1-64. http://hdl.handle.net/10613/6204.

Ryan, A. M. (2000). Peer groups as a context for the socialization of adolescent's motivation, engagement, and achievement in school. Educational Psychologist 35(2), 101-111.

Salifu, S. K. (2017). Factors Contributing to the Negative Attitudes of Female Students Towards the Study of Mathematics in Selected Junior High Schools in the Tolon District, Ghana, 1-139.

Salkind, N. J. T. (2010). Exploring research. Prentice Hall Upper Saddle River, NJ.

Salkind, N. J., (2010). Encyclopaedia of research design, 1(1), 1-36.

Salm, S. J. & Falola, T. (2002). *Culture and customs of Ghana*. Retrieved from https://ebookcentral.proquest.com.

Sam, L. C. (2002). *Public Images of Mathematics.* Philosophy of Mathematics Education Journal, 15(15), 123-192.

Sarkar, A., Dowker, A. & Kadosh, R. C. (2014). Cognitive enhancement or cognitive cost: trait-speplomin' cific outcomes of brain stimulation in the case of mathematics anxiety. Journal of Neuroscience, 34(50), 16605-16610. https://doi.org/10.1523/JNEUROSCI.3129-14.2014.

Sattin-Bajaj, C., Jennings, J. L., Corcoran, S. P., Baker-Smith, E. C. & Hailey, C. (2018). Surviving at the street level, How counselors' implementation of school choice policy shapes students' high school destinations. Sociology of Education, 91(1), 46-71.

Sax, L. (2005). Why Gender Matters: What parents and teachers need to know about the emerging science of sex. New York: Doubleday.

Schiller, K. S., Khmelkov, V. T. & Wang, X. Q. (2002). Economic development and the effect of family characteristics on Mathematics achievement. *Journal of Marriage and Family*, 64(3), 730-742.

Schoenfeld, A. H., (1989). Explorations of Students' Mathematical Beliefs and Behavior. *Journal for Research in Mathematics Education*, 20(4), 38- 355.

Schunk, D., Pintrich, P., & Meece, J. (2007). Motivation in education: Theory, research, and applications. Hoboken, NJ: Prentice Hall.

Scott, W. R. (1975). Organizational structure. Annual Review of Sociology, 1(1), 1-20.

Sekaran, U. (2003). Research methods for business: A skill building approach (4th ed.). Hoboken, NJ: John Wiley and Sons.

Sekaran, U. (2013). *Research methods for business: A skill building approach*. (4 ed.), New Jersey: John Wiley and Sons. 1-56.

Sekyere, E.A. (2009). Teachers' Guide. Kumasi. Afosek Educational Consult.

Sesay, R. B., Kpangay M. & Seppeh, S., (2021). An Ordinal Logistic Regression Model to Identify Factors Influencing Students Academic Performance. International Journal of Research and Scientific Innovation (IJRSI), 9(1), 2321–2705.

Simpson, J. A. & Weiner, E. S. C. (1989). The oxford English dictionary (2nd ed.) vol. 1. Oxford: Clarendon Press.

Singer, J. (1999). Opinion gap: Measuring Public School Academic Performance. ACS - VT 2000.

Singh, P., Verma, A., Bhaskar, S. & Vishwakarma, R., (2020). The Study Of Students' Perception On Mathematics In First Year Undergraduate Course. Ilkogretim Online - Elementary Education Online, 19(4), 7361-7374. https://ilkogretim-online.org. doi: 10.17051/ilkonline.2020.04.765138.

Siyepu S., (2013). The zone of proximal development in the learning of Mathematics. South African Journal of Education, 33(2), 1-13.

Spelke E. S., & Grace A. D. (2007). Sex, math, and science. In S. J. Ceci & W. M. Williams (Eds.), Why aren't more women in science? Top researchers debate the evidence (pp. 57–68). Washington, DC: American Psychological Association.

Star, J. & Rittle-Johnson, B. (2016). Toward an educational psychology of mathematics education. In L. Corno & E. Anderman (Eds.) Handbook of Educational Psychology. Third edition. American Psychological Association. New York, NY: Routledge, 257-268.

Stipek, D., Franke, M., Clements, D., Farran, D. and Coburn, C. (2017). Pk-3, What does it mean for instruction? Social policy report. Society for Research in Child Development, 30(2).

