UNIVERSITY FOR DEVELOPMENT STUDIES, TAMALE

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BY

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DISSERTATION / THESIS SUBMITTED TO THE DEPARTMENT OF DEVELOPMENT EDUCATION STUDIES, FACULTY OF EDUCATION, UNIVERSITY FOR DEVELOPMENT STUDIES, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF PHILOSOPHY DEGREE IN DEVELOPMENT EDUCATION

JULY, 2017

DECLARATION

Student

I hereby declare that this dissertation/thesis is the result of my own original work and that no part of it has been presented for another degree in this University or elsewhere:

Candidate's Signature… ……. Date: ……

Samuel Kassim Salifu

Supervisors'

I hereby declare that the preparation and presentation of the dissertation/thesis was supervised in accordance with the guidelines on supervision of dissertation/thesis laid down by the University for Development Studies.

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

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ABSTRACT

The purpose of this study was to investigate the factors contributing to the negative attitudes of Junior High School female students towards the study of Mathematics in selected Junior High Schools in the Tolon District of the Northern Region of Ghana. The study, guided by the interpretivist paradigm, adopted a qualitative approach. The Case Study design was employed for the study. Twenty-four respondents (twelve female students, four Mathematics teachers and eight female non-Mathematics teachers) were selected from the Junior High Schools for face-to-face in-depth one-on-one interviews and focused group discussions through the use of interview guide. Participants' responses were analysed manually. The study revealed that factors relating to Mathematics teachers such as, teachers' beliefs, attitudes, knowledge, professionalism, demeanor and personality were the major contributory factors to female students' negative attitudes towards the subject. In addition, the school environment (both in and outside the classroom), peer influence, the home and the family of the female student, as well as socio-cultural beliefs such as gender stereotyping and gender roles were other major contributory factors. The study also identified laziness, absenteeism, fear and lack of constant practice, which were all within the purview of the female student as other contributory factors. The study suggested some strategies for developing positive attitudes towards the study of Mathematics among female students. These include training and encouraging more female teachers to take up the teaching of Mathematics, providing rewards and incentive packages for female students who excel in Mathematics, sensitizing parents to get involved in the education of their female children, and finally, having patient, discipline and gender sensitive Mathematics teachers who would not only avoid the use of cane but also adopt appropriate teaching methods, as well as concrete teaching and learning materials.

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Last but not least, I salute my dear wife Ms. Deborah Sanmali Mankutui and my two children Allswell Nasara Kassim and Emmanuel Katari Kassim for their love, support, patience, encouragement and prayers, and for bearing with my frequent absence.

To all who have contributed in diverse ways to the success of this project, I say a big thank you and may God bless you all.

DEDICATION

I dedicate this work to my dear wife, Ms. Deborah S. Mankutui and two children Nasara A. Kassim and Katari E. Kassim. I also dedicate it to my late grandmother, M Paga Sanatu Laamihi Adam. May her soul rest in peace!

ACRONYMS AND ABBREVIATIONS

B.E.C.E:	Basic Education Certificate Examination
CAMFED:	Campaign for Female Education
CIDER:	Center for Instructional Development and Educational Research
C. R. D. D:	Curriculum Research and Development Division
G.E.S:	Ghana Education Service
G. E. U:	Girls Education Unit
ICT:	Information Communication and Technology
J.H.S:	Junior High School
MDGs:	Millennium Development Goals
MoE:	Ministry of Education
P.T.A:	Parent Teacher Association
S. H. S:	Senior High School
STME:	Science, Technology and Mathematics Education
STM:	Science, Technology and Mathematics
TRA:	Theory of Reasoned Action
TLMs:	Teaching and Learning Materials
UNESCO:	United Nations Educational, Scientific and Cultural Organization
UNICEF:	United Nations Children Educational Fund
WAEC:	West African Examinations Council
WASSCE:	West African Senior Secondary Certificate Examination

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CHAPTER ONE

INTRODUCTION

1.0 INTRODUCTION

The role of Mathematics in national development cannot be overemphasized. It is not only useful for the scientific, industrial and technological advancement of a nation, but also, it helps in shaping the minds of people and individuals to enable them make constructive and informed socio-economic decisions for themselves, families and the nation at large. The claim is buttressed by the quotation below:

> *"Mathematics is of central importance to modern society. It provides the language and analytical tools underpinning much of our scientific and industrial research and development. Mathematical concepts, models and techniques are also key to many vital areas of the knowledge economy, including the finance and ICT industries. Mathematics is crucially important, too, for the employment opportunities and achievements of individual citizens"* (Smith, 2004 p. v).

It is in recognition of this indispensable role that Mathematics has been made a core subject at the basic and secondary levels of education across the West African Sub-region, including Ghana. Unfortunately, many students especially females are not doing well in this important subject both at the basic and secondary levels of education in Ghana due to negative attitudes and approach towards the study of the subject (Asante, 2010).

Whiles a number of factors, such as inadequate teaching and learning materials, inadequate laboratory and poor teaching methods could be accountable for the poor

performance of students especially in Mathematics, negative attitudes and perceptions of students towards the study of Mathematics has been identified as a major stumbling block for the successful study of the subject. According to Smith (2004: 2), many young learners perceive Mathematics as a "boring, irrelevant and very difficult subject" hence does not have any interest in studying it.

This Study, therefore, seeks to investigate the factors contributing to the negative attitudes of Junior High School female students towards the study of the subject. The main focus of this chapter is to attempt at discussing the following thematic areas: Background to the Study, Problem Statement and Purpose of the Study. Others are the Research Questions underpinning the study, Objectives of the Study, Justification and Significance of the Study. The rest are Delimitations of the Study, Definition of Terms, Conceptual Framework, Organization of the Study and Conclusion.

1.1 BACKGROUND TO THE STUDY

The background of the study includes analysis of the attitudes of girls towards the study of Mathematics in the international, African and the local or Ghanaian contexts.

1.1.1 International Context

Mathematics has been described as the queen of the Sciences; hence a good and strong foundation in it is the beginning of success in the study of Science and Technology (Smith, 2004). The poor performance of students in first- year Science, Technology and health related disciplines in most universities and colleges in Australia, United Kingdom (UK), Ireland and the United States of America is blamed

on the lack of appropriate mathematical background of students (Raylands and Coady, 2008).

Negative attitudes of students towards the study of Mathematics have been identified as one of the major causes of this problem. According to Gunderson, Ramirez, Levine and Beilock (2012), attitudes play a crucial role in students' performance in Mathematics, specializing in Mathematics and the choice of Mathematics related careers. In a research conducted in the United States of America (USA), Gunderson et al (2012) revealed that negative attitudes and anxieties towards Mathematics are more pronounced in girls than boys. This accounts from the fact that, many girls tend to have low self-concepts of themselves and are mostly affected by the ramifications of gender stereotypes than their male counterparts. In the United Kingdom (UK), Smith also observed that many female students across the globe has perceived Mathematics as a "boring, irrelevant and very difficult subject of study" and hence, is meant for males and talented students (Smith, 2004:2).

A study in Minnesota by Smith (2004) also revealed that many students especially females are suffering from Mathematics anxiety as a result of the perception that mathematical aptitude is innate and that only people with special talents would be able to succeed in it. In a survey conducted in the United Kingdom, Lim (2002) cited in Haylock and Manning (2014:4), "identified three widely-acclaimed myths about Mathematics: it is a difficult subject, it is only for clever people; and it is a male domain". Sanchez, Zimmerman and Ye (2004) in a study carried out in North America reported that, American boys show more interests in studying Mathematics than girls mostly in the eighth grade. With regards to

perception, however, Sanchez and colleagues indicated that, girls perceive Mathematics as more important course than boys in America.

Forgasz, Becker, Lee and Steinthorsdottir (2010) also observe that women are still underrepresented in upper-level Mathematics classes and careers across the globe. For instance, in Canada, Forgasz et al (2010) found that only one per cent of the total students graduating from the Mathematics and Mathematics-related fields were females. They went further to indicate that women were not only underrepresented in colleges and higher education in Mathematics, but also, they were underrepresented in the workplace. They revealed that, in the United States (U.S.), the workforce in the Computer and mathematical occupations can only boast of one-quarter of females.

In a research conducted by McLeod (1994) in New York, these negative attitudes towards Mathematics were mostly developed during the elementary stages of learning. In this regard, Lacombe (1985) warns of a persistent increase of these negative attitudes towards Mathematics at the Senior High and tertiary levels if not tackled properly at the basic level. He made this observation in a study carried out in Philadelphia. This accounts from the fact that, many of these attitudes are strongly influenced by pupils early learning experiences and that any traumatic early experiences of learners may have a long term effect on their attitudes towards Mathematics as a subject (Relich, 1996). According to McLeod (1994), these negative attitudes of females towards Mathematics prevails right from the elementary level through to the tertiary level and do not seem to be improving even as they mature.

Osborne, Simon and Collins (2003) in the United Kingdom (UK) have, therefore, observed that these negative attitudes of female learners towards the study of the subject may result in a decline in the supply of Mathematics, Statistics, Science and Technology professionals across the globe if not dealt with. Recognizing the crucial role of Science and Mathematics in achieving high standards and competitiveness of nations, Osborne et al (2003) foresee a serious threat to economic prosperity of the United Kingdom among other nations if these negative attitudes towards the subject persist.

1.1.2 African Context

According to the Pan-African Conference on the Education of Girls organized under the auspices of UNESCO/UNICEF (1993) in Burkina Faso, the story is not different in Africa. The report indicated that less than 30 per cent of female students were pursuing Science and Mathematics related courses in Africa. The report also blamed this situation on the negative attitudes and disillusionment of girls about Science and Mathematics education. These negative attitudes of girls can be traced to their early contact of the subject at the elementary levels of education. Experts in education at the conference identified poor teaching methods for being responsible for destroying the natural curiosity and inspirations of the female student towards the subject. They added that, although both boys and girls are affected by these poor pedagogical skills at the elementary level, girls whose minds have already been conditioned by society to think of Mathematics and Science as a male-domain are mostly affected. The perception, demeanour and the attitude of the teacher towards girls has also been seen as a precursor for the development of self-censure, cognitive

self-discrimination and negative attitudes among girls towards the study of Mathematics (UNESCO/UNICEF, 1993).

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 perceptions about the subject have contributed greatly to the gender differences in Mathematics, Science and Engineering professions in Nigeria and Africa as a whole (Ajai & Imoko, 2015:45).

A study conducted in Nigeria revealed that lack of interest and negative attitudes of female students, lack of gender-sensitive trained teachers, under resourced laboratories, as well as teaching methods that are more focused on memorization and regurgitation of facts among others have been identified as the major factors accounting for the poor performance of female students in not only Mathematics, but also in Science and Technology (Obomanu, 2011). Describing Mathematics as a prerequisite for higher achievement in the Sciences, Obomanu (2011) stated that negative attitudes towards the study of the subject have negatively affected the successful study of Science, Technology and Mathematics education in Nigerian schools.

In Kenya, Kiptum, Rono, Too, Bii and Too (2013) have indicated that Mathematics has been perceived as a subject that favour male students. They posit that most female students in Kenya show less interest in Mathematics and have

negative attitude toward the subject. It is also reported that girls in general tend to learn mathematical concepts by means of rules or cooperative activities, while boys have a tendency of competing to master mathematical concepts. This notion is believed to be responsible for the gender differences between male and female students in Mathematics enrolment and performance in Kenyan schools. They added that many female students in Kenya tend to pursue courses, such as Art, Literature and Home Science that are of more use to them in the kitchen and in the living room. They also observed that, out of the few females who are pursuing Mathematics and its related courses at the higher levels of education, only a minute are able to excel thereby exacerbating the underrepresentation of females quagmire in Mathematics related careers.

Conducting a study on the relationship between attitude and Mathematics performance of students in the Keiyo South District Primary School, Kiptum et al (2013) suggested that some social factors may be accountable for the negative attitudes of females. Parental, societal and teachers' expectations and influence were identified as some of the influencing factors of girls' attitude towards Mathematics. In this regard, they suggested gender friendly Mathematics curricula in schools.

According to Wadesango, Chabaya, Rembe and Muhuro (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 add 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 a study on the perceptions of stakeholders of education on the causes of poor performance of Grade 12 students in a Province in South Africa, Legotlo and Maaga (2002) revealed that, the socio-economic background of learners, parental occupation and involvement, low interest levels of students, weak morale and poor commitment of the teacher, poor pedagogical skills and unfavourable school environment among others were some of the causes of poor performance of students in Mathematics in South Africa.

In Botswana, research has revealed that learner's view and description of Mathematics as a subject that places premium on the provision of correct answers and memorization of procedures has substantially impacted on the interest and motivation of students in the study of the subject, and how much they enjoy learning it. It was also found that, students experiences in Mathematics class is a possible source of dislike for the subject by many people especially women (Mapolelo, 2007). Mapolelo (2007) advocated for the reformation of Mathematics instructions in schools by adopting child-centred pedagogies.

1.1.3 The Local (Ghanaian) Context

In another research conducted in Ghana on sex differences in Mathematics among Senior High School students, Asante (2010:2) found that when compared with

boys, "girls lacked confidence, had debilitating causal attribution patterns, perceived Mathematics as a male domain, and were anxious about Mathematics". This confirms the assertion that male students have more positive attitudes towards the subject than female students. The low representation of women in Mathematics, Science and Technology programmes and professions in Ghana has been blamed on the negative attitudes and perceptions of women towards those disciplines (Asante, 2010).

Among the factors identified as the causes of these differences in attitude towards the subject among males and females are the attitudes and beliefs of the Mathematics teacher, the school environment and the type of teaching methodology employed by the teacher, as well as parental educational level and attitudes (Asante, 2010).

An inaugural speech delivered by Professor Dontwi, Dean of the Faculty of Physical Education of the Kwame Nkrumah University of Science and Technology (KNUST) in a workshop on Harnessing and Empowering Female Talents in Mathematics and Science, if Ghana is to achieve the Millennium Development Goals (MDGs) and go further to attain the status of a successful knowledge based economy, she must ensure that her youth – both men and women, are equipped with strong skills in Mathematics and the basic Sciences (Mireku, 2008).This is because Mathematics is widely regarded as the language of Science and Technology. Mathematics is the bedrock that provides the spring board for the growth of technology. "Without Mathematics, there is no Science and without Science there is no modern technology and there is no modern society" (Mireku, 2008: n.p).

Analysing the Results of the 2012 and 2013 West African Senior Secondary Certificate Examination (WASSCE) by the West African Examinations Council of Ghana (WAEC), Gavor (2014) revealed that, out of the 59,400 candidates who sat for the Elective Mathematics examinations, only 27.4% of females obtained the pass grades of A1 to E8 as compared to 70.5 % of their male counterparts. There were, however, limited differences in the pass rates of males and females with regard to Core Mathematics. Out of the total number of candidates who sat for the Core Mathematics examinations, the pass rates for males and females were 35.6% and 35.5% respectively. In 2013, whereas the pass rates for males and females in Core Mathematics were 40.0% and 31.7% respectively, the pass rate for Elective Mathematics for males and females were 54.3% and 23.1% respectively (WAEC, 2013).

This gloomy picture of the performance rate of females in Mathematics has become a source of worry for many well-meaning Ghanaians, educationists, parents and policy makers. In response to this situation, the government, philanthropies and non-governmental organizations have developed a number of programmes to encourage the enrolment, retention and achievements rates of female students in Mathematics, Science and Technology programmes. Among these programmes are the Science, Mathematics and Technology (STMs) clinics for Senior High School students and the Girls Mentoring, Tutoring and Support Programmes (CAMFED, 2012, GEU, 2001).

Despite these efforts, many females are still lagging behind their male counterparts in Mathematics and Science programmes in Ghana especially at the rural areas, such as Tolon, due to lack of interests and negative attitudes of females towards the subject. In the light of this development, there is the need to conduct an investigation into the factors influencing these negative attitudes and its associated ramifications on the development of Mathematics education in Ghana.

Although a number of researchers and analysts have expended time and resources to discover and identify the attitudes of students and teachers on the study of Mathematics, as well as causes of poor performance of students in the subject, an area that is yet to be explored extensively is the factors contributing to the negative attitudes of basic school students towards the study of Mathematics. Most of the research conducted in this area has often been carried out at the Senior High and tertiary levels of education (Smith, 2004, Asante, 2010 & Wadesango et al, 2011). The development of negative attitude towards a particular subject revolves around many factors, including experiences, the environment in which the individual finds himself or herself and exposure among others. It is against this background that a comprehensive study into the factors contributing to the negative attitudes of female students at the Junior High School level in the Tolon District was laudable.

1.2 STATEMAENT OF THE PROBLEM

As indicated earlier, negative attitudes towards the study of Mathematics and its associated anxiety among many female students have been a great concern for educators, parents and policy makers over the years. Many Junior High School

female students in the Tolon District as indicated in the background analysis are showing less interest in studying Mathematics. Informal interaction with some of the female students during Mathematics lessons revealed that a great number of them perceived Mathematics as a "boring, irrelevant and very difficult subject" (Smith, 2004:2).

In line with the assertion of Zan and Di Martino (2007), many learners in the District regarded Mathematics and Science as not only a male-domain, but also, a subject meant for the talented and high achievers. As observed by Allotey (2012), some female learners have viewed Mathematics as some "abstract black box" that contains nothing but complex, strictly held concepts and procedural imaginative formulae for memorization. This view of Mathematics as a subject of study has contributed to the dwindling interest of female learners towards its study.

Considering the role of Mathematics in promoting socio-economic and technological advancement, Ghana would be deprived of the contribution of women in these areas if these negative perceptions persist. The current gender imbalance with regards to such critical professions such as Mathematics, Science, Medicine, Technology and Engineering would be exacerbated if these negative attitudes of female learners are not diagnosed and resolved appropriately. Since it would be very difficult if not impossible for a problem of this nature to be resolved without first identifying the root causes, an investigation into the factors accounting for these negative attitudes among female learners is very essential. It is against this backdrop that a study into the factors contributing to the negative attitudes of Junior High

school female students in the Tolon District of the Northern Region of Ghana is very relevant.

1.3 PURPOSE OF THE STUDY

The main purpose of this study was to investigate the factors contributing to the negative attitudes of female students towards the study of Mathematics in selected Junior High Schools in the Tolon District of the Northern Region of Ghana.

1.4 RESEARCH QUESTIONS

The following are the research questions underpinning the conduct of the study:

1.4.1 Main Research Question

The main research question guiding the conduct of the study was; what are the factors contributing to the negative attitudes of female students in Junior High Schools in the Tolon District towards the study of Mathematics?

1.4.2 Sub-Research Questions

1. What are the causes of the negative attitudes of Junior High School female students towards the study of Mathematics?
2. What are the motivational levels of female students of Junior High Schools in the Tolon District towards the study of Mathematics?
3. What are the effects of the negative attitudes of Junior High School female students on their performance in Mathematics?
4. How can the negative attitudes of female students of Junior High Schools in the Tolon District towards the study of Mathematics be addressed?

1.5 OBJECTIVES OF THE STUDY

The study aims to achieve the following objectives:

1. To identify the factors contributing to the negative attitudes of female students of Junior High Schools in the Tolon District towards the study of Mathematics.
2. To examine the motivational levels of female students of Junior High Schools in the Tolon District regarding the study of Mathematics.
3. To examine the effects of the negative attitudes of female students of Junior High Schools in the Tolon District on their performance in Mathematics.
4. To suggest strategies for developing positive attitudes among female students of Junior High Schools towards the study of Mathematics.

1.6 JUSTIFICATION OF THE STUDY

The researcher developed interest in investigating the factors contributing to the negative attitudes of Junior High School female students towards the study of Mathematics in the Tolon District because of the adverse effects of these negative attitudes on Science, Technology and Mathematics (STM) education in Ghana. Ghana as a country has a long way to go in achieving gender equality in Science, Technology and Mathematics (STM) education since these areas has been dominated by male professionals. Mathematics and Science is not only perceived as a preserve of males, but it is also viewed as some 'abstract black box' that can only be handled by special and talented individuals (Allotey, 2012).

This study was worth conducting because Ghana is in need of highly qualified female Mathematics teachers, mathematicians, scientists, doctors and other scientific

professionals for a holistic development of the nation (Allotey, 2012). Studies have revealed that the number of female scientists, mathematicians, doctors, statisticians and technologists in Ghana are very few as compared to their male counter parts. These differences have been blamed on lack of interests and motivation among females in pursuing Mathematics and Science related courses (Asante, 2010 and Allotey, 2012). The study therefore sought to unravel the factors accounting for lack of interest in Mathematics among female learners so as to make recommendations that would assist them to develop positive attitudes and interests toward the study of Mathematics. This would not only create employment opportunities for females, but also, it would contribute to narrowing the employment and placement gap of males and females in the Mathematics, Science and Technology sectors of the economy. Similarly, the study was worth pursuing for its role in developing the interest of female learners in appreciating the usefulness of Mathematics in everyday life and as well seeing Mathematics as a fascinating subject in its own right.

The study was worth undertaking because it would be contributing to the achievement of the objective of "increasing the participation, retention and enrolment rates of girls in Science, Technology, and Mathematics (STM) subjects through the improvement of the quality of teaching and enhancing the perceptions of these subjects" of the Girls' Education Unit's (GEU's) of the Ghana Education Service (GES, 2001: XIV).

Furthermore, the study was worth conducting because of the critical role of Mathematics in scientific and technological advancements of countries especially developing countries such as Ghana. Mathematics plays a critical role in shaping the

minds and thinking abilities of people and individuals towards making constructive and informed socio-economic decisions (Zan and Di Martino, 2007). According to Smith (2004), Mathematics is the driving force for this twenty-first century. He added that, Mathematics is not only a vehicle for "scientific and industrial research and development" but also, it serves as the medium of communication for technological progression. Another compelling need for Mathematics is that, its concepts, models and techniques are the epicentre to the knowledge economy, including finance, economics, agriculture and the ICT industries.

Moreover, the study was worth undertaking because, a persistent negative attitudes and perceptions of female students towards the study of Mathematics may exacerbate the current gender disparities in the Mathematics and Science professions in the country. It may also result in a continuous cycle of poverty among females since they might not be equipped with the needed scientific and critical thinking abilities to be able to create and managed resources for the socio-economic development of their families, communities and the nation at large.

1.7 SIGNIFICANCE OF THE STUDY

It expected that the findings of this study would help in contributing to the existing knowledge of factors contributing to the negative attitudes of female students towards the study of Mathematics in Junior and Senior High Schools. The findings of this study, it is hoped would be very instrumental in unlocking the bottlenecks of Mathematics education among female students in the Tolon District, Northern Region, Ghana and the world at large, through the recommendation of strategies to improving upon the attitudes of female students of Junior High Schools and beyond

towards the study of Mathematics. Again, it is envisaged that the findings of this study would stimulate the interest of many female learners to pursue Mathematics at the Senior High and tertiary levels which would eventually qualify them for Mathematics and Science related careers.

Furthermore, the outcome of the study would be communicated to the Girls Education Division of the Ghana Education Service, Ministry of Education (MoE), Curriculum Research and Development Division (CRDD), Head Teachers of Junior High Schools and Mathematics teachers in the District in order to draw their attention to the factors contributing to the negative attitudes of female students of Junior High Schools towards the study of Mathematics. This would go a long way in assisting the stakeholders to devise strategies to promoting Mathematics education among female students in particular and students in general through the design of girl-friendly, innovative and practical oriented methodologies for the teaching and learning of Mathematics.

It is hoped that the outcomes of the study would be very instrumental in assisting Mathematics teachers to develop and adopt practical pedagogies for the teaching of Mathematics. Finally, the findings of the study would serve as a foundation for further research work on measures to addressing the negative attitudes of female students on the study of Mathematics.

1.8 DELIMITATION

The study was conducted in Four (4) Junior High Schools in the Tolon District in the Northern Region of Ghana. The main thrust of the study was to investigate into

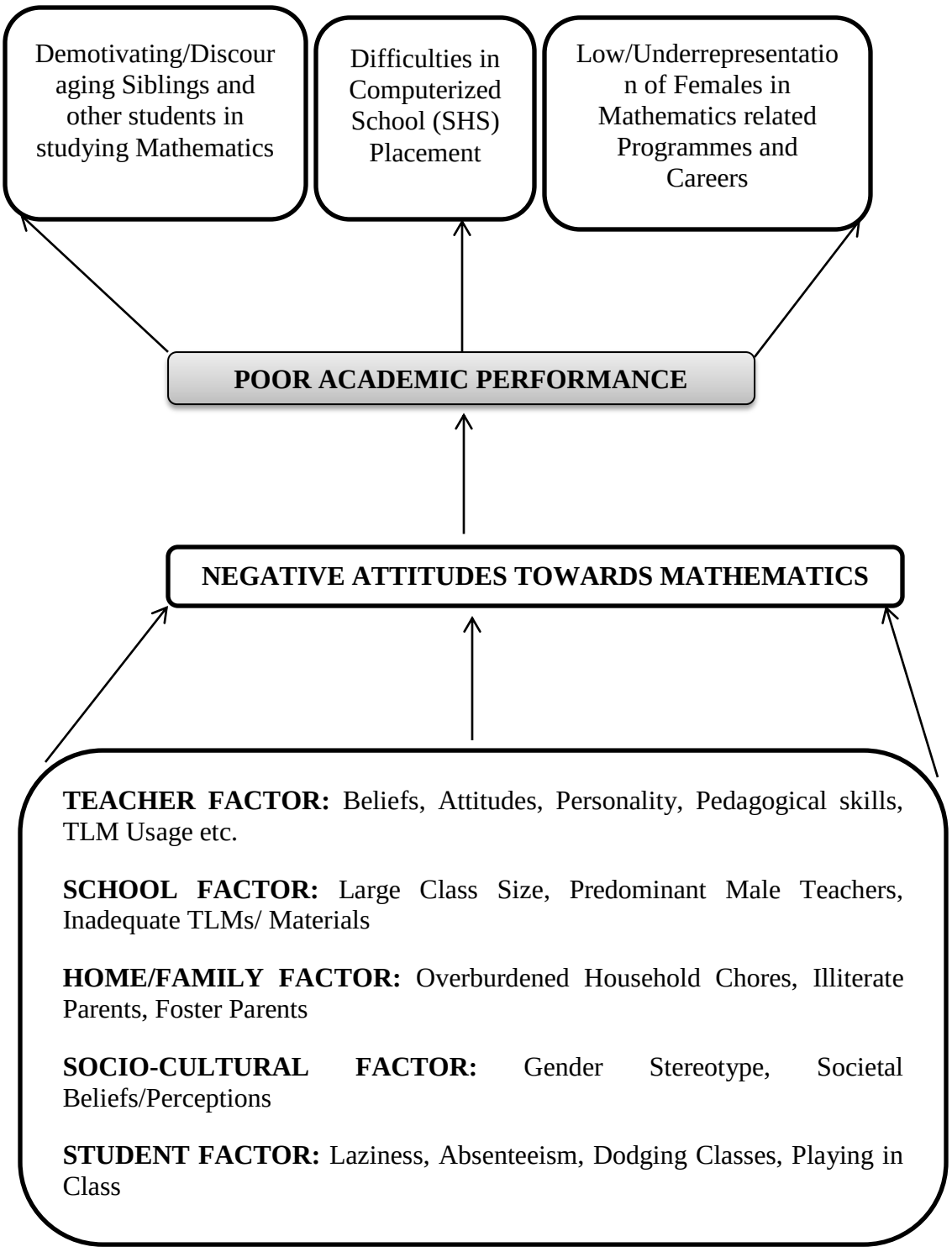
the factors contributing to the negative attitudes of female students' towards the study of Mathematics. It went further to examine the effects of these negative attitudes of female students on their performance in Mathematics. The study also attempted some suggestions and recommendations regarding the development of positive attitudes among female students towards the study of Mathematics.

1.9 CONCEPTUAL FRAMEWORK ON CAUSES OF MATHEMATICS ANXIETY AND ITS EFFECTS ON MATHEMATICS EDUCATION

According to Al-hassan (2015:33), a conceptual framework is "a model that allows the researcher to explore the relationship among variables in a logical and prescribed fashion". Conceptual frame work is a foundation upon which research is built. It is a presentation or a model in which the researcher conceptualizes or represents the variables in the study graphically or diagrammatically. The diagram below represents the structure or the pictorial view of the entire research study work.

The conceptual framework as presented in Figure 1 is an illustration of the causes and effects of Mathematics anxiety among female students. Negative attitude towards Mathematics is caused by a number of factors. They include factors relating to the Mathematics teacher, the school environment, the home, society and the female student. The major effect of these negative attitudes is poor performance in Mathematics which results in placement challenges to Senior High Schools and discouragement of siblings in the study of the subject. All these effects results in low or underrepresentation of women in Mathematics related programmes and careers.

FIGURE 1: CONCEPTUAL FRAMEWORK



Source: Authors Own Construct (2017)

1.10 ORGANIZATION OF THE REPORT/THESIS

The thesis is organized into five (5) chapters. The first chapter dealt with the introduction to the study, background of the study, problem statement, purpose of the study, significance of the study and research questions. It also outlines the objectives of the study, definition of terms, delimitations, conceptual framework and the organization of the study as well as chapter summary. Review of relevant literature on the topic of discussion is the main focus of the second chapter. The main thrust of chapter three is on key methodologies employed on the research process. Thus, research design, sampling techniques and processes as well as data collection strategies, instruments, data analysis and limitations or challenges of the study. Discussion of results and findings is the main subject of the fourth chapter. The fifth chapter then encapsulates the summary of findings, conclusions and recommendations.

1.11 CONCLUSSION

This chapter discussed the background to the factors contributing to the negative attitudes of female students of Junior High Schools towards the study of Mathematics. It also outlined the problem statement, the purpose of the study, the Research Questions underpinning the study and objectives of the study. Other issues discussed included the justification of the study, significance of the study, delimitations of the study, definition of terms, conceptual framework, organization of the study and conclusion or chapter summary.

CHAPTER TWO

LITERATURE REVIEW

2.1 THEORETICAL FRAMEWORK ON PERCEPTIONS AND ATTITUDES

There are numerous theories of attitudes, as well as attitudinal change. This study is premised on Daniel Katz's (1960) Functionalist Theory of Attitude Formation and Change and the Fishbein and Ajzen (1980) Attitude's Theory of Reasoned Action. Other theories considered are the various Learning Theories and the Expectancy-Value Theory albeit numerous theories.

2.1.1 Daniel Katz Functional Theory of Attitude Formation and Change

Daniel Katz Functional Theory of Attitude Formation is very relevant for this study because it tries to answer the mind bothering question on why individuals hold particular attitudes towards persons, things and objects. The theory posits that people do not hold a particular attitude towards something just for its sake, but rather, they do so because such attitude serves a specific function. People hold attitudes towards things because it helps them to achieve some basic goals. Katz identified four psychological functions of attitude. They are: instrumental/ utilitarian function, knowledge, ego-defensive and value-expressive functions (Katz, 2015).

***Instrumental /Utilitarian Function*:** According to Katz, people develop favourable attitudes towards things that are more rewarding and unfavourable attitudes towards things that may attract penalties. He added that any attitude that is developed to meet a personal interest of an individual may be considered to be performing an

instrumental function. For instance, any political party that may advance the economic wellbeing of the citizenry may be favoured than one that may exacerbate their hash economic conditions through the imposition of high taxes and tariffs.

***Knowledge Function*:** Another function of attitude is that it helps people to maintain meaningful, structured, and a well arranged purview of the world around them. Attitude provides the standpoint for evaluating the complexities of life. For example, our world view of good and bad and its attendant effects provides a framework for our attitude towards what is good or what is bad.

Value-Expressive Function: Here, Katz declared that attitude serves as an expression of one's core values and self-concept, which in turn leads to the establishment of self-identity. For instance, if one sees oneself as a scholar, it would be incumbent on one to embrace the core values of scholars in order to be identified and approved as one.

***Ego-Defensive Function*:** The ego-defensive function of attitude, according to Katz is a psychoanalytic principle in which attitudes serve as "defence mechanisms" to protect people from psychological harm. That is the harsh realities of life. He added that, people who suffer from misfortune or frustration are more likely to adopt the ego-defensive mechanism so as to insulate themselves from further harm. Some common mechanisms mostly used are: denial, repression, projection and rationalization.

Katz also provided an explanation with regards to the reasons for a change in attitude. According to him, an attitude changes when it no longer performs its function which may result in frustration and depression to the individual. In this regard, change in attitude of an individual can be achieved by a remodelling of a persons' motivational and personality needs, rather than trying to change the individuals' perception about the object. This implies that in our quest to see a positive attitude of female students towards the study of Mathematics, the focus must be on things that would motivate them besides identifying the appropriate and applicable learning theory that would enhance the teaching and learning process of Mathematics as a subject of study at the basic level of education.

2.1.2 Fishbein and Ajzen Theory of Reasoned Action

The Theory of Reasoned Action (TRA) is one of the major Social Psychology Models of attitude and behaviour which was developed by Martin Fishbein and Icek Ajzen in 1975. The main thrust of the theory is that, there is a relationship between attitudes, intention and behaviour within human action. According to the theory, for an individual to perform any action, there is a basic motivation for the performance of that action. This is premised on the fact that, an individuals' intention to put up certain behaviour precedes the actual behaviour. This intention has been referred to as behavioural intention by some scholars and it comes as a result of the belief that exhibiting such behaviour would result in a specific outcome that would inure some benefits. Behavioural intention is seen as very crucial elements in determining people's attitudes towards objects and that stronger intentions would result in an increased effort to exhibiting such behaviour (Ajzen, 2012).

> *Behaviour is seen as being determined by intention, and intention, in turn, is a joint product of attitude towards the behaviour and the subjective norm (i.e. beliefs about how other people would regard one's performance of the behaviour)* (Osborne, Simon and Collins, 2003: 1054).

According to Fishbein and Ajzen (1980) cited in Ajzen (2012), there are two factors that determine intention. That is attitudes and subjective norms (significant others). An attitude here refers to a person's opinion about whether behaviour is positive or negative, while a subjective norm has to do with a perceived social pressure that arises from one's perception of issues (beliefs about how other people would regard one's performance of the behaviour). The social pressure that pushes an individual to exhibit or do otherwise of an intended behaviour is what has been termed as a subjective norm or significant order (Ajzen, 2012). Fishbein and Ajzen posit that, an individual's attitude towards something or object, together with his/her subjective norms does influence his/her intentions to behave in a particular way (chooses to do mathematics as subject of study in school or to do otherwise). The theory maintains that there is high relationship between attitudes and subjective norms to behavioural intention, and subsequently to behaviour. If a suggested behaviour is evaluated and perceived as positive (attitude), in addition to a belief that a significant other is worth performing the proposed behaviour (subjective norm), it will result in a higher intention (motivation) to exhibit that behaviour and hence is more likely to be carried out.

Applying the Theory of Reasoned Action (TRA) to attitude towards the study of Science, Crawley and Coe (1990) found that the students' perception of the nature of Science as a subject of study and social support from peers are the determinants of a students' choice to pursue Science. They added that the perception that "girls don't do Science" may either be reinforced or downplayed by the kind of attitude a student girl has in addition to her feelings about what other people may be thinking about her (her subjective norms) which would eventually result in a behavioural intention to pursue or not to pursue Science or Science related course.

2.1.3 Learning Theories

Attitude is said to be formed through life experiences. Most of the attitudes people hold results from their learning experiences. Attitude formation is a concept of how people form evaluations of persons, places or things. Social psychologists have tried to offer explanations as to how attitudes are formed using three major learning theories. These learning theories are the classical conditioning, operant conditioning and observational learning (Ntim, 2010).