Taber, K.S. (2018). The use of Cronbach's Alpha when developing and reporting research instruments in science education. Research in Science Education, 48(6) 1273-1296. https://doi.org/10.1007/s11165-016-9602-2.

Tang, H., Chen, B. & Zhang, W. (2010). Gender issues in mathematical textbooks of primary schools. Journal of Mathematics Education, 3(2), 106-114.

Tavakol, M. & Dennick, R. (2011). Making sense of Cronbach's alpha. International journal of Medical Education, 2(1), 53-55. Retrieved from https://www.researchgate.net/publication/270820426_Making_Sense_of_Cron bac h%27s_Alpha.

Teijlingen, E. R. & Hundley, V. (2001). The importance of pilot studies. Social Research Update, 35(2), 1236-1260.

Thompson, B. R., & Thornton, H. J. (2002). The Transition from Extrinsic to Intrinsic Motivation in the College Classroom: A First-Year Experience. Education, 122(4), 785-800.

Tobias S., (1989). They're not dumb, they're different: Stalking the second tier. Tucson, AZ: Research Corporation.

Torbeyns J., Verschaffel L., & Ghesquière P., (2004). Strategic aspects of simple addition and subtraction: The influence of mathematical ability. Learning and Instruction, 14(2), 177-195.

Ubi, E. E. & Odiong, A. U. (2018). Misconception in Mathematics. *International Journal of Innovative Science and Research Technology*, 3(10), 444-445.

Uche, N. (2010). The influence of Peer group on adolescent's academic performance: A case study of some selective schools in Abia State: Ogun: Ego Boosters Publishers.

Usher E. L. (2009). Sources of middle school students' self-efficacy in mathematics: A qualitative investigation. American Educational Research Journal, 46(1), 275–314.

van Wijk, E. & Harrison, T. (2013). Managing ethical problems in qualitative research involving vulnerable populations using a pilot study. International Journal of Qualitative Methods, 12(1), 570-586. Retrieved from http://journals.sagepub.com/doi/pdf/10.1177/160940691301200130.

Villamizar, A. G., Araujo, A. T. Y. & Trujillo, C. W. J. (2020). Relationship Between Mathematical Anxiety and Academic Performance in Mathematics in High School Students. Ciencias Psicológicas, 14(1), 2165-2174.

Voigts F., (1998). The quality of education: Some policy suggestions based on a survey of schools. Ministry of Basic Education and Culture, Windhoek.

Vorderman C., Porkess R., Budd C., Dunne R., & Rahman-Hart P., (2011). A world-class mathematics education for all our young people.

Wachukwu, C. H. & Amadi, G. A. (2021). Peer pressure as a contemporary issue in teenage upbringing. International Journal of Home Science, 7(1), 21-27. https://www.homesciencejournal.com.

WAMBUI M. K. (2018). Factors Influencing Girls' Perceptions And Attitudes Towards Mathematics In Secondary Schools. 1-66.

Wang G., Du H., & Liu Y., (2009). Case study on improving high school students with learning difficulties in Mathematics. Journal of Mathematics Education, 2(2), 122-133.

Wang, Q. & Xue, M. C. (2022). The implications of expectancy-value theory of motivation in language education. Frontiers in Psychology, 3(1), 1-8.

Wasike A., Ndurumo M. & Kisilu K. J., (2013). The Impact of Perception on Performance in Mathematics of Female Students in Secondary Schools. Journal of Education and Practice, 4(20), 104-110.

Watt H. M. G. (2006). The role of motivation in gendered educational and occupational trajectories related to maths. Educational Research and Evaluation, 12(4), 305–322.

Watt, M. G. H. (2007). A trickle from the pipeline: why girls under-participate in mathematics, 6(3), 36-40.

Wedasango, N., Chabaya. O., Rembe, S. & Muhuro, P. (2011). Assessment of First Year Female Students‟ Experiences in Historically Male Dominated Subjects in Higher Education from a Cultural Capital Perspective, Journal of Social Sciences, Kamla-Raj, South Africa, 27(1), 7-14.

Weinfied, L. (2010). Remembering the 3rd wave. Retrieved March 6, 2010.

Weiss, R. S. (1968). Statistics in social research: An introduction. New York: John Wiley & Sons.