***Classical Conditioning*:** Propounded by Ivan Pavlov, classical conditioning is a process in which an individual (learner) becomes accustomed to a particular phenomenon due to a continuous or repeated exposure to that phenomenon for a long time. According to the classical conditioning theory of learning, attitudes are formed as a result of the individual's exposure to the attitude object. According to Linero & Hinojosa (2012), people are more likely to have positive attitude towards an 'attitude object' they are frequently exposed to than one they are not exposed to. According to the Classical Conditioning theory, a mere repeated exposure of the individual to the

attitude object is a sufficient condition for the development of positive attitude toward it, and the reverse is true. Children, for example, are more likely to become fans of the favourite football clubs of their parents due to a long time exposure to those clubs.

Operant Conditioning: Propounded by B.F. Skinner, Operant Conditioning is a learning theory which emphasizes that children or learner's attitude and behaviour are conditioned by stimulus – thus reinforcement and punishment. The theory posits that any behaviour or attitude that receives positive response is more likely to be repeated – and that is what Skinner refers to as reinforcement. On the other hand, any behaviour or attitude that receives negative response or consequence will most likely be halted or not repeated again. Skinner calls this one punishment (Ntim, 2010). For instance, if a student receives a nod from the class teacher for a particular activity in class, they are more likely to repeat that activity than one that receives a negative remark from the class teacher.

***Observational Learning*:** Observational learning theory was also propounded by Albert Bandura. The theory posits that children acquire behaviours by watching or observing the behaviours of people around them, especially those people they admire, respect or hold in high esteem. According to this theory, children and for that matter students behaviours and attitudes are formed as a result of what they see around them. Teachers and parents are, invariably considered as role models for their students and children, hence the attitudes and behaviours of teachers and parents are mostly being imitated (Yara, 2009). For instance, a female student who is being taught Mathematics by a very confident female teacher is more likely to develop positive

attitude for the subject than one who is being taught by either a male or a female who lacks confidence in the subject.

2.1.4 Expectancy-Value Theory

Expectancy-Value Theory is said to have been developed by Martin Fishbein in the mid1970s in his quest to understand the achievement motivation of individuals. The theory posits that there are expectations as well as values or beliefs that affect subsequent behavior of people and individuals. Applying the import of the expectancy theory in the field of education in the 1980s, Jacquelyn Eccles identified that the achievement of students in any subject of study is determined by two factors – that is expectancies for success and subjective task values (Kahle and Valette-Florence, 2012). Expectancies here refer to the confidence of individuals in their ability to succeed in a given task. Expectancies have to do with the specific beliefs that people and individuals have with regards to their short-term and long-term successes in engaging in a particular task or activity (Hannula, 2002). The theory holds that, the behaviour, attitude and choice of an individual are determined by the expectations he/she has. For instance, a female Junior High School student whose future expectation is to become an accountant would devout all her effort to becoming a good student of Mathematics. However, a female student who is just hoping to become a house wife after a Junior High education might not see the need to be serious in school let alone to be a good student in any subject (Minton and Khale, 2014).

Closely linked to the concept of expectancy is what Wood (2000) and Klinger (2006) described as self-concept and self-efficacy. According to Wood, self-concept involves a belief in one's ability to reach his or her goal whiles self-efficacy is a concept that has added the issue of competence to ability in realizing an individual's goals in life. Subjective task values on the other hand have to do with the usefulness and importance an individual attaches to a given task. Subjective task value is that factor that motivates an individual to perform a given task or activity (Eagle and Chaiken, 1998). Allport (1935) identified four categories of subjective task values. They include: the attainment value (importance for identity or self), Intrinsic Value (Enjoyment or Interest), Utility Value (Usefulness or Relevance), and Cost (loss of time, overly-high effort demands, loss of valued alternatives, or negative psychological experiences such as stress). The interaction of these expectancies and the subjective values results in a continuous interest, engagement and the development of positive attitude or otherwise in a given task (e.g. studying mathematics). Other factors identified as responsible for the performance of a task (studying Mathematics) is the demographic characteristics of the individual (student), prior experiences, stereotypes and perceptions or the beliefs and behaviours of other people (Allport, 1935, Kahle and Valette-Florence, 2012, Minton and Khale, 2014). Implicating the theory of expectancy-value in the field of education, Jacquelyn Eccles, according to Allport (1935) identified numerous factors that determines an individual's expectancies and values towards given tasks. These factors include the cultural milieu of the individual, socializer's beliefs and behaviours, differential aptitudes of the individual and the individual perceptions of social beliefs. Others are

the individual's interpretations of his/her experiences, previous achievement-related experiences, affective memories of the individual and the general goals and self-concepts of the individual (Hannula, 2002).

According to Fishbein and Ajzen (1980), there are three components of the expectancy-value theory. They are belief, value assignment and expectation. With regards to belief, Fishbein and Ajzen are of the view that most often people's response to any information with regards to an object, thing or a person is as a result of the belief they have or may develop about the object, thing or person. Further information on the object, thing or a person may lead to a modification of this belief. On value assignment, Fishbein and Ajzen posit that often time, people normally assigns a value to each attribute that a belief is based on. Then based on this beliefs and value assignment, an expectation is created or modified after a careful analysis of the cost and benefits of performing the given task or activity. For instance, if a student belief that his/her Mathematics teacher is humorous based on the information he/she has gathered about the teacher, the student is most likely to assign a positive value to humour in the classroom, with this, the expectation of the student may be that his/her interaction with the teacher in a Mathematics class will be very positive. With this motive, Fishbein and Ajzen (1980) concludes that such a student is more likely to develop a positive attitude towards the Mathematics teacher and for that matter towards the study of Mathematics if he/she actually finds the teacher to be humorous during Mathematics lessons.

2.2 THE CONCEPT OF ATTITUDE

The concept of attitude is said to have been introduced in the field of sociology by W. I. Thomas and F. Znanieki in 1918 (Roeckelein, 1998). Today, the term attitude has become a core concept in the field of social psychology. The term attitude is defined as an expression of favour or disfavour toward a person, place, thing, or event (Eagly and Chaiken, 1998). An attitude could be a concrete or abstract evaluation of mental evaluation of persons, things and objects based on either past or present experiences with regards to the attitude object (Franzier-Kouassi, 1999). Attitude, according to Eagly and Chaiken (1993) is a psychological tendency of evaluating a particular entity with some degree of favour or disfavour as a result of our personal experiences. Jung (1966) sees attitude as a readiness of the psyche to act or react in a certain way. The term has also been defined as an evaluative disposition towards some object, person or thing as a result of cognitive and affective reactions, behavioural intentions and past experiences or behaviours that has the tendency of influencing cognitive and affective responses, as well as future intentions and behaviours with regards to the attitude object, person or thing (Zimbardo and Leippe, 1991 and Klinger, 2005). Quoting from Allport (1935), Arul (1995) cited in Hannula (2002) defines attitude as a mental and neural state of readiness organised through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related. Attitudes generally, may be positive, negative or neutral (ambivalent) view about a person, place, thing or event which is often termed as the attitude object. How people perceive of the situations in which they find themselves may be referred to as their attitude towards that situation.

Although attitude has been described as latent which is not directly observable in itself, it provides direction to the nature of actions and behaviours exhibited by people. From these definitions, it is very clear that an attitude is a psychological orientation of an individual which is developed as a result of his /her experiences. Attitude does influence how a person views situations, objects or people, and how he/ she respond to such situations, objects or people. The response may be positive or negative; favourable or unfavourable; neutral or ambivalent.

2.2.1 Components of Attitude

Studies have revealed that there are three main components of attitude. They are the cognitive component, the affective component, and the behavioural component (Eagly & Chaiken, 1993).

Cognitive Component: The cognitive component of attitude has to do with what one thinks or believes about people, situations or objects (the attitude object). It refers to the thoughts and attributes that are associated with the attitude object. The way an individual thinks of a particular situation results from his/her attitudes (Maio & Haddock, 2010). For instance, if the mind-set of a student with regards to a particular teacher is positive, it may lead to the development of a strong liking for the teacher and his/her subject. If on the other hand, the student thinks of the teacher as wicked, it may lead to the student developing fear for that teacher and his/her subject

***Affective Component*:** The affective component of attitude has to do with the feelings or emotions an individual has with regards to the attitude object (Ajzen, 2012). For example, the sight of a teacher who is perceived to be wicked may evoke the feeling

of fear and panic among students. On the other hand, the sight of a teacher who is perceived to be humorous by students may cause excitement among students.

***Behavioural Component*:** The behavioural component is the tendency to respond in a certain way to the attitude object. It has to do with how people tend to act, or expected to act towards the attitude object or person (Maio & Haddock, 2010). For instance, a student who dreads a particular teacher may decide to stay away from his/her lessons or better still fake sickness just to stay out of his/her sight. From the ensuing discussion, it is very clear that all the three components of attitude - cognitive, affective and behavioural are interrelated and interconnected.

2.2.2 Attitude Change

This study seeks to suggest measures to developing positive attitudes among female students towards the study of Mathematics. According to Festinger (1957), considering the affective, cognitive and conative stands of attitude of individuals, persuasion is the effective means of changing the attitude of people. This accounts from the fact that, persuasion appeals to the emotional level of the attitude holder. It must be noted that, if the emotions of the attitude holder is not effectively appealed to through motivation, it would be very difficult if not impossible to see an attitude change among people. In this regard, Festinger identified four factors that must be considered in designing a persuasive message aimed at changing an attitude. They include the target characteristic, source characteristics, message characteristics and cognitive routes of the message.

Target Characteristics: These are characteristics that refer to the person who receives and processes a message. In this study, the target person is the Junior High School

female student. Festinger is of the view that, if the attitude of a person is to be changed effectively towards a desired goal, it is very incumbent to take into cognizance the characteristics, the mood, emotions and mind-set of the target recipient of the message. For instance, Klinger (2005) observed that, people of moderate self-esteem are more easily persuaded than those with either high or low self-esteem. A fair knowledge of these characteristics would be very useful in informing the message developer and deliverer (teacher) of the type of message to design or strategy to adopt for a specific group of receivers (students) for an effective outcome (Akurugu, 2010).

***Source Characteristics*:** The second factor considered by Festinger is the source characteristics of the message. The major source characteristics of a message are expertise, trustworthiness and interpersonal attraction or attractiveness of the message source. The argument is that if a message is coming from a credible source, it is more likely to cause attitudinal change among recipients than one where the credibility is in doubt. For instance, a message on disease outbreak from a professional medical doctor will be deemed to be coming from a credible source than one from a renowned politician. However, Hovland and Weiss (1951) cited in Simon and Maushak (2001) have advanced an argument against the Festinger Leon's source credibility assertion. According to them, whether a message is coming from a credible source or not, the message may disappear in the minds of people in the passage of time due to what they termed as the 'sleeper effect'. In response to this argument, Petty and Cacioppo (1984) have stated that, if people are made aware of the source of a message, it would go a long way to reducing the sleeper effect than if they are not aware of the source of

the message. The import by and large of the Festinger's Source Characteristics of a message is that, the negative attitudes of female students of Junior High Schools in the Tolon District can only be changed if the attitude change messages are coming from credible sources such as from teachers of positive attitudes towards Mathematics and that of their parents.

***Message Characteristics*:** The third factor to be considered according to Festinger is the characteristics or nature of the message. The nature and type of message to be delivered is very crucial for the persuasion of the individual or otherwise. An individual is presented with an option to change or do otherwise of his/her attitude when a given message appeals to his/her cognitive evaluative domain. The import is that, people are more likely to change their attitude if they are made aware of the pros and cons of the message. For instance, in our quest to change the negative attitudes of Junior High School female students towards the study of Mathematics, the change messages and for that matter teaching methodologies employed must be designed in such a way that it would not only appeal to the cognitive evaluative domain of female learners, but also, the methodologies must help them to identify and appreciate the pros and cons of Mathematics as a subject of study in school (Petty and Cacioppo, 1984).

***Cognitive Routes*:** Cognitive route according to Festinger is a psychological path of a given message in the mind of the listener or target group. A given message that goes through this psychological path has the tendency of appealing to the cognitive evaluative domain of the individual which will eventually result in a change in an

attitude of the individual. He identified two cognitive routes to persuading the individual. They are the central and the peripheral routes. With regards to the central route to persuasion, Festinger believes that here, an individual is presented with a data (message) and is motivated to evaluate the data and arrive at a decision to change an attitude or do otherwise. Within the peripheral route, the individual does not only considers the content of the message, but also, the source of the message. The modern concepts of advertisement where prominent celebrities and stars are used to advertise products is said to be employing this concept (Petty and Cacioppo, 1984). For instance, in seeking to change the negative attitudes of Junior High School female students towards the study of Mathematics, the teaching methodologies must not only appeal to the cognitive evaluative domain of female learners, but also, Mathematics lessons must be handled by professionals as well as professional female teachers as role models.

2.3 THE CONCEPT OF PERCEPTION

The term perception is said to have originated from a Latin word, ‘percipere‘, which means to perceive. Perception is defined as the process through which we select, organise and interpret information gathered by our senses in order to understand the world around us (Greenberg and Baro, 1999:72). Perception has to do with the individual’s feelings about, or appraisal of, a given object, thing or a person based on the individual’s past and present experiences. Fazio and Williams (1986) see perception as those subjective experiences of objects or events that results from a stimulation of the individual’s receptor organ. There are two dimensions to

perception. They are the conscious recognition dimension and the instinctive dimension. Conscious recognition dimension of perception concerns itself with the process by which an individual consciously recognizes and interprets issues in accordance with his/her understanding of the environment or the perceived object. Conscious recognition dimension is believed to be the basis for a particular action or reaction towards a perceived person, object, activity or event (Akurugu, 2010). Instinctive dimension on the other hand, deals with the response or reaction of an individual towards the perceived object based on the individuals existing knowledge, sense, notion, impression and conception of the individual (Akurugu, 2010). It is in recognition of these dimensions that Fazio and Williams (1986) explained that perception about a given object, person, or event results from the stimulation of a person's receptor organ. According to them, this stimulation is encoded into a neural activity which in turn is relayed to the central nervous system for further processing. It is believed that the perceptual experience of an individual is a direct result of these neural processes. It must however be noted that perception may sometimes occur without necessarily being influenced by an external receptor stimulus, but rather, it may result from an evolutionary adaptation of an innate knowledge (Fazio and Williams, 1986 and Akurugu, 2010). From the above revelations, the perceptions of female learners on Mathematics as a subject of study at the Junior High School may either be innately determined or may be based on their past and present experiences with regards the subject.

2.3.1 Perception as Information Process

Kreitner and Kinicki (2004), cited in Akurugu (2010) have explained that the formation of perception about an object is just similar to processing information. Just like information processing, perception begins from a selective attention stage through to encoding, storage and retention to a final stage of retrieval and response. With regards to the selective attention stage, Kreitner and Kinicki are of the view that people are not able to comprehend all the competing information that comes their way hence; they may tend to select such information that either suits their interests or those that are familiar with their previous knowledge. According to Akurugu (2010) however, the tendency of people to pay more attention to information that connotes negative is higher than that of positive information. In this regard, the tendency of students to pay more attention to the notion that Mathematics is a difficult subject of study is high than one that sees Mathematics as a very useful subject for all persons. This accounts from what he terms as a "negative bias" tendencies among people in general (Akurugu, 2010:19). In this light, he thinks that a person might consider and for that matter selects information that connotes negativity if such information is regarded as what he terms a "salient stimuli".

The selected information is then encoded. Here, the individual begins to analyse and interpret the information based on what Akurugu refers to as the person's 'schemata'. It must be noted that varying interpretations may arise on the same information by different people based individual's differences in schemata, moods and emotions, as well as cognitive abilities. For instance, Kreitner and Kinicki (2004), cited in Akurugu (2010) observed that individuals who are depressed in life

are more likely to interpret information negatively than those who are happy in life. Following the encoding stage is the storage and retention stage. Here, the encoded information is stored in the long- term memory of the individual.

The final stage of Kreitner and Kinicki's perception process, according to Akurugu (2010) is the retrieval of information from memory where it was stored. For people to make their judgements and decisions with regards to issues confronting them, they would have to retrieve the stored information from their memories. This retrieved information is believed to be responsible for the responses of the individual with regards to the given situation, person or object and subsequent formation of a perception towards that object, person or situation.

2.4 IMPLICATIONS OF THE THEORIES AND CONCEPTS OF ATTITUDES AND PERCEPTIONS FOR THIS STUDY

The purpose of the analyses and exploration of the various theories and concepts of attitude and perception was to place the study within a theoretical framework that may serve as a springboard for a study into the factors contributing to the negative attitudes of female students of Junior High Schools towards the study of Mathematics. These theories and concepts have helped to unravelling the factors responsible for the development of attitudes (either negative or positive) and perceptions for a particular subject or the attitude object.

Linking attitude change to a message of communication, Festinger (1957) believes that, persuasion is the effective tool for realizing attitude change among people. With this, it is very obvious that if the negative attitudes of female students towards Mathematics are to be addressed, then teachers, parents and educators in

general must employ the persuasive model. Again, the three learning theories especially the observational learning theory, which claims that children mostly learn new ideas and forms their attitudes and perceptions through observation, would serve as a springboard for parents, teachers and adults to conduct themselves in ways that would motivate children and students to inculcate positive attitudes and behaviours both in the classroom and at home. The functional theory of Daniel Katz which posits that individuals normally develop favourable attitudes towards things that are rewarding, and negative attitudes towards things that may incur punishments would also serve as an eye-opener for teachers and parents to devise strategies such as rewards for female students to develop positive attitudes towards Mathematics.

Closely linked to this is the Fishbein and Ajzen (1980) expectancy-value theory. The theory holds that the behaviour exhibited by an individual is determined by his/her expectations and values or beliefs. It went further to state that the achievement and performance of students in any field of study is determined by two factors – expectancies for success and subjective task values (Kahle and Valette-Florence, 2012). This theory therefore, among others is very useful for this study since it provides a springboard for teachers and curriculum developers to design child and gender friendly strategies that would promote the interest and performance of female students in Mathematics as a subject of study in schools.

Also, Kreitner and Kinicki (2004), cited in Akurugu (2010) theory of perception formation about an object which sees perception formation as more like information processing, posits that, individuals perception of issues accounts from the way in which a specific information is selected, encoded, stored in a retention

memory and finally retrieved from the memory for a specific response. This implies that, information with regards to Mathematics must appeal to the cognitive domain of students especially females to enable them effectively select, encode, store and retrieve the information for a positive or favourable response for Mathematics as a subject of study in schools.

In effect, the various theories and ideas about attitude formation, perception and attitude change is a springboard for comprehending the mental and psychological disposition of the student and for that matter female student who are the target population of this study. The knowledge and ideas gathered through the exploration of these theories and concepts is very instrumental for identifying the factors contributing to the negative attitudes of female students of Junior High Schools towards the study of Mathematics as well as addressing these negative attitudes towards the subject among female students.

2.5 GENERAL ATTITUDES OF STUDENTS TOWARDS THE STUDY OF MATHEMATICS

According to Zan and Martino (2007), attitude towards the study of Mathematics is either a positive or negative emotional disposition towards Mathematics as a subject. Attitude towards Mathematics has also been defined as "a like or dislike" for Mathematics which results in a tendency to either engage in or totally avoid mathematical activities. This concept of "like and dislike" accounts from a notion of seeing oneself as good or bad at Mathematics as a subject, coupled with the individuals world view of Mathematics with regards to is usefulness or otherwise (Reynolds and Walberg, 1992 and Franzier-Kouassi, 1999).

Introducing a multidimensional perspective (emotions, beliefs and behaviours) to the concept of attitude towards the study of Mathematics, Smith (2004) sees attitude towards Mathematics as the tendency to be fearful of and anxious about Mathematics as a result of the beliefs of an individual about the subject, the emotions associated with the subject and subsequent behaviour towards the subject. As explained by Eagly & Chaiken, (1993), attitude towards Mathematics is characterised by cognitive, affective and behavioural components which can be formed through experience, reinforcement and observation of the Mathematics teacher's attitude and behaviour towards the subject. The perception of students about Mathematics as a subject determines their approach to studying the subject. Studies have shown that many students approach Mathematics with disdain as a result of the perception that Mathematics is a procedural and rule oriented subject (Mensah, Okyere and Kuranche, 2013).

According to Carroll and Gill (2011), negative attitudes towards the study of Mathematics are quite prevalent among students. In an evaluation of the University of Limerick Mathematics Learning Centre, Carroll and Gill revealed that, nearly "half of the adult population in England had negative attitudes toward Mathematics" since the early 1980s (Carrol and Gill, 2011:16). Supporting this assertion, Haylock (2006) indicated that many adults in Britain are characterised by "feelings of anxiety, helplessness, fear, dislike, guilt and lack of confidence" when it comes to studying the subject and doing Mathematics related tasks and activities. Citing his interaction with adult learners in numeracy class of the London King's College, Haylock revealed that majority of these learners see themselves as failures, confused and

frustrated and carried some form of negative disposition towards the subject. This accounts from the fact that Mathematics is not only perceived as a difficult subject with rigid procedures and formulae, but also, it is characterised by questions to which your answers are either right or wrong (Haylock, 2006:2).

In Ireland, Hourigan and O'Donoghue (2007) also added that many students are not only anxious, but also, underprepared for tertiary level Mathematics mostly due to the influence of their experiences with the subject at the pre-tertiary level. Carroll and Gill (2011) however observed that, the level of negative attitudes among younger students (those between the ages 17 to 23) were not as high as that of the mature students of the university. Only 22.5% of students within this age brackets exhibited negative attitudes towards the study of Mathematics as compared to about fifty present of the mature students of the university (Carroll and Gill, 2011:62).

A study into the factors contributing to Senior Secondary School learners' poor performance in Science subjects in South Africa also revealed that at the early stages of learning, students are mostly characterised by positive attitudes and perceptions towards the Sciences. As they climb the academic ladder however, these attitudes dwindle to a negative one which mostly results in poor performance (Dandala, 2013). Investigating the attitudes of Italian students through essays on the theme "Me and Mathematics", Zan and Di Martino (2010) found that students with negative emotional disposition towards Mathematics were more than those with positive attitudes towards the subject. This accounted from the perceptions students has about their own abilities or inabilities to succeed in Mathematics. Below are some expressions made by some participants of the essay competition:

> *"Actually I completely hate Mathematics, simply because it is a subject I feel really far from me. When you have to solve an equation you don't need to be creative, to interpret or say what you feel; mathematics is empty of feelings.* Mathematics is difficult: *I didn't like Mathematics much because I saw it was difficult. It's full of rules and theorems and it's almost impossible to remember each of them* (Zan and Di Martino, 2010: 165 & 166).

Employing a Problem-Based Learning (PBL) method as a Case Study in gender differences in Mathematics achievement and retention scores in Nigeria, Ajai & Imoko (2015) stated that many students in Nigeria have developed negative attitudes for Mathematics due to the notion that Mathematics is a rigid and do-it-right subject which can only be studied effectively by an exceptionally gifted persons. A research into students' experiences with Mathematics teaching and learning, Mapolelo (2007) revealed that many students in Botswana dislike or have no interest in studying the subject due to their experiences in Mathematics lessons. The perceptions of these students are that Mathematics is a subject of strictly held and static procedures that places premium on the ability of a student to produce correctly held answers based on a high retentive memorization of concepts and formulae.

2.5.1 Gendered Differences in Attitudes towards the Study of Mathematics

Several research studies have shown that there are remarkable gender differences in attitudes towards the study of Mathematics across the globe. Negative predispositions and anxieties towards the study of the subject is said to be a high phenomenon among female students in the United States of America (Gunderson et

al, 2012). Although a research conducted by Smith (2004) revealed that girls have equal aptitude and innate abilities as boys, most of them fear or dread Mathematics. This dread for the subject among female students emanates from what Lim (2002) cited in Haylock (2006) described as the three myths of Mathematics which says that Mathematics is not only a very difficult subject, but also it is a subject of sharks and males (Ajai and Imoko, 2015).

Conducting a study into the sex differences in Mathematics performance among Senior High School students in Ghana, (Asante, 2010), revealed a significant differences between the attitudes and performance of males and females in Mathematics. He added that "girls lacked confidence, had debilitating causal attribution patterns, perceived Mathematics as a male domain, and were anxious about Mathematics" (Asante, 2010:2). Females were identified to exhibit low self-confidence in Mathematics than their male counterparts.

He however stated that gender differences in Mathematics performance are not obvious at the elementary stages. But in the Junior and Senior High stages, female students begin to slack behind their male counterparts. Contrary to the assertion of Asante, McLeod (1994) found that negative attitudes of female students towards the study of Mathematics are mostly developed during their elementary stages and carried through to the secondary and tertiary stages. As a result of the negative attitudes and dwindled interests of female learners towards the study of Mathematics, many female students in Kenya is said to have developed a nerd for courses such as Art, Literature and Home Science that are perceived to be more relevant at home than Mathematics. With a myopic view of the significance of Mathematics, many female

students is said to have seen the subject as a rule-oriented, less rewarding and a must-obeyed subject and hence, have approached the subject with disdain (Kiptum et al, 2013).

According to Carroll and Gill (2011), contrary to the findings of previous research studies which revealed negative attitudes of female students towards Mathematics (McLeod, 1994, Smith, 2004, Asante, 2010), most female students of the University of Limerick in Ireland who participated in the study had considerable positive attitudes towards the subject than their male counterparts in the study. Sanchez, Zimmerman and Ye (2004) seems to agree with Carroll and Gill when they stated that girls perceive Mathematics to be a very important course than boys in America. Contributing to this debate, Eshun (2004) in a study on Sex-differences in attitude of students towards Mathematics in secondary schools, also added that there is no significant difference between the attitude of male and female students towards the study of the subject. The type of attitude held by a female student towards Mathematics is mostly influenced by gender stereotype. The perception of many people is that Mathematics is a male domain and hence boys perform better in it than girls. These beliefs and perceptions have greatly affected the attitude of female students towards the study of the subject (Asante, 2010, Mata, Monteiro and Peixoto, 2012). Studies conducted by Eshun (2004) concluded that the differences in attitude towards Mathematics and the sciences between males and females are declining. They added that areas where Mathematical concepts were developed to favour males have now either diminished or tailored to favour females and thereby leading to

equally higher performance in the subject and other science related subjects among female students.

2.6 CAUSES OF NEGATIVE ATTITUDES OF FEMALE STUDENTS TOWARDS THE STUDY OF MATHEMATICS

Negative attitudes of female students towards the study of Mathematics are triggered by a number of factors. According to Asante (2010), socio-cultural stereotypes, the attitudes and beliefs of the Mathematics teacher which he referred to as the teacher factor, the school environment, type of teaching methodology employed, the nature and type of teaching and learning materials (TLMs) used, level of parental involvement in female children's education and the perceptions and world views of female students about the subject.

2.6.1 Socio-Cultural Stereotypes

With regards to socio-cultural stereotypes, research (Gallagher and Kaufman, 2006, Gunderson et al, 2012, Ajai and Imoko, 2015) has shown that the minds of many girls in Africa have been conditioned by the society to see themselves as subservient to boys. The expectations of many African families for girls is to be equipped with some basic literacy and numeracy skills to enable them manage their families well and as well preserve the culture (Gallagher and Kaufman, 2006, Asante, 2010, Ajai and Imoko, 2015) . Boys on the other hand are expected to be decision makers and breadwinners in society. With these expectations, many parents and families prefer to invest heavily in boys' education than girls (Gallagher and Kaufman, 2006, Gunderson et al, 2012).

Gallagher (1998) also notes that from birth, children are socialized into male and female cultures by labelling some activities and subjects, such as Mathematics as male domain and others such as Home Economics as feminine. Some parents, teachers and peers, therefore, employ different strategies, such as rewards and punishments, to either encourage children or discourage them from pursuing their socially assigned subjects or otherwise. The high level of negative attitudes and anxieties towards the study of Mathematics among female students is therefore caused by these socio-cultural stereotypes which have been blamed for making female learners more susceptible and reduced self-confidence (Gunderson et al, 2012).

2.6.2 The School Environment

The school environment has also been identified as a major factor that influences gender differences in students' attitudes towards the study of Mathematics. The nature and type of environment learners find themselves does affect the type of attitude being developed. Students who find themselves in a hostile environment are more likely to develop negative attitudes than those in a congenial environment (Gallagher & Kaufman, 2006).

In a study on students and teachers' perceptions of the causes of poor academic performance in Nigeria, Asikhia (2010) stated that inconducive school environment such as large class size has not only contributed to the negative attitudes of learners but also, it has contributed to the poor academic performance of students. Classroom size, social interaction within the school (between students and school

authorities, or among students themselves), methods of assessment in the school and the content of the curriculum are some features of the school environment that influences learners attitude and interests in Mathematics (Gallagher & Kaufman, 2006).

2.6.3 The Attitudes and Beliefs of the Mathematics Teacher (Teacher Factor)

The role of the teachers' attitude and beliefs towards mathematics cannot be overemphasized. Teachers with positive attitudes and strong knowledge of mathematical concepts and principles are more likely to positively influence the attitudes of learners for the subject than those with negative attitudes and lack of confidence. Humorous, motivated, gender sensitive, devoted, friendly, encouraging and supportive teachers are more likely to develop positive attitudes among female learners of the subject than those with rude, low self-concepts, gender bias, uncommitted, unsociable, less encouraging and unsupportive teachers (Li, 1999, Asante, 2010, Mata, Monteiro and Peixoto, 2012 and Mensah et al, 2013). Research on student's attitude towards Mathematics performance: does the teacher attitude matter conducted by Mensah et al (2013) in Ghana disclosed that teachers who devoted themselves to encouraging and supporting their students did not only helped in shaping the attitudes and behaviours of their students, but also, they provided opportunities for their students to face difficulties associated with school life with ease. They added that "teachers are, invariably, role models whose behaviours are easily copied by students". With this, Mensah and his colleagues maintained that the

"likes or dislikes" of a teacher does have "significant effects" on the academic and psycho-social lives of his/her student (Mensah et al, 2013:135).

Yara (2009), however, asserts that, many teachers seldomly realize these important role played by teachers. A research on sex differences in learned helplessness reported that, female students of Junior and Senior High Schools are generally praised for outstanding performances in extra-curricular activities whiles male students are praised for their outstanding performances in Mathematics and perceived – difficult subjects assignments and tests (Dweck and Bush, 1976). Wedesango et al (2011) seems to agree with Dweck and Bush when they discovered that most female students in South Africa exhibit reduced interest and negative attitudes towards the subject and other Science related courses as a result of the influence of teachers of the subject. Wedesango and his colleagues asserted that, teachers often times give more opportunities to boys than to girls to perform hands-on practical demonstrations in mathematics lessons in most schools. They added that despite the fact that female students are equally talented with similar Mathematics aptitudes as males, most teachers of the subject interact favourably with male students than females during Mathematics lessons (either intentionally or unintentionally).

A study carried out on learners' attitude towards Mathematics and academic achievements in some selected schools in Nigeria revealed that learners are mostly characterised by positive attitudes towards Mathematics just like any other subject at the early stages of their academic persuasions. However, the demeanour, attitude, knowledge, skills and pedagogical techniques of the teacher are mostly responsible for the development of positive or negative attitudes of the student towards

Mathematics (Yara, 2009). In this regard, Yara proposed the development of high levels of mathematical competence and skills through comprehensive training of teachers, coupled with the development of positive, gender - sensitive attitude and appropriate and child-centred methods of teaching the subject.

2.6.4 Teaching Methodologies Employed During Mathematics Lessons

Douglas (2002) defines teaching methodologies as interventions adopted by a teacher to enable students arrive at a learning objective. He added that teaching and learning is a "dynamic interaction among four components: the teacher, the learner, the curriculum and the learned repertoire" (Douglas, 2002:4). Adding to this view, Ozkan (2011) emphatically stated that "teaching is not just a matter of telling stories, and learning is not just a matter of listening to stories". Ozkan defined teaching methods as "the types of principles and methods used for instruction" (Ozkan, 2011:1). Depending on the type of subject, content, environment, level of students and objectives of a particular lesson, a teacher may employ one or more of these identified teaching methodologies: activity or child-centred methodology, demonstration, lecture, question-and-answer as well as drama and role-play (Douglas, 2002, Smith, 2004, Mapolelo, 2009, Ozkan, 2011 and Mathematical Association of Ghana, 2013).

Researchers have stated that poor, gender-bias, teacher-centred, ineffective and inappropriate teaching methods employed by some Mathematics and Science teachers is responsible for the disillusionment, low self-concepts and efficacy as well as reduced interest of female learners for the study of the subjects

(UNESCO/UNICEF, 1993). According to Yara (2009), inappropriate teaching methodology employed by teachers has contributed greatly to killing the innate curiosity and aspirations of learners. Writing on the topic "poor teaching", Smith (2004) said that poor teaching is the process by which teachers employ inappropriate strategies that is characterised by a mismatch between the study curriculum and the needs of the student. He added that poor teaching also involves the inability of the teacher to identify the different learning and special needs as well as the behavioural learning styles of students so as to adopt appropriate strategies and measures to addressing those differing needs. Smith went further to state that poor teaching methods has only exacerbated the existing learning problems of students, but also, it has contributed adversely to the development of pupils with special needs in schools.

2.6.5 Use of Teaching and Learning Materials (TLMS) During Mathematics Lessons

Teaching and Learning Materials (TLMs) may be seen as any material that aids the teaching and learning process in classrooms. TLMs are mostly used by teachers to stimulate and engage the interest of learners during the learning processes (Mathematical Association of Ghana, 2013). Akuamoah, Ampadu, Asamoah, Baffoe-Bonney and Pray (2004) see teaching and learning materials as instructional materials that aid students to comprehend a given lesson. They went further to add that teaching and learning materials, also known as instructional materials is any audio-visual or teaching aid which contributes to the learning process. According to them, TLMs are now referred to as instructional media or multimedia in these contemporary times. Some examples of TLMs mostly used by instructors are real objects such as

photographs and sketches and drawings. The role of TLMs in promoting the understanding and raising positive attitudes of students towards studies cannot be overemphasized. According to Akuamoah et al (2004:148), the use of TLMs arouses the interests of learners and as well promotes self-learning and transfer of knowledge. It also provides an opportunity for students to participate actively in class thereby leading to a revamping of self-confidence among learners especially females. Finally, the use of TLMs brings Mathematics closer to the student by making the subject very practical and real.

Despite the significance of teaching and learning materials in Mathematics education, some teachers still teach the subject in abstraction without recourse to any teaching aid. Akuamoah et al (2004:148) postulated that such teachers end up being frustrated and aggravated for the inability of their students to perform well in the subject. Research studies have shown that most schools in developing countries such as Ghana are not equipped with the required instructional materials. Teachers in such schools are left to their fate to either improvise these materials or to do without them (Legotlo and Maaga, 2002).

The impacts of this situation on the academic performance of learners in Africa are quite devastating. Inappropriate and or no use of teaching and learning materials during teaching and learning processes does not only reduces the morale, interests and enthusiasms of learners, but also, it leads to the development of apathy, rote learning, poor academic performance and unfavourable attitudes towards studies among learners (Legotlo & Maaga, 2002, Allottey, 2012 and Akuamoah et al 2004).