West African Examinations Council (2013). West Africa Senior School Certificate Examination. Chief Examiner's Report, Accra.

Wigfield, A. & Cambria, J. (2010). Student's achievement values, goal orientations, and interest: *Definitions, development, and relations to achievement outcomes. Developmental Review,* 30(1), 1-35.

Wigfield, A. & Eccles, J. S. (2000). Expectancy–value theory of achievement motivation. Contemporary Educational Psychology, 25(1), 68-81.

Wigfield, A., & Eccles, J. S. (1992). The development of achievement task values: A theoretical analysis, 12(2), 265-310. doi: 10.1016/0273-2297(92) 90011-P.

Wigfield, A., Eccles, J. S., Schiefele, U., Roeser, R. & Davis-Kean, P. (2006). Development of achievement motivation. In W. Damon & N. Eisenberg (Eds.), *Handbook of child psychology*. New York: Wiley, 3(1), 933- 1002

Yamane, T., (1967). Statistics, An Introductory Analysis, 2nd Ed., New York: Harper and Row.

Yildiz C., (2018). Determining the Perceptions of Female Mathematics Teachers Concerning the Concept of "Female Mathematician" Through Metaphors. Journal of Education and Training Studies, 6(9), 86-100. doi:10.11114/jets.v6i9.3342. https://doi.org/10.11114/jets.v6i9.3342.

Yusuf, T. A., Onifade, C A. & Bello, O S. (2016). Impact of Class Size on Learning, Behavioral and General Attitudes of Students in Secondary Schools in Abeokuta, Ogun State Nigeria. *Journal of Research Initiatives,* 2(1),50-90.

Zakaria, E., Chin, L. C. & Daud, M. Y. (2010). The effects of cooperative learning on students' mathematics achievement and attitude towards Mathematics. *Journal of Social Sciences*, 6(2), 272-75.

Zientek R. L., Ozel, E. Y. Z., Ozel, S. & Allen, J. (2012). *Reporting Confidence Intervals and Effect Sizes: Collecting the Evidence. Career and Technical Education Research*, 37(3), 277-295. DOI: 10.5328/cter37.3.277.

APPENDICES

APPENDIX A

QUESTIONNAIRE FOR PERCEPTION AND ITS EFFECTS ON PERFORMANCE

(UNIVERSITY OF EDUCATION; GRADUATE SCHOOL, WINNEBA)

This study seeks to assess factors influencing Students Perception in Math and its impact on their interest among girls at the SHS level**.** The study is carried out as part of the requirements for an award of MPHIL in education. You are assured that all information provided will be treated with confidentiality and used for academic purposes only. Thank you for your cooperation.

Instructions

Thank you for taking time to complete this questionnaire. Please answer each question to the best of your knowledge. Your thoughtfulness and candid responses will be greatly appreciated. Your name or identification is not required. Your responses will be kept completely confidential.

Demographic Information

Please tick (✓) in the appropriate space provided below where applicable.

Age range: 13-15[ ]yrs 16-18 [ ]yrs 19-20 [ ]yrs 21+ [ ]yrs.

Level: SHS 1[ ] SHS 2[ ] SHS 3[ ].

Program: Science [ ] Business [ ] Home Economics [ ] Visual Arts [ ] General Arts [ ]

School Type:

I. Government [ ] Private [ ]

II. Single Sex [ ] Co-education [ ].

Area Lived: Rural [ ] Town [ ] City [ ].

Perception Constructs

Please, tick (✓) *the option that best reflects your thought in the table below. Please answer all the questions and if you are uncertain of your response you may always select "Neutral".*

Rating Scale: **Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), Strongly Disagree (SD).**

	Perception construct items	**SA**	**A**	**N**	**D**	**SD**
	Perceived difficulty					
1	I do not think I can advance in Mathematics					
2	Mathematics has been my worst subject					
3	Everyone is capable of learning mathematics					
4	Mathematics is difficult to understand					
5	I perform poorly in Mathematics in class and end of term examinations no matter how hard I try.					
	Students' Mathematics Anxiety					
6	I am always afraid during Mathematics lesson					
7	Girls' exhibit Mathematics nervousness than boys.					
8	It is difficult to ask for explanation on concepts which have not been understood.					
9	Thinking about upcoming mathematics test make me scared					
10	I am afraid of mathematics related career choice Program					
	Interest					
11	Mathematics learning is discouraging					
12	I dislike mathematics because of my mathematics teacher					
13	I practice a lot after Mathematics lessons.					
14	I will like to pursue further studies in Mathematics.					
15	Mathematics is my least favorite subject					
	Peer influence					
16	I am discouraged by my peers in Mathematics.					
17	I rely on friends for help with difficult problems.					
18	I do not attend class regularly because of peer influence.					
19	I get more understanding in Mathematics through my peers'					
20	I get more understanding during cooperate learning					
	Misconceptions					