2.6.6 Attitudes of Parents and Their Involvement in Female Students Education

The attitudes of parents towards their children directly influence their involvement in the education and academic performance of these children. Parents are considered as the first teachers of children. The type of attitudes, perceptions, beliefs and values held by children towards any subject, object and or a person, is believed to be greatly influenced by his/her parents. This is because, as first teachers of the child, parents and the family normally inculcates their own attitudes, values, interests, beliefs, customs and norms in the child, which in turn influences how he/she perceives things and behaves towards things and issues (Akuamoah et al 2004 and Mji and Makgato, 2006). Parents are valuable resources because they invest a lot in their children's education. Parents provide the required equipment such as school uniforms, school fees, books and other stationery for their children. The concept of parental involvement has been defined as the participation of parents in every facet of their children's education and development from birth through to adulthood. The term simply means that parents are actively involved in assisting their children to learn effectively in schools and out of school and as well partnering with schools in the decision-making and advisory process with regards to their children's education (National PTA, 2012). An "involved parent", according to LaBahn (1995:1) is one who is "sympathetic, understanding, reassuring and encouraging". LaBahn indicated that parents who show interests, and effectively involves themselves in the education of their children has contributed significantly to the academic performance of their children as well as renewed interests and favourable attitudes towards education.

Despite these seeming benefits of parental involvement, many parents in Africa are not effectively involved in their children's' education especially girls. Among the reasons accounting for low involvement of parents in their children's education are illiteracy, family pressures, financial challenges and perceptions of parents towards the child and subjects of study (LaBahn, 1995 and Akuamoah et al 2004).

Dandala (2013) found that literate parents were more involved in their wards education and choice of courses than illiterate parents. This he said could account from the fact that illiterate parents might not be fully aware of the importance of education let alone to know the significance of parental involvement. Family pressure is also another stumbling block to parental involvement. Socio-cultural problems such as divorce and single parenting coupled with time constraints may also affect the ability of a parent to effectively involve themselves in their wards education.

Supporting this assertion, Asikhia (2010) postulated that polygamous parents were less likely to be involved in their children's education and academic performances than their counterparts in nuclear families. This is so because, there is so much pressure in the polygamous of extended family as compare to the monogamous or nuclear family. Closely linked to this is financial pressure. The lack of or passive participation of some parents in their children's education is blamed on difficult economic situations of facing those families. Lack of or passive involvement of some parents does not necessarily mean they are neglecting their parental duties, but rather, they are financially handicapped (LaBahn, 1995).

Finally, the perception of many parents towards their female children has influenced the level of participation of those parents in their children's education. The perceptions of many parents within the African sub region towards females are that, girls and women play subservient roles such as home making, cooking and nursing of children. Females are also perceived to lack the innate abilities to pursue mathematics, engineering and science related subjects. With this notion, girls are only required to abreast themselves with some basic literacy and numeracy skills that would enable them to make a gentle pass in these subjects and to make use of these basic concepts latter in managing their marital homes and families. Parents with these negative perceptions and dispositions will rather prefer to invest their little resources on their male children rather than the female. This will surely lead to a less or no involvement of parents in the education and academic achievements of female learners (Gallagher, 1998, Gallagher and Kaufman, 2006).

2.6.7 The Perceptions and World Views of Female Students about Mathematics

Most female students are characterised by high levels of negative attitudes and anxieties towards Mathematics. As discussed earlier, socio-cultural stereotypes, gender-biased approaches to Mathematics teaching and learning, low parental involvements among others has contributed to making many a female student to perceive themselves as failures when it comes to Mathematics, Engineering, Technology and Science education. The world view of many girls about themselves are that they are weak in Mathematics and mathematical concepts, they are not gifted or talented in Mathematics and hence do not have what it takes to succeed in Mathematics tests (Cracker, 2006 and Gunderson et al, 2012). Also, some female

learners view the subject as an abstract, conundrous, challenging and less feminine savour (McLeod, 1994, Smith, 2004, Asante, 2010, Mata, Monteiro and Peixoto, 2012, Kiptum et al, 2013 and Ajai and Imoko, 2015). Some researchers has however presented self-relieving revelations by indicating that some female students, based on the findings of their studies demonstrated favourable attitudes towards the subject (Sanchez, Zimmerman, Ye, 2004, Eshun, 2004 and Carroll and Gill, 2011). For instance, a study conducted by Farooq and Shah (2008) among Secondary School students in Pakistan revealed that there was no significant difference in confidence levels and attitudes of male and female students towards Mathematics.

2.7 AN OVERVIEW OF STUDENTS MOTIVATION TOWARDS MATHEMATICS AS A SUBJECT

The role of motivation in learning Mathematics and achievement cannot be overemphasized. Motivational factors are very crucial in determining the kind of attitude students have towards Mathematics as a subject and their efforts in studying it. Motivation towards Mathematics has to do with the factors that inform and influence people and or students to pursue the subject. Students are motivated towards Mathematics as a school subject of study if their expectations are that it will lead them to a desired goal. According to Baba (2012), motivation is defined as the willingness of an individual to exert high levels of efforts towards the realization of organizational goals. Motivation is also defined as all the inner striving conditions such as wishes, desires and urges which leads to the stimulation of a person's interest in a particular activity (Ofoegbu, 2004). For Akuamoah et al (2004:214), "motivation is both the internal and external desires which pushes and sustains one's interest to achieve a goal". According to (Dörnyei, 2001), motivation is the motives behind the

performance of a given activity. She added that, these motives actually determine the kind of efforts being put into the activity and the period in which the activity is performed. Motivation involves the attitudes and affective states of a person that determines the degree of effort exerted towards the attainment of a desired goal (Saeman, 2009). Motivation for Mathematics may therefore be seen as those internal drives, desires and expectations which urge students and people to pursue Mathematics as a subject of study in schools. There are three components of motivation. They are; effort, desire and affect. Effort has to do with the energy exerted towards some activity. A student who is highly motivated will exert more effort such as attending extra classes and doing extra studies into his/her Mathematics and other subjects of learning. A desire for achievement will surely influence the seriousness of a student towards his/her studies. The affect component of motivation deals with the enjoyment, excitement and the fund associated with performing a task such as studying Mathematics. It must be noted that these three components of motivation are interrelated and interconnected. Any student who lacks any of these components might not be fully motivated for Mathematics and may hence find difficulties in studying and achieving in the subject which may subsequently result in the development of negative attitude towards Mathematics (Saeman, 2009 and Baba, 2012). According to Akurugu (2010), there are different kinds of motivation. They include intrinsic, extrinsic, instrumental and integrative motivations.

2.7.1 Intrinsic Motivation

Intrinsic motivation refers to the desire of an individual to do something for a self-conceived reward. With this kind of motivation, a student has the urge to learn

due to personal interests, desire and excitements. This kind of motivation has been identified as a kind that makes learning an enjoyable process which results in long lasting positive effects among students even after they have left school (Akuamoah et al, 2004, Akurugu, 2010). Intrinsic motivation is very crucial for the sustained development of positive attitudes of students towards Mathematics as a subject. Self-motivated factors such as a desire to be a renowned mathematician or accountant, to be highly respected by peers and to obtain a very good grade in Mathematics to qualify one for a university education are some examples of intrinsic motivation.

Saemann (2009) has further categorized Intrinsic motivation into intrinsic-knowledge, intrinsic-accomplishment and intrinsic-stimulation. According to him, intrinsic-knowledge has to do with the joy and satisfaction associated with gathering knowledge about something such as mathematical concepts. For instance, a student who is able to acquire thorough knowledge in a particular mathematical topic may feel satisfied and hence, will be motivated to acquire new knowledge in other topics. The excitement associated with the process of achieving a desired goal is what Saemann refers to as intrinsic-accomplishment. An example of an intrinsic-accomplishment is a student who is able to follow the right procedure as taught by the teacher to arrive at a correct result. With intrinsic-stimulation, a student who feels some sense of flow in understanding mathematical concepts and principles from the genesis of his/her encounter with the topic to the last lesson may be referred to as an intrinsic-stimulated student. In summary, intrinsic motivation is a psychological construct that reflects the "natural human propensity to learn and assimilate" (Richard and Edward, 2000:1).

2.7.2 Extrinsic Motivation

Looking at motivation at the work place, Armstrong (2007) sees extrinsic motivation as anything that is done to boast the interest of employees. For example, increased in salaries/wages, promotions, punishments and disciplinary actions are all factors that propel people to work. According to Akuamoah (2004:215), extrinsic motivation in education has to do with "learning that is related to outside influence or incentives such as rewards, praises, high grades and self-esteem". Extrinsic motivation is also seen as something that is done "because it leads to a separable outcome" (Richard and Edward, 2000:2). Extrinsic motivation has been identified as a very powerful tool for getting people to do things such as serious studies or hard work. Akuamoah and his friends observed that, students who are provided with all or most of the things (mathematical sets, pupils' text books, graph books and pocket money among others) are more motivated to learn Mathematics than those without those necessary items. However, it must be noted that the effects of extrinsic motivation is short lived. Through extrinsic motivation, people may engage themselves with some activities with resentments, compulsion and disinterests. For instance, a student may pretend to show interest in a particular subject due to some kind of reward promised by the subject teacher for performance in the subject. Such a student might not be able to keep this interest if the motivation factor is no longer in place (Armstrong, 2007). In this regard, although incentives may play critical role in developing positive interests among females and students in general, teachers of the subject and other stake holders in girls' education must rather put more efforts towards the intrinsic kinds of motivation for Mathematics education.

2.7.3 Integrative Motivation

Integrative motivation in education deals with the role of the target group (classmates or peers) in stimulating the interests of the individual student/learner. Supportive and friendly classmates are a motivation factor for students than unsupportive, unfriendly and bullying ones. Thus, female students who study Mathematics with supportive and encouraging classmates, peers and friends are more motivated to develop positive attitudes for the subject and as well perform in it than one who is studying with bullies (Saeman, 2009).

2.7.4 Instrumental Motivation

Pupils are motivated towards Mathematics if they identify knowledge and skills in Mathematics as a prerequisite for realizing a desired goal. For instance, most students at the Junior High level are motivated towards Mathematics because it is not only a core subject, but also, it is considered as a prerequisite for securing admission into a Senior High School (Akuamoah et al, 2004, Saeman, 2009 and Akurugu, 2010).

In seeking to develop positive attitudes among female students of Junior High Schools, it is imperative from these discussions on the various kinds of motivation for teachers of Mathematics to identify the different learning needs of students so as to determine the kind of motivation that will arouse the interests of learners in Mathematics.

2.8 THE EFFECTS OF STUDENTS' NEGATIVE ATTITUDES ON THEIR PERFORMANCE IN MATHEMATICS

The impact of negative attitudes of students towards the study of Mathematics is a debatable topic of discussion among scholars. Whiles some scholars have identified negative attitudes towards the study of Mathematics as a serious setback to the academic performance of students in the subject (Smith, 2004, Sanchez, Zimmerman and Ye (2004, Asante, 2010, Forgasz, Becker, Lee and Steinthorsdottir, 2010, Gunderson, et al, 2012 and Kiptum et al, 2013), others have indicated a weak correlation between the two variables (Eshun, 2004, Carroll and Gill 2011).

According to Smith (2004:5), learner's anxiety towards the study of Mathematics does affect the value they place on the subject and the confidence and seriousness attached to the study of the subject. A simple fear of Mathematics has caused serious challenges for the achievements and performance of many a student in the subject. Smith asserted that "students who fear Mathematics do not try as hard to understand and finish their homework as students who do not have the fear" of the subject. He added that, this type of students "set themselves up for failure before they even attempt to succeed". In a review of research and related literature on adult numeracy in London, Coben (2003) also reported that student's attitudes towards Mathematics do affect their learning of the subject. Coben's study revealed that students with positive attitudes towards the subject perform higher than students with negative attitudes. In explaining the relationship between attitudes and performance in Mathematics, Aiken and Dreger (1961) however argued that, although there is a strong correlation between the two variables, it is rather achievements that affects

students attitude and not the vice versa. According to them, students who obtains higher grades in Mathematics develops positive attitude towards the subject whiles those who obtains weak grades develops negative attitudes towards the subject.

A study conducted in Portugal among Basic and Secondary School students confirmed this argument. The study revealed that students with high academic performance had more favourable attitudes towards Mathematics than those with low academic performance (Mata et al, 2012). As to whether attitudes influences Mathematics performance or the vice versa, Mapolelo (2007) postulates that, perceptions and negative attitudes towards the subject has a great impact on students interests, enjoyments, achievements and performance in Mathematics. The conception of students about Mathematics as a subject of study determines how the subject is approached and studied. Students who see Mathematics as a difficult subject most often than not approach the subject with great anxiety and for that matter, a procedural and rule oriented subject. These types of students have mostly been identified as those who perform poorly in Mathematics (Mensah et al, 2013). Negative attitudes towards Mathematics do affect students' performance in many ways. According to Smith (2004:6), students with Mathematics anxiety may not only dread attending Mathematics lessons, but also it may hinder their working memory. He added that such students suffer a great deal of difficulty in studying and working Mathematics tasks and assignments due to unconcentrated mind. Quoting from Perina (2002), Smith postulated that "students who are anxious about Mathematics are less likely to continue working on mathematical problems if they fail to understand it the first time" (Smith, 2004:7).

A study on the relationship between attitude and Mathematics performance of students in the Keiyo South District Primary School, Kiptum et al (2013:248) revealed that boys generally perform better in Mathematics and Science related courses than girls in Kenya. They concluded that "*fewer female excel in Mathematics while majority under achieve. Fewer female than male continue with the study of Mathematics and related course at higher level of education, and that female are underrepresented in areas requiring certain qualification in Mathematics*". They made this revelation after analysing the results of the 2011 Kenya Certificate of Primary Education (KCPE) examinations. The results indicated a 49.94% pass for girls in Mathematics as compared to a 54.28% pass mark of boys. When it comes to the general arts courses however, Kiptum et al indicated that the results were better in favour of girls. This situation has led to many a female student pursuing art related courses to the neglect of Mathematics and Science related programmes thereby exacerbating the underrepresentation of women in the Science and Mathematics related careers.

Contributing to this revelation, Forgasz, Becker, Lee and Steinthorsdottir, (2010) postulated that, as a result of reduced interest of females in Mathematics, females are not only performing poorly in Mathematics, but also, it has resulted in underrepresentation of females in Mathematics related programmes and careers in most parts of the world. Subjecting students' scores to an independent t-test in his quest to examine sex differences in Mathematics performance among Secondary students, Asante (2010) indicated that girls were lagging behind their male

counterparts when it comes to Mathematics performance and achievements in Secondary Schools.

Also, a study conducted in Macedonia showed that only few students study Mathematics at the college and tertiary levels in Macedonia and that students graduating from the institutions in Mathematics were nothing to write home about. The study also indicated that the numbers at the Vocational and Technical institutions in the country were not different despite the efforts of the government through the Ministry of Education in Macedonia. This situation has contributed significantly to the low Mathematicians and Scientists not only in Macedonia but in many countries especially the African sub region (Atanasova-Pachemska, Lazarova, Arsov, Pacemska and Trifunov, 2015).

2.9 STRATEGIES FOR ADDRESSING NEGATIVE ATTITUDES OF FEMALE STUDENTS TOWARDS MATHEMATICS AS A SUBJECT

According to Kiptum et al (2013), negative attitudes of female students towards the study of Mathematics can be addressed through the development of gender friendly Mathematics curricula in schools. All Mathematics study materials must address the concerns and needs of both girls and boys at all levels. Another mechanism for instilling positive attitudes among female learners has to do with a transformed, gender sensitive and well trained teaching personnel at all levels of education. Teachers are seen as role models for their students. In this regard, a desire for positive attitudes of students towards Mathematics begins with the teacher. A teacher with positive attitudes towards Mathematics will surely influence his/her students positively than one with negative attitudes (UNESCO/UNICEF, 1993 and

Smith, 2004). Again, teachers who are competent and have thorough knowledge in the subject matter do influence their students positively in their subjects than those with limited knowledge in their subject area. Teachers must therefore do well to master their subjects so as to build positive attitudes among their students in their subjects of study. Teachers should also do well to be very supportive to their students especially those with learning difficulties (Akuamoah et al, 2004). Akuamoah et al added that teachers should try as much as possible to plan their work in order to meet the different needs, abilities, aspirations and levels of students. Asikhia (2010) also added that teachers must avoid making derogatory remarks about their students or else they risk killing their spirits of learning. Regularity and punctuality to work has also been identified as measures to developing positive attitudes among learners. Smith (2004) also called on teachers to eschew all forms of gender stereotypes and develop positive attitudes towards their female students, and offer them equal support and opportunities as boys. This will go a long way to boost the morale of the female student towards the study and success in the subject.

Closely linked to this is the type of methodology employed by the teacher during Mathematics lessons. Akuamoah et al (2004) and Asikhia (2010) have offered useful suggestions for teachers of Mathematics and the Sciences. As a motivation for learners, Mathematics teachers must adopt variety of child centred methods such as games and group works. In child centred methods of teaching, the teacher is expected to acknowledge and respect the individuality of the student and encourage him/her to develop his/her potentials. This situation according to Akuamoah et al makes learners

to feel very important, dignified and sense of satisfaction. In this regard, Mathematics teachers must make good use of teaching aids so as to arouse the interests and natural curiosity of learners in the subject. Introducing students to concrete or basic mathematical principles and ideas through to the abstract and complex ones has also been identified as another measure for building strong mathematical foundation of students (Smith, 2004).

Again, the government through the Ministry of Education (MoE) and the Ghana Education Service (G.E.S) should do well to provide schools with adequate learning resources such as text books, chalk, classrooms and furniture. This would not only contribute to promoting self-learning and self-confidence among students but it will also result in the development of positive attitudes (Akuamoah et al, 2004 and Mathematical Association of Ghana, 2013). Akuamoah et al went further to advocate for the need to make room for feedback so as to identify students' challenges in order to help them improve. Smith (2004) however advices that, teachers should desist from using mathematical problems as punishments for student misbehaviours in class or school since this situation has accounted for many students negative predisposition towards the subject. The Mathematics teacher must therefore be very creative and innovative if he/she is to develop positive attitudes among his/her students towards the subject. Use of cooperative learning –sharing of ideas among students has been identified by Smith (2004) as one of the mechanisms for addressing negative attitudes towards Mathematics among learners. Many educators have acknowledged the role of cooperative learning in not only Mathematics education in schools but in all subject areas. Students sometimes learn faster and

understand concepts better when it is being explained by their peers and friends (Douglas, 2002, Akuamoah et al, 2004 and Walshaw and Anthony, 2009). Furthermore, the influence of the attitudes of parents towards their children and their involvement in the education and academic performance of these children cannot be over emphasized. One of the measures therefore to addressing the negative attitudes of students towards Mathematics is a comprehensive involvement of parents in their wards education.

Considering parents as the first teachers of the child, Akuamoah et al 2004 calls for sensitization of parents to enable them take active interest in the education and achievements of their children – both boys and girls.

Finally, another mechanism for addressing the negative attitudes of female students towards the study of Mathematics is the development of Girls Mentorship Programmes (GMPs) in schools. According to UNESCO/UNICEF (1993), using female Mathematics and Science teachers in Senior High Schools over the years as mentors to girls has yielded tremendous results in many parts of Africa. Girls tend to see themselves as capable of achieving greater heights in these subjects when the have role models to look up to. Despite the difficulties associated with learning Mathematics, female students are encouraged and motivated to take up Mathematics and Science courses if they are surrounded by role models in that field (CAMFED, 2012, GEU, 2001 and Allotey, 2012).

2.10 CONCLUSSION

This chapter reviewed related literature on factors contributing to the negative attitudes of female students towards the study of Mathematics. The review considered some theories of attitudes and attitudinal formation and change among learners, general attitudes and perceptions of students towards Mathematics as well as an overview of students' motivation towards the subject. Others are the causes of negative attitudes of students towards Mathematics and its effects on their performance in Maths and some strategies for addressing negative attitudes of female students towards the study of Mathematics.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 RESEARCH PARADIGMS

According to Neuman (2006:81), research paradigm is a "general organizing framework for theory and research that includes basic assumptions, key issues, and models of quality research, and methods for seeking answers". Research paradigm has to do with the world view of the researcher with regards to theory and practices of the social world based on the researcher's orientations into the scientific world. Creswell (2003) explains that a research paradigm, which may also be referred to as a "knowledge claim" or a "philosophical assumption" is the beliefs, ideas and assumptions of researchers with regards to a social entity or study. It deals with their views of what to study and how to conduct a study in order to achieve a stated objective (Creswell, 2003:6).

According to Neuman (2006), there are three major methodological research paradigms. They are the positivism, interpretivism (social constructionism) and structuralism (pragmatism). He went further to state that there are two emerging research paradigms which are both critics to positivism and seems to be speaking in favour of interpretivism. They are feminism and postmodern approaches. Creswell (2014) also identified post positivism and advocacy/participatory as some additional research traditions. For the purpose of this study, positivists research tradition, the interpretivist and the pragmatist research traditions were considered.

3.1.1 Positivist Paradigm

According to Creswell (2014:8), positivism, also known as post positivism and or empirical Science, refers to a research tradition that is based on the philosophy of empiricism – which emphasizes on "cause and effect" relationship. Advocates of positivism, such as August Comte, John Stuart Mill and Emile Durkheim assumes that there is an analogy between the social and the natural science hence, social research must be conducted within the confines of what Creswell refers to as the "scientific method".

Neuman (2006:82) explains positivism as "an organised method for combining deductive logic with precise empirical observations of individual behaviour in order to discover and confirm a set of probabilistic causal laws that can be used to predict general patterns of human activity". Positivism may therefore be seen as an epistemological position or school of thought which advocates for the use of the physical science methods to study the social phenomenon. The main objective of a scientific research, according to the positivists' paradigm is to "explain" the cause and effect relationships between variables. In this light, the researcher must approach the subject of study with a clear, value-free and neutral mind, without any form of pre-set ideas, attitudes and beliefs. The researcher must therefore detach his/her feelings, values and believes from the study –thus, must play the role of an outsider in approaching the subjects of the study. That is the notion of naturalists or empiricist interpretation of objectivity (Neuman, 2006, Creswell, 2003, 2014 and Wiliam 2006).

Patton (2002:93-94) has observed that, most contemporary social researchers are more of post positivism than being rigid followers of the tenets of positivism like the founding fathers of the paradigm. According to Patton, unlike the positivists who support the belief that knowledge comes from one reality, post-positivists maintain that what constitute knowledge may come from many realities. They have admitted that, what constitute knowledge in the social world is different from that of the laboratory, in that true objectivity in the social world is very difficult if not impossible to achieve. Hence, the idea of objectivity should be a contextual issue and not a strait jacket issue.

3.1.2 Interpretivist Paradigm

The interpretivist paradigm, also known as social constructionism, idealism and qualitative sociology has been defined as "the systematic analysis of socially meaningful action through the direct detailed observation of people in natural settings in order to arrive at understandings and interpretations of how people create and maintain their social worlds" (Neuman, 2006:88). Interpretivism has also been defined as a philosophical research position that posits that our understanding of the social world is based on our experiences, exposure, beliefs and values (Walsham, 1993:5).

Interpretivism is said to be a critic of the positivist tradition which seeks to draw an analogy between the natural science/laboratory and the social world. Proponents of social constructionism such as Max Weber, Wilhem Dilthey, Alfred Schutz and Harold Garfinkel maintained that the social world is totally different from

the natural science phenomenon and that the logic of natural science is not and cannot be applicable in social research " (Neuman, 2006).

According to this paradigm, the main goal of social research is to understand (vestehen) the social world and not to be explaining and predicting human behaviour. The interpretivist believes that there is no single objective reality, but rather, there are multiple realities which are socially constructed by individuals and people based on their experiences and contextual interpretations. In this regard, interpretivists are of the view that social researchers require research procedures that reflect the distinctiveness of humans and their social institutions (Neuman, 2006).

In this light Creswell (2014) stressed on the concept of engagement and empathy of the researcher. The import is that, to be able to describe the intentions, meanings, reasons, values and beliefs people attach to their social world, the researcher must get closed to the pupil so as to view the world or phenomenon from their own perspectives. In effect, the researcher is expected, according to the social constructivists to be an insider (emic perspective), and that is the notion of objectivity as inter-subjectivity (Creswell, 2014 and Neuman, 2006).

Descriptive method which is a type of qualitative methodological approach is most adopted by social constructionists. The purpose of this approach is to explore and as well make insights into the experiences of people and meanings they attached to those experiences and not just experimenting and manipulating with statistical tools and formulae (Creswell, 2003, 2014, Neuman, 2006 and Williams, 2006).

3.1.3 Pragmatists Paradigm

Another paradigm that governs social researchers is pragmatism. According to Creswell (2014), pragmatism is a research tradition that blends both the positivists and the interprevists views in research studies. Pioneered by Pierre Bourdieu, Mead and Dewey, pragmatism is a "philosophical" research paradigm that advocates on the adoption of appropriate research methods and techniques based on the research purpose, and not just based on the nature and type of research study (Creswell, 2003:11-12).

According to the pragmatists, the social world is not an absolute unit with absolute reality as postulated by the positivists, but rather, the social world is characterized by multiple realities as maintained by the interpretivists. In this regard, the pragmatists maintain that researchers must be given the "free" will to adopt appropriate "methods, techniques and procedures that best meet their needs and purposes" (Creswell, 2003:12).

The pragmatists therefore recommend the mixed method (quantitative and qualitative) approaches to conducting research. According to Creswell (2003:12), the main thrust of pragmatism as a research paradigm is to deal with the "what and how" of a research. Thus, the concern of pragmatists is "what works" well in a given research study based on the given situation or context.

3.1.4 Paradigmic Position

This study was situated within the confines of the interpretivist paradigm because of the researchers' assumption that reality in terms of the factors contributing to the negative attitudes of female students towards the study of Mathematics in selected Junior High Schools in the Tolon District is not only relative, but also, it is multiple and contextual. It was also situated on the interpretivist paradigm because reality as an interpretive device is socially constructed based on the meanings participants attached to their perceptions, experiences, exposure, beliefs and values (Walsham, 1993:5 and Neuman, 2006:88). According to Creswell (2014), social reality is a product of meaningful social interactions among people as perceived from participants own view points and not from the view point of the researcher or observer.

The study was also situated within the purview of the social constructionists paradigm because each of the individual participants were unique and distinct in their perceptions, values and attitudes and that the researcher therefore needed to engaged and empathized with them by employing the insider's view (emic perspective) in order to identify factors contributing to their negative attitudes towards Mathematics (Neuman, 2006, Creswell, 2014).

Again, the researcher situated the study within the interpretivist paradigm because, the main aim of the study was to understand, define, describe and interpret the behaviours of the participants with regards to the factors that are contributing to their negative attitudes towards the study of Mathematics.

3.2 RESEARCH APPROACH

Research approach, tradition or framework is the backbone of any research. Research approach provides a framework for conducting research. According to Creswell (2014), research tradition has to do with the range of approaches that are employed in research studies from the beginning of the study to the end so as to realize the study goals and objectives. Research approach has also been seen as structure, strategy and plan of action that researchers follow to find answers to their research questions (Akurugu, 2010: 95). The three main research approaches, traditions or methodologies are the quantitative, qualitative and the mixed method approaches (Creswell, 2014, Opoku, 2005, Neuman, 2006 and 2009). In this study, the qualitative research approach/tradition was employed.

3.2.1 Qualitative Research Approach

Qualitative research is a type of social research that produces non-numerical data. Qualitative research aims at reporting a situation or phenomena as it exist in the natural setting rather than a laboratory setting. The main thrust of qualitative research, therefore, is to answer questions set by the researcher, mostly in a form of words, actions or visual symbols (Lee, 2006, Neuman, 2006).

According to Creswell (2014:18), qualitative research is based on the social constructivists' tradition on knowledge claims which mostly uses "open-ended emerging data" to develop "themes' from the gathered data. Creswell added that some strategies of qualitative research are narratives, phenomenological, ethnographic, case studies and grounded theory.

Qualitative research was deemed appropriate for this study because of its role in extracting in-depth information on social phenomenon. According to Johnson and Christensen (2008:6), qualitative approach is the best method to understanding social phenomenon especially on abstract issues such as "perceptions, attitudes, behaviours, beliefs, opinions, emotions, world views and culture". Qualitative research is also useful for identifying and measuring such intangible factors such as religion, ethnicity, gender roles, socio-economic status and norms (Mack, Woodson, McQueen, Guets and Namey, 2011).

Marie (1997) also maintains that qualitative research is not only useful for digging into a little known phenomenon, but also, it is very instrumental for gaining new and emerging perspectives on known areas. Again, qualitative design was more appropriate because it offer the participants the opportunity to respond more elaborately on issues raised than they would have in a standardized "yes or no" session, but also, the researcher had the opportunity of probing more into responses that were not clear enough (Mack et al, 2011).

Furthermore, as postulates by Neuman (2003), this approach enabled the researcher to thoroughly engage the respondents through historically empathizing with them to enable the researcher understand or find answers to the factors contributing to the negative attitudes of female students towards Mathematics from their own perspectives. This situation was necessitated by the fact that, the nature of reality of human attitude and behaviour is best constructed by the person's involved (respondents).

Neuman maintained that qualitative researchers place premium on the social context of a given phenomenon. Data becomes distorted and meaningless if a social phenomenon is detached from its contexts through reducing the social phenomenon to "numbers and variables" (Neuman, 2006:156). According to Mack et al, (2011), participant observation, focus group discussions and in-depth interviews are research design strategies associated with qualitative research.

3.3 RESEARCH DESIGN

The researcher employed the Case Study research design in the study. With this design, the researcher did describe explain, interpret, and assesse the factors contributing to the negative attitudes of female students towards the study of Mathematics in four selected Junior High Schools in the Tolon District. According to Opoku (2005), Case Study is a systematic study into an event, or set of related events with the intent of describing a social phenomenon. According to Creswell (2014:14), Case Study is a design that offers the researcher the opportunity to do an in-depth exploration and description of a particular real life social phenomenon through various data collection procedures. Findings from the study are then used to apply to other cases and contexts.

The Case Study design was deemed appropriate for this study because of its relevance in enabling individual researchers to conduct rich, in-depth and detailed study on a given situation within a limited time frame (Creswell, 2014:15, Pamela and Susan, 2008). With the main aim of identifying and understanding the factors accounting for the negative attitudes of female learners in Junior High Schools in the Tolon District towards the study of Mathematics from individual female students, the

could not have been a better research design than the case study. This is because the design is very instrumental in studying the dynamics and perceptions of female learners of Junior High Schools towards the study of Mathematics (Yin, 2008).

3.4 POPULATION AND SAMPLING

3.4.1 Population

According to White (2005:112), population is the sum totals of all the cases that meet the definition of the unit of analysis of a study. A population refers to an "abstract idea of large group of many cases from which a researcher draws a sample and to which results from a sample are generalized" (Neuman, 2006:224). Neuman added that a target population refers to a specific pool of case that a researcher seeks to study. A population may be seen as a collection of objects, events or individuals having some common characteristics that the researcher is interested in studying. The target population of this study comprised all female students of Junior High Schools in the Tolon District of the Northern Region of Ghana, as well as Mathematics teachers and female non-Mathematics teachers in the District.

3.4.2 Sampling Technique

According to White (2005:114), sampling is the process of selecting samples (units/elements) from a sample frame for a study. Sampling has to do with extracting or "getting a representative sample from a large population, such that the researcher can study the smaller group and produce accurate generalizations about the larger group" (Neuman, 2006:219).

The sampling technique employed in this study was the non-probability sampling. Non probability sampling, according to Neuman, is a qualitative sampling technique that does not necessarily strives for representativeness, but rather, respondents are selected based on their "relevance to the research topic" (Neuman, 2003:220). Quota sampling, purposive sampling, convenient/accidental/haphazard/availability sampling, snowball, deviant case, sequential and theoretical sampling has been identified as some types of non-random sampling technique (Neuman, 2006, Creswell, 2014, Williams, 2006 and White, 2005).

In this study, the purposive, also known as the judgmental sampling strategy was employed. Purposive sampling, according to Creswell (2014) is a process of selecting respondents based on their relevance to the subject of study. Purposive sampling is based on the judgment of the researcher. The researcher selects participants who are deemed as persons with the required knowledge and expertise (having adequate and useful information) with regards to the topic of discussion (White, 2005). Neuman (2006) also added that, if the purpose of a researcher is to obtain a deeper understanding of an issue through an in-depth investigation, then the purposive sampling is the appropriate strategy to employ.

3.4.3 Sampling Size

Sample size refers to the actual number of subjects, individuals or cases selected from the target population. Due to time and resource constraints, the researcher employed a relatively few and manageable sample size of about twenty-four (24) participants from four selected Junior High Schools in the District. The samples comprised twelve (12) female students (three from each of the four Junior

High Schools) and four (4) Mathematics teachers (one from each of the four schools). Eight (8) female non-Mathematics teachers (two from each school) were also selected for a Focus Group Discussion with regards to the factors accounting for the negative attitudes of female learners towards Mathematics.

The selection of the sample sized was based on Gajendra and Kanka (1990) position on sample size for a Case Study. According to them, Case Study is the "presentation and interpretation of detailed information about a single subject, whether an event, a culture or an individual". They posited that, Case Study is "not practicable with a very large sample" but rather a "small group of individual units or individuals" (relatively small sample size). They maintains that, Case Study is essentially about an "in-depth, detailed and intensive analysis and an evolutionary description of and individual" (Gajendra and Kanka, 1990:81 and Merriam, 2009). Miller (1991:48) also supported this assertion by stating that a research study which is "based on a representative sample is often better than a large sample or whole population, for there is no need interviewing large numbers of participants saying the same thing".

The rationale behind this selection was due to the fact that these female students as well as the teachers are directly involved in the teaching and learning of Mathematics and could does provide the researcher with the adequate and needed information on factors accounting for the negative attitudes of female students towards the study of Mathematics. Again, these participants were deemed necessary because they are the most affected persons of the conundrums associated with these

negative attitudes and could does provide the needed information on how to address the issue.

3.5 RESEARCH INSTRUMENTS

Unstructured observation and unstructured face-to-face interview have been identified as some of the research instruments associated with Case Study (Neuman, 2006). In this study, face-to-face in-depth one-on-one interview and focus group discussion were employed as data collection instruments.

3.5.1 Face-to-Face in-depth Semi-structured Individual Interview

This study employed a face-to-face in-depth open-ended individual interview to solicit the views, ideas and opinions of female students and Mathematics teachers, with regards to the factors contributing to the negative attitudes of female students towards the study of Mathematics in Junior High Schools in the Tolon District of the Northern Region of Ghana. An interview is a two-way conversation in which the interviewer asks the participants questions and recording the responses with the aim of learning about the ideas, beliefs, opinions and behaviours of the participant (Maree, 2007:35). Face-to-face interview therefore is a social interaction between an interviewer and an interviewee where the interviewer poses questions and records the answers given by the interviewee (Neuman, 2006, Creswell, 2014).

Despite the ills (time consuming and the interviewer effect) associated with open-ended face-to-face one-on-one interviews (Neuman, 2003), this instrument was useful for the success of this study. It did not only allowed for an in-depth and interactive discussion between the researcher and the respondents, but also, it enabled

respondents to freely expressed their opinions, ideas, feelings and perceptions without any form of fear or favour.

Again, it created an opportunity for the interviewer to probe more into unclear responses from the participants. This instrument enabled the researcher to obtained more detailed information about participants' perceptions about Mathematics as a school subject. Participants also had the opportunity of asking for clarity on questions that were not very clear to them. Furthermore, the instrument gave the researcher the opportunity to study the moods and body language (non-verbal communication) of the respondents. Through this instrument, the researcher had the opportunity of validating the authencity of his findings since it was not so difficult to identify incorrect responses from participants.