21	Mathematics is only for the clever.					
22	As a girl, I cannot succeed in Mathematics careers'					
23	It is hard to believe female to be genius in Mathematics					
24	Mathematics has no practical connection with every day's life.					
25	Males are naturally better than females in Mathematics					
	Cultural beliefs					
26	My Mathematics achievement depends largely on male counterpart assistance.					
27	At home they always say Mathematics is for male and not female.					
28	I am mostly undervalued in Mathematics at home					
29	My house chores affect my Mathematics practice at home.					
30	Preferences are given to boys in terms of schooling					
	Value					
31	Mathematics is a worthwhile and necessary subject					
32	Mathematics is practical in everyday life					
33	Mathematics is irrelevant in my career choice					
34	Mathematics is relevant in other fields of study					
35	Studying Mathematics is waste of time					

Source: Adapted, Arthur, Asiedu-Addo & Assuah (2017); Kunwar (2021).

APPENDIX B

INTERVIEW QUESTIONS

Thank you for accepting to be part of this interview which is meant for academic exercise. You are assured that all information provided will be treated with confidentiality and used for academic purposes only. Your name or identification is not required. Your responses will be kept completely confidential.

Demographic Information

Age range: 13-15[ ]yrs 16-18 [ ]yrs 19-20 [ ]yrs 21+ [ ]yrs.

Level: SHS 1[ ] SHS 2[ ] SHS 3[ ].

Program: Science [ ] Business [ ] Home Economics [ ] Visual Arts [ ]. General Arts [ ]

School Type:

I. Government [ ] Private [ ]

II. Single Sex [ ] Co-education [ ].

Area Lived: Rural [ ] Town [ ] City [ ].

Mathematical Identity (View)

1. What is your perception (view) about mathematics?
2. Can you say that your peers influenced your mathematics identity (view)?
3. What motivates you to study mathematics?
4. Who shaped your mathematical identity (view)?
5. What kinds of qualities did you like in her or him?
6. Why do you attribute your success or failure to him or her?
7. Describe your experiences in mathematics up to this level.
8. Is there any reward (fulfilment) looking back at your mathematics experiences?
9. What do wish mathematics teachers to do during teaching?

APPENDIX C

WASSCE RESULTS FROM 2018 TO 2020

The table below shows the summary of the performance of female students' in Hohoe E. P. S.H.S.

2018-2020 WASSCE PASS RATE OF HOHOE E. P. S.H.S					
Subject	**Year**	**Number of Candidates**	**Number Passed(*A1-C6*)**	**% Passed(*A1-C6*)**	
Core Mathematics	**2018**	683			7.90
		Girls	Girls Passed	2.34	
		346	16		
		Boys	Boys Passed	5.56	
		337	38		
Core Mathematics	2019	576			32.64
		Girls	Girls Passed	13.54	
		283	78		
		Boys	Boys Passed	19.10	
		293	110		
Core Mathematics	2020	606			31.19
		Girls	Girls Passed	13.20	
		302	80		
		Boys	Boys Passed	17.99	
		304	109		

Source: Hohoe District Education Directorate.

APPENDIX D

TESTS OF NORMALITY

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Perc_Diff	.101	296	.000	.978	296	.000
Anxiety	.070	296	.001	.980	296	.000
Interest	.094	296	.000	.988	296	.015
Peer	.097	296	.000	.979	296	.000
Misconceptions	.138	296	.000	.903	296	.000
Cultural_B	.074	296	.001	.978	296	.000
Value	.156	296	.000	.944	296	.000

Source: Field Work.

The data collected failed normality test and therefore non-parametric model was adopted to run the data. Ordinal Logistics Regression model was adopted to run the data collected from the school.