Through the use of interview guide, the researcher obtained relevant, first-hand, in-depth and rich information from participants with regards to the factors accounting for female students negative attitudes towards the study of Mathematics. Some of the questions discussed during the in-death interview included: (1) in your opinion, is Mathematics a difficult subject? (2) What are the factors accounting for the negative attitudes of female students towards the study of Mathematics? (3) What are the effects of these negative attitudes on Mathematics achievement and performance of female students in the District? (4) How can these negative attitudes of female students towards the study of Mathematics be addressed?

3.5.2 Focus Group Discussion

In order to enhance the validity of the research findings, the study also employed a face-to-face interview with some female teachers in the selected schools. The researcher sought permission to interview some female teachers in the selected schools to solicit their views on factors contributing to the negative attitudes of female learners towards the study of Mathematics in the District. This accounted from the fact that these female teachers were deemed to have both past and present experiences with regards to Mathematics as past students and currently, teachers. Each focused group discussion lasted for about sixty minutes. There were two to five members in each session. Panel members in all the various discussions did express their views with regards to the topic of discussion based on their personal experiences. The discussions ranged from female students feelings and anxieties about Mathematics, to whether or not Mathematics is a difficult subject and what can be done to address the negative attitudes of females towards the study of Mathematics.

Prior to each of the discussion sessions, the researcher, together with the participants set the rules that will govern the discussion. Each participant was given the opportunity to speak for about two minutes without any form of interruption from another participant. Questions were evenly distributed to participants and each participant had the option to answer or pass the question on to any other person. Members were at liberty to answer the whole question or provide a partial response, or even offer responses that were opposed to others views, opinions and positions. The researcher, in the process of the discussion then took down notes for latter

compilation. It must be noted that in almost all the cases, the researcher gave prior notice to the interviewees about his intention to have an in-depth focus group discussions with them.

3.6 DATA COLLECTION PROCEDURE

The data collection procedure that was followed in conducting this study is discussed below. After permissions were granted from the District Director of Education and the Head Teachers of the selected schools, the researcher went further to make arrangements with the Head Teachers and the respondents on a convenient date and time for the interview sessions. The researcher introduced himself and presented his credentials to the respondents at the genesis of the interview sessions. The researcher also stated the purpose of the study, the duration of the interview sessions as well as their rights and responsibilities with regards to participating (ethical considerations) in the study.

Each interview session began with an introductory statement such as "there is so much concern about the negative attitudes of female students towards the study of Mathematics. I am conducting a research to find out the factors contributing to the negative attitudes of female students towards the study of Mathematics in selected Junior High Schools in the Tolon District. I am interested in exploring your ideas, opinions and experiences about this topic under discussion. I would therefore, want you to tell me about your experiences, views and opinions with regards to the factors accounting for the negative attitudes of female students towards the study of Mathematics, its effects on female students' Mathematics achievements and performance, and how these negative attitudes can be addressed".

Through the use of interview guides, the researcher engaged the interviewees in thorough, in-depth and detailed discussions with regards to the topic of discussion mostly after school hours, so as not to disrupt academic work. Each individual interview session lasted about thirty (30) to thirty-five (35) minutes whiles the focus group discussions took about an hour. The researcher used note taking as a tool to recording the responses provided by the interviewees during the interview processes.

3.7 DATA ANALYSIS

The researcher analysed the collected data from the participants manually or through content analysis. According to Marie (1997), qualitative data analysis involves the organization and breaking down of data into manageable units, and synthesizing them into patterns so as to arrive at a reliable and meaningful conclusion. The researcher read through the interview notes several times to become familiar with it before examining the data in detail so as to carry out what Straus (1987) cited in Neuman (2006:461) described as "open coding" (categorization and grouping of data into themes). Open coding is defined as the first process of condensing or reducing large volumes of data into smaller and manageable categories, codes and themes (Silverman, 2001 and Neuman, 2006).

According to Miles and Huberman (1994:56) cited in Neuman (2006:460), "codes are tags or labels for assisting units of meaning to the descriptive of inferential information compiled during a study. Usually, codes are attached to varying size – words, phrases, sentences or whole paragraphs, connected or unconnected to a specific setting". The next step of the analysis was to group similar coded themes into tentative categories. This type of coding, according to Straus is the axial coding.

Following this step was the selective coding stage. The major themes developed at the previous stage as well as the codes were critically scanned to identify further similarities and differences for a relabeling and development of broader and major themes for final descriptions and explanations (Neuman, 2006). Findings were derived from emerging themes from data.

In order to ensure the trustworthiness and credibility of the data, the services of an independent coder was thereafter sought by the researcher to code and categorize the data. The independent coder was presented with the raw interviewed texts alongside the research objectives to code (categorize the data into groups and themes). Differences that arose from the coded themes between the researcher and the independent coder were discussed, rectified and integrated, so as to arrive at uniform categories, codes and themes. Results of the analysed data are presented in the next chapter.

3.8 LIMITATIONS

The study was affected by a number of challenges. They included: few sample size, inability of some respondents to communicate effectively in English Language as well as difficulties in answering open-ended questions by respondents. Others were time, logistics and financial constraints.

To begin with, the use of four schools out of a total of 19 Junior High Schools in the District as a result of time and resource constrains may affect the generalizability of the research findings. Also, the inability of some respondents to communicate effectively both in the written and spoken English Language posed

some problems to the research work especially the open-ended questions. The researcher has to spend more time than expected in explaining the questions to individual respondents mostly in their mother tongue so as to enable them provide the needed and accurate information. Again, the interview sessions and focus group discussions was mostly carried out during working hours and meant being absent from duty hence could affect his work output.

With determination and singleness of purpose of the researcher however, these challenges was properly managed through the following measures: use of simple English to enable respondents to be able to understand the questions. The researcher also helped the respondents to understand the questions properly by explaining the questions to those with difficulties in their mother tongue (Dagbani) as and when necessary.

3.9 ETHICAL CONSIDERATIONS

According to Neuman (2006:129), "ethics is what is or is not legitimate to do or what a 'moral' research procedure involves". Ethics are generally considered to be concerned with beliefs about what is right or wrong, proper or improper, good or bad (White, 2005). Research ethics may therefore be seen as a set of general moral principles governing the conduct of research with regards to dealing with participants and other research materials. According to Neuman (2006), social researchers must be very mindful, tactful and prepare themselves to observe research ethics (code of conducts) as they design and conduct their studies "so that sound ethical practice is built in to the study" (Neuman, 2006:129). Some ethical issues considered in this study are discussed as follows:

3.9.1 Permission: The researcher sought and was granted written permissions to carry out the study in the selected Junior High Schools by the District Director of Education as well as the Head Teachers of the selected schools.

3.9.2 Debriefing: All the participants to the study were debriefed of the purpose of the study as well as the mode of data collection and what is expected of them.

3.9.3 Informed Consent: All the participants in the study were given written forms that described the research objectives and procedures to append their signatures as an evidence of consent to participate in the study. In line with Neuman (2006) position on informed consent, the researcher explained the risks and time involved in participating in the study. Participants were also informed of their right to participate or not to participate in the study. Finally they were also informed of their right to withdraw or discontinue participating in the study at any time they felt they were no longer interested in participating in the study, without any fear.

3.9.4 Voluntary Participation: According to Neuman (2006), people must not be coerced into participating in a research study, but rather, they must be given the free will to participate or do otherwise. The researcher gave participants enough time to freely/voluntarily participate in the study or do otherwise after the details of the study were communicated to them.

3.9.5 Anonymity: The researcher did not identify any respondent with a given response. Responses from participants were rather represented by alphabetical letters and not their names or any form of identity that may lead to any form of traces to them. This was also done in accordance with Neuman's (2006:139) position on anonymity. He says that participants in a study must remain nameless and unknown.

3.9.6 Confidentiality: According to Neuman (2006), confidentiality is a situation in which the researcher keeps information provided by respondents secret from public view so that there is no traces whatsoever that will lead to the identification of the individual. The researcher did not disclose any given responses from participants publicly. Participants were also assured that, any information that may embarrass them or endanger their friendship and relations would not be disclosed.

3.9.7 No Harm to Participants: Neuman (2006) also added that researchers must strive to ensure that participants to their studies do not suffer any form of harm (physical, psychological and emotional) as a result of participating in their studies. The researcher therefore considered the needs and concerns of the participants in the research process, and therefore took oversight responsibility in the interview processes. The researcher took the general well-being of the participants as a top priority throughout the study. Hence, the researcher assured the participants of doing everything at his disposal to protect them from any form of harm as long as participating in the study was concerned.

3.9.8 No Deception of Subjects: According to Mack et al (2011), deception of subjects has to do with a deliberate misrepresentation of facts in order to make another person (subjects) belief in what is not true. The researcher, throughout the study, maintained an open, honest, dignifying, frank, objective, focused and professional relationship with the respondents. Having introduced himself to the respondents, the researcher was very clear to the respondents that the study was meant for academic purpose.

3.10 RELIABILITY AND VALIDITY (AUTHENTICITY AND TRUSTWORTHINESS)

According to Neuman (2006), validity and reliability are basic requirements of both quantitative and qualitative research, although the terms are applied differently by quantitative and qualitative researchers. Creswell (2014) added that, despite the fact that the terms validity and reliability connotes quantitative measurements, and has therefore created a lot of debate among scholars, it is still very important for qualitative researchers to ensure that their study or findings are trustworthy, credible, authentic and accurate.

3.10.1 Validity

To ensure validity, the researcher followed the proper procedure in conducting interviews as prescribed by Neuman (2006). The interview guides developed by the researcher for the interview sessions were crossed checked by the research supervisor to find out if they could measure or describe what they were supposed to measure or describe. As suggested by Creswell (2014:196), the researcher also ensured validity by employing the following strategies: one, member checking, specific descriptions emanating from the studies were taking back to the respondents to determine the accuracy of the descriptions before the report were finally compiled. Two, the researcher did not only used “rich and thick” descriptions of participants responses, but also, the researcher captured the exact responses from some of the participants to buttress some points as deemed necessary. Three, the researcher used more than one strategy during the data collection process (triangulation) - face-to-face one-on-one interview and focus group discussion.

Validity, according to Creswell (2014:195) "determines whether the findings are accurate from the standpoint of the researcher, the participant or the reader". Kvale (1996:236 cited in Neuman 2006) also sees validity as "the truth and correctness of a statement". It must be noted that all these measures were aimed at ensuring internal validity (the extent to which findings represent the phenomenon being studied). Scholars have however identified another form of validity that must be ensured in a research study – external validity, which has to do with the extent to which research findings can be generalised to the wider population (Creswell, 2014).

Furthermore, validity in qualitative research can be in the form of descriptive, interpretative, generalizable or theoretical. In this case, the study could be said to have employed the descriptive (factual accuracy of the data/account) and generalizability (findings useful in understanding similar situations / phenomenon).

3.10.2 Reliability

The researcher ensured that findings of the study were credible and could be relied upon for decision making by embarking on processes that sought to eliminate or minimize distortions and causal errors that could affect the results. One key strategy was the use of an independent coder to assist in the data analysis processes. Another strategy was member checking as stated earlier. With the permission of the respondents, the researcher also took photographs of some of the interview sessions as suggested by Neuman (2006).

Through the use of "rich and thick" descriptions with direct quotes, the researcher did not only ensure credibility, but also, transferability was ensured. With these descriptions, readers of this research report would be able to determine the

applicability of these research findings in new and similar situations. Reliability is defined as the 'accuracy or precision of an instrument"; the degree of consistency or agreement between two independent derived sets of scores; and the extent to which independent administrations of the same instrument yields similar results under comparable conditions" (White, 2005:197). Neuman (2003:196) has summarized the term by saying that "reliability means dependability or consistency". A reliable research therefore is one that can produce same or similar results when replicated in a same or similar situation or phenomenon with the same or similar subjects.

3.11 CONCLUSION

This chapter discussed the various methodological research paradigms. It went further to identify the interpretivist paradigm as a suitable paradigm for the study; the chapter also discussed the qualitative research approach as the appropriate approach for this study. With regards to research design, the chapter discussed Case Study as a design strategy employed in this study. The purposive sampling strategy as employed in the study was also discussed. Discussed in this chapter also, were the in-depth face-to-face one-on-one interview and focused group discussions as the appropriate data collection strategies / research instruments employed. The chapter also made an extensive discussion on the data collection procedure and data analysis adopted in the study. Finally, the chapter also discussed the ethical considerations as well as reliability and validity (authenticity and trustworthiness) issues ensured in the study.

CHAPTER FOUR

DATA PRESENTATION AND DISCUSSIONS OF FINDINGS

4.1 PRESENTATIONS OF RESPONSES AND EXCERPTS

The responses and excerpts of the various respondents – female students, Mathematics teachers and female non-mathematics teachers are presented in this section.

4.1.1 Presentation of Responses and Excerpts from Female Students, Mathematics Teachers and Female Non-Mathematics Teachers

4.1.1.1 School Related Factors Responsible for the Negative Attitudes of Junior High School Female Students towards the Study of Mathematics

The respondents listed the following as the school related factors responsible for the negative attitudes of Junior High School female students towards the study of Mathematics: Mathematics lessons being taught in the afternoon, overcrowding of students in class, lack of fun when learning Mathematics, most Mathematics teachers are men, amorous relationships between some male Mathematics teachers and female students, inadequate teaching and learning materials in schools and Mathematics teachers habit of rushing lessons when teaching in class which do not favour slow learners. The following excerpts support these responses: **Respondent A (Student):** *I think it is not good that we learn Mathematics in the afternoon, we are also too many in class and also our Maths teachers are all men so I think Maths is for men. Our teachers always rushing when teaching us so we the slower learners do suffer a lot.*

Respondent G (A Focused Group Female Teacher): *Most Mathematics teachers are male so the female students think Maths is for boys and not girls.*

Others are, inadequate qualified Mathematics teachers, lack of motivation by the female students to study Mathematics, unfair treatment of female students during Mathematics lessons by some male teachers creates fears in girls and that makes them feel reluctant. the perceptions that Mathematics is difficult, lack of sufficient interest in Mathematics at the early stage, inappropriate teaching methodologies often adopted by some teachers in class and the failure to repeatedly practice basic arithmetic's in Mathematics. The excerpts below confirm these views: **Respondent C (Mathematics Teacher):** *These factors are inadequate teaching and learning materials in Mathematics. Inappropriate teaching methods adopted by some teachers in class and failure to repeat the practice of basic arithmetic in Mathematics.* **Respondent D (Mathematics Teacher):** *The first factor is the perception that Mathematics is difficult. The next is lack of sufficient interest in Mathematics at the early stage.*

4.1.1.2 Societal and Cultural Beliefs about Women and Girls That Have an Impact on Their Attitude towards the Study of Mathematics

The societal and cultural beliefs about women and girls that have an impact on their attitude towards the study of Mathematics, according to the respondents were: the belief that girls' education is not important, the belief that Mathematics is not for women and negligence of some parents in providing the educational needs of their girl children. Others are peer group influence and the overburdening of girls with household chores which do not allow them to revise and practice what was learnt in

school. The following excerpts support these claims: **Respondent C (Student):** *At home they always say Maths is for men and not women. Again, we have no time to study at home because of work: fetching water, fire wood, cooking and washing.* **Respondent F (Student):** *My parents do not buy books and other maths materials for me because the say girls' education ends with marriage.*

The respondents further revealed that in most communities, people perceive that Mathematics is for boys and not girls because girls are not intelligent. Mathematics teachers are always men and not women. Girls are not supposed to play certain games which are mathematically inclined. Women who study Mathematics and Sciences are feared by men – hence, they find it difficult getting husbands. At home, girls are expected to be busy working with their mothers and not studying so they lack time to practice Mathematics. The responses below support the claims above: **Respondent E (A Focused Group Female Teacher):** *Girls have less time for learning at home because of work and the perception that women who pursue Maths and Science find it difficult to get husbands because men fear them.*

Again, in most communities in the Tolon District there is the perception that a woman's place is in the kitchen. Among her responsibilities are child bearing, nursing and serving the husband. Women are also expected to play subservient role to men whiles their needs are provided by either their husbands or male relatives. The following examples support these: **Respondent A (Mathematics Teacher):** *The people of this community always say Mathematics is for boys and not for girls, Maths teachers are always men and not women and they also believe that girls are not supposed to play certain games in the house but those games are Mathematical*

oriented. **Respondent B (Mathematics Teacher):** *In our society, there are beliefs that women talents are for household chores, child bearing and not mathematical or scientific purposes and that men are always superior over women in all matters.*

Moreover, there is the perception that girls who do well in Mathematics are levelled as witches. They are believed to be draining the knowledge of their class mates to perform well. The following excerpts confirm these mentions: **Respondent B (A Focused Group Female Teacher):** *In this school girls who do well in Mathematics are called witches because they draw knowledge from their class mates in order to perform well.*

4.1.1.3 Factors Relating to Mathematics Teachers that Influences Female Students to Develop Negative Attitude towards the Study of Mathematics

The following were identified as the factors within Mathematics teachers that have an influence on female students' negative attitude towards the study of the subject: Beating and canning students for slow understanding of mathematical concepts, making sexual advances on the female students, lateness to class and poor attention for slow learners especially females. *The teacher comes to class late; he spends most of the time telling stories and tries to make friendship with the grown and beautiful girls in the class.* **Respondent C (Student)** retorted**.** Also, most Mathematics teachers are not patient enough to assist students especially the slow learners by further explanations when they do not understand. Some teachers just consider girls to be lazy and weak in Mathematics and other Science related subjects. They come to class with anger and keep shouting on students at the least provocation. They verbally abuse or insult any student who is not able to provide correct answers

to their questions in class. *Our teacher get annoy quickly and shouting and insult you if you don't give correct answer in class and has no time for we the girls who do not understand easily.* **A female student Respondent (D**) observed. It was also revealed that some Mathematics teachers are not only poor in the subject matter, but also, they spend most of their instructional time telling stories and reading Mathematics problems to their students in class instead of assisting them to work out the problems. Some do not only use inappropriate teaching methodologies, but also, they do not use concrete teaching learning materials. **Respondent G (A Focused Group Female Teacher):** *It is about the competency level of the teacher and his/her choice of appropriate teaching method and TLMs.* **Respondent C (Mathematics Teacher):** *You see, some Maths teachers are not able to use suitable methods when teaching Mathematics and making female students think Maths is a very difficult subject to study.*

Again, some Mathematics teachers discourages the female learners in Mathematics through statements such as "Mathematics is a very difficult subject, Mathematics is for boys and not for girls" among others. Below are some excerpts of the participants' responses: **Respondent F (Student):** *Our Maths teacher always tells us that Maths is very difficult, it is for boys and not girls and also he likes canning us.*

Furthermore, some Mathematics teachers favour boys over girls in class. Some teachers always ask the boys to attempt solving mathematical problems first before the girls are made to attempt. Again, others give simple mathematical problems to girls with the notion that they are not good whiles the difficult problems are given to boys. **Respondent B (A Focused Group Female Teacher):** *Teachers*

sometimes consider female students to be lazy and weak so will always perform poorly in Mathematics. Some teachers are too fast and rushing to cover the syllabus without paying attention to the slow learners. Use of cane during lessons by teachers also deters girls since they fear cane a lot. Inadequate motivation for female students in Mathematics as well as poor mastery of the subject by some teachers was also identified. **Respondent A (Mathematics Teacher):** *These factors are: favouritism of boys over girls in class, teachers caning and rushing to cover syllabus when teaching.*

4.1.1.4 Home and Family Factors that Influences Female Students to Develop Negative Attitude towards the Study of Mathematics

The home and family factors that play critical roles in influencing the attitudes of female students towards the study of Mathematics according to the respondents are: little time at home for studies due to too much work (household chores), illiterate and unsupportive parents, lack of materials to study at home, lack of motivation and encouragement from parents (parental involvement), family poverty and hunger during lessons. Some parents do not provide the needed books and learning materials to their girl children, and above all some parents neglect their girls so they come to class looking hungry and depressed. The respondents also mentioned that some girls are living with wicked foster parents who are not giving them breathing space at home. Other issues identified were lack of assistance to do homework. The excerpts below confirm these responses: **Respondent K (Student):** *My parents are illiterate so there is no one to assist me. Sometimes* too, *there is too much work to do at home and little time to study.* **Respondent C (Mathematics Teacher):** *Some parents are*

not able to motivate, encourage and support their female children at home. Some cannot provide food for their wards. They come to school looking hungry during lessons. **Respondent H (A Focused Group Female Teacher):** *Female students at home are expected to do lot of home chores so do not have ample time for studies. Some girls especially those who are staying with their aunties come to class looking hungry and tired either because of the treatment at home or they did not get food to eat before coming to school.*

4.1.1.5 Motivational Levels of Junior High School Female Students towards the Study of Mathematics

The respondents highlighted that, female students at the Junior High School had low level of motivation in studying Mathematics. Most female students fear Mathematics, they perform poorly in the subject and do not like attending Mathematics classes. The following attests to these highlights: **Respondent J (Student):** *We do not like Maths because is very difficult to understand.* The low motivation of many female students in the District is due to the fact that they (female students) see Mathematics as a subject of boys and not for girls, and hence do not get serious with it. Also, most girls fear Mathematics as a subject and are therefore not motivated to study it. Again, the attitude of some teachers serves as demotivation for girls in Mathematics. The belief that girls generally are not good at Mathematics has discouraged a lot of girls from pursuing Mathematics and science related subjects. The excerpts below confirm these claims: **Respondent B (A Focused Group Female Teacher):** *The level is very low since the girls are made to know that Mathematics is for the boys.* **Respondent D (A Focused Group Female Teacher):** *The motivation is*

very low for the female students since their teachers already know that they will perform poorly in the subject.

It must however be noted that three students indicated that they have high level of motivation for studying Mathematics due to the fact that they pass their Mathematics test well. One student also indicated that she uses boys who are good at Mathematics to motivate herself in studying the subject. Below is an example of such response: **Respondent F (Student):** *I have a high motivation for Mathematics. When I see any boy doing well in the subject I always try to compete with him and I also pass my Maths test.* **Respondent A (Mathematics Teacher)** had this to say: *I think they have low motivation levels. Though, some girls take encouragement from the performance of their classmates who are boys in Mathematics.*

4.1.1.6 Reasons for Lack of Motivation towards the Study of Mathematics among Junior High School Female Students

The respondents mentioned frequent poor performance in Mathematics, difficulties in understanding the subject, laziness, unfavourable attitudes, lack of constant practice, the habit of not asking questions in class, lack of books and study materials, the belief that Mathematics is for boys and not girls, the fear for the subject, poor study habits and poor time management. The following excerpts support these mentions: **Respondent I (Student):** *It is because we fear Mathematics and also we do not pass it.* **Respondent L (Student):** *The reasons are failing the subject, lack of Maths books and constant practice and let me say laziness.*

Other reasons are, very few girls are made to participate in a National Mathematics and Science Quiz Competitions. The inability of some females to participate in extra classes due to house hold chores and lack of finance, unstable educational policies and frequent curriculum changes, inadequate motivational strategies and rewards in the schools and at home. Lack of female Mathematics teachers in the District also serves as a disincentive for female students to study Mathematics. Some respondents had this to say: **Respondent C (Mathematics Teacher):** *Most of the girls do not even have time when you organized extra classes for them due to household chores. Also, there are no female Mathematics teachers in the District for the girls to look up to as role models so they think Maths is men affair.* **Respondent D (Mathematics Teacher):** *The reasons are that our female students are lazy, they do not get care and support from the government and from the parents to be motivated enough and also the unstable policies and curriculum changes.*

Furthermore, the respondents identified teachers as the major reason for lack of motivation for female students to study Mathematics. Most teachers believe in the intelligence of boys than girls when it comes to Mathematics and Science. They do not only put fear into the minds of girls by telling them Mathematics is a difficult subject, but also, they label girls as weak and lazy. Girls do not get the required extra help in learning Mathematics at home. Most girls are not also provided with the need materials for Mathematics and finally lack of female Mathematics teachers in most Junior High Schools in the District serve as disincentive for girls to study Mathematics. Some respondents had this to say: **Respondent C (A Focused Group**

Female Teacher): *The reason is that most people especially teachers think female students are lazy and that also makes them not to put more efforts.* **Respondent H (A Focused Group Female Teacher):** *I think because they have financial problems and do not also see female Maths teachers in the schools who act as role models.*

4.1.1.7 Effects of Lack of Motivation among Junior High School Female Students on their Performance in Mathematics

The respondents indicated that lack of motivation towards Mathematics has contributed to the fear of the subject, poor performance, hatred of Mathematics teachers, low zeal and interest in Mathematics, poor class attendance and dodging of Maths lessons, low contributions and concentrations in class, frustration during Mathematics lessons, poor performance in Mathematics and Sciences and other subjects where there are calculations. A respondent, **Respondent L (Student),** had this to say; *Because of low motivation in Mathematics we do not contribute in class and also we have low concentrations.*

Other effects are laziness to practice Mathematics in class, discouragement of younger ones in studying the subject and the development of negative attitudes towards the subject and its teachers, which eventually, leads to abysmal failure in Mathematics at the Basic Education Certificate Examination (BECE) resulting in challenges with regards to the Computerised School Selection and Placement to the Senior High School. The following examples support these claims: **Respondent A (Student):** *It makes us hate the subject and its teachers and also we do not pass well in BECE and because Maths is a core subject some girls do not get placement to SHS.* A participant had this to say: **Respondent B (Mathematics Teacher):** *lack of*

motivation towards Mathematics often leads to poor and low performance in Mathematics, and discourages other female students at the basic levels from studying the subjects.

4.1.1.8 Other Factors Contributing to the Poor Performance of Junior High School Female Students in Mathematics

The respondents mentioned the following as other factors that can also contribute to the female students at the Junior High Schools to perform poorly in Mathematics. These factors are: playing during Maths lessons, poor learning styles, lack of group studies, lack of concentration in class, lack of time, lack of parental encouragement and involvement, and going after men at night. Others are lack of electricity to study at night, the environment in which female students find themselves, poor foundations in Mathematics, prolong durations for Mathematics lessons, lack of assistance at home and failure to do homework. The two examples below confirm these mentions: **Respondent D (Student):** *Some of us do not get parental encouragement, and we also miss Maths classes. Some of us also like playing during maths lessons.* **Respondent F (A Focused Group Female Teacher):** *The environment in which they find themselves and the prolong duration of Maths lessons.*

Other factors identified are general indiscipline among students, lack of revision and high level of absenteeism and missing of classes among students, lack of self-confidence, fear to be criticized or laugh at in class when they make mistakes in Mathematics class, fatigue due to over burdening with household chores and fear of the Mathematics teacher, influence of kayaye returnees, peer group influence and

disco dancing. Some respondents had these to say: **Respondent A (Mathematics Teacher)**: *Fatigue in class as they are always working hard at home and also they fear the Mathematics teacher and the subject.* **Respondent B (Mathematics Teacher):** *These are lack of self-confidence, laziness to practice Mathematics and fear of been criticized in class.* **Respondent D (Mathematics Teacher**): *Other factors are peer group influence, general indiscipline among students, absenteeism and disco dance at night.*

4.1.1.9 Addressing the Negative Attitudes of Female Students of Junior High Schools in the Tolon District towards the Study of Mathematics

Respondents presented the following as the possible strategies that could be used to address the negative attitudes of female students of Junior High Schools in the Tolon District towards the study of Mathematics: first, there is the need for mentors as well as guidance and counselling coordinators in schools to help students develop interest in the subject. Second, the government through Ghana Education Service (GES) and other stakeholders should provide adequate text books, TLMs and other logistics. Third, teachers must also be encouraged to use appropriate teaching methods with concrete TLMs. **Respondent B (Mathematics Teacher)** had this to say; *GES and other stakeholders should supply schools with adequate learning and teaching materials. Incentives packages should be given to female students to put much effort in studying Mathematics.* **Respondent G (Student):** *We should plan our studies well and should always be in class when they are teaching us Maths. Girls should also be motivated to work hard in class.* **Respondent H (A Focused Group**

Female Teacher): *Also, there should be mentors and guidance and counsellors in Mathematics to help us develop interest in the subject.*

Fourth, teachers are also encouraged to exercise patience and restraint when handling female students and slow learners. Fifth, teachers should also make Mathematics lessons very practical and fun and lovely. Sixth, girls should be motivated to work hard and as well plan their studies well and be in class at all times. Seventh, Mathematics lessons should be scheduled in the morning when the concentrations of all students are still high to enable full concentration of all categories of students. Eighth, quiz competitions should also be organized regularly to boast the interests of girls in the subject. Ninth, reward packages for female students who excel in Mathematics should also be introduced and promoted. The following is an excerpt of some responses: **Respondent C (Mathematics Teacher):** *Mathematics teachers must use appropriate teaching methods as well as teaching and learning materials to make the subject interesting to the female students. Also, female students must be paired with male students so that they could share ideas and learn together.* **Respondent D (A Focused Group Female Teacher):** *These students should be motivated at school, in the community and at home to develop an interest in Mathematics. Mathematics test and quiz should also be organized for the female students and rewards given to the best to motivate others study the subject.*

Furthermore, the respondents also suggested that more female teachers should take up Mathematics in schools to serve as role models for female students and to as well disabuse the notion that Mathematics is a masculine subject. Again, Teachers should also stop using canes during lessons. Additionally, Mathematics teachers

should not only encourage female students to pursue the subject, but also, they should be patient with the slow learners especially females. Female students should be grouped with male students to share ideas in Mathematics. **Respondent D (Mathematics Teacher):** *There should be well trained and qualified Maths teachers who have patience for the students and there should be more maths learning materials in the schools.*

It was also suggested that the District Education Directorate should organize special classes for female students in the supposed difficult subject areas. Again, Parents should also get themselves involved the academic work of their female wards by visiting them at school, encouraging them, monitoring their performance and homework at home, providing their educational needs and as well reducing their workload at home. Below are the suggestions of some respondents. **Respondent G (A Focused Group Female Teacher):** *Our parents at home should encourage these students to study Mathematics and they should also reduce the workload at home to enable them study. Parents at home should give the girls enough time to study and they must equal motivate them.*

4.2 DISCUSSION OF THE FINDINGS

The findings of the study are discussed in the light of the research questions, objectives of the study, as well as the literature review.

As indicated already, the study aimed at achieving the following objectives:

1. To identify the factors contributing to the negative attitudes of female students of Junior High Schools in the Tolon District towards the study of Mathematics.
2. To determine the motivational levels of female students of Junior High Schools in the Tolon District towards the study of Mathematics.
3. To examine the effects of the negative attitudes of female students of Junior High Schools in the Tolon District on their performance in Mathematics.
4. To suggest strategies to developing positive attitudes among female students of Junior High Schools towards the study of Mathematics.

4.2.1 Objective 1: Factors contributing to the negative attitudes of female students of Junior High Schools in the Tolon District towards the study of Mathematics

With regards to this objective, the study revealed that there were a number of factors that accounted for the negative attitudes of Junior High School female students towards the study of Mathematics in the study area. Factors relating to the Mathematics teacher was identify as the major contributory factor. The school environment (both in and outside the classroom) was also identified as the second major contributory factor. The third major contributory factor identified was factors relating to the home and family. Next was a societal and cultural factor such as gender stereotyping. Issues relating to the student and peer influence were other contributory factors identified.

These findings confirm that of Asante (2010). In a research conducted in Ghana on sex differences in Mathematics among Senior High students, Asante (2010)

also identified socio-cultural stereotypes, the attitudes and beliefs of the Mathematics teacher which he referred to as the teacher factor, the school environment, type of teaching methodology employed, the nature and type of teaching and learning materials (TLMs) used, level of parental involvement in female children's education and the perceptions and world views of female students about the subject.

4.2.1.1 Mathematics Teacher's Factor

The study identified Mathematics teachers as the major contributory factors to female students' negative attitudes towards the subject. The role of the teacher in developing students' attitudes cannot be overemphasized. According to the respondents, most Mathematics teachers do not have the patience to handle, support and encourage students who are weak in the subject. Instead of patiently repeating lessons to enable the weak ones (mostly females) to improve, most of them rather becomes angry and keep shouting on the weak ones thereby exacerbating their plight. These revelations support the findings of previous researchers such as Asante, Mensah and his colleagues and Mata and her friends. According to them, humorous, motivated, gender sensitive, devoted, friendly, encouraging and supportive teachers are more likely to develop positive attitudes among female learners of the subject than those with rude, low self-concepts, gender bias, uncommitted, unsociable, less encouraging and unsupportive teachers (Asante, 2010, Mata, Monteiro and Peixoto, 2012 and Mensah et al, 2013).

The use of cane by some Mathematics teachers during lessons was also identified as a contributory factor for the dislike of the subject. Some respondents also revealed that some of the teachers do not only report to school late, but also, the keep rushing during lessons to enable them cover the syllabus on time to the detriment of the student whiles others on the other hand, spend most of the contact hours telling stories. A student had this to say: *The teacher comes to class late and tells lot of stories that takes all the teaching time.* A female teacher also added this: *These factors are: favouritism of boys over girls in class, teachers' canning, shouting on students and being quick when teaching.*

Again, a number of participants indicated that, the attitude of some Mathematics teachers about girls and Mathematics is also a contributory factor. Most Mathematics teachers, especially males, do not see girls as having equal abilities as boys in Mathematics. They consider the girls to be lazy and weak in Mathematics. With this perception, they treat boys differently from girls, which often times are perceived as a discrimination against the girl child. For instance, perceived challenging tasks are given to boys whiles simple ones are a preserve for girls during Mathematics lessons. A female teacher made this observation: *Teachers sometimes consider female students to be lazy and weak so will always perform poorly in Mathematics.* Some respondents also indicated that some Mathematics teachers contributed greatly to the negative attitudes of girls towards Mathematics by discouraging girls to pursue Mathematics through derogatory remarks during lessons. It is very common to hear teachers remarking that Mathematics is a very difficult subject; it is not for lazy people. It is a subject for men. *They cane us too much and*

also keep saying Mathematics is difficult and that it is for boys and not for girls. A student remarked.

A research conducted in South Africa by Wedesango et al (2011) made similar revelations. They found that, teachers often times give more opportunities to boys than to girls to perform hands-on practical demonstrations in Mathematics and Science lessons in most schools. They added that despite the fact that female students are equally talented with similar Mathematics and Science aptitudes as males, most teachers of the subject interact favourably with male students than females during Mathematics lessons (either intentionally or unintentionally).

The desire of Mathematics teachers (predominantly men) to engage in amorous or sexual relationships with girls was also identified as one of the major reasons for the dislike of Mathematics and its teachers. About eighteen (18) respondents revealed that, sexual advances towards girls by some teachers have made many a girl to lose interest in not only Mathematics, but in education in general.

With regards to the teaching skills and methodologies employed by teachers during Mathematics lessons, the study revealed that some Mathematics teachers were not very good in the subject and for that matter do not give learners the opportunity to seek further clarifications in class. Some students complained that their teachers use insults and other abusive language on them any time they try to ask questions in class. Some teachers are not only using inappropriate teaching methods, but also, they teach in abstraction without the use of teaching and learning materials. Again, lack of fun during Mathematics lessons was identified as another cause for the dislike for Mathematics. Most students complained of lack of fun during Mathematics lessons

which eventually leads to boredom and tiredness. *You see, some Mathematics teachers are not able to use suitable methods when teaching Mathematics. They don't use TLMs to teach and they don't repeat lessons for the weak ones to also understand.* A female teacher revealed. A female student also made this report: *our Maths teacher is too serious in class. He doesn't create jokes and when you ask him a question he will insult you and say you are 'zuku'.*

A research conducted by UNESCO/UNICEF (1993) also identified poor mastery of the subject matter, inappropriate teaching methods, insufficient use of teaching and learning materials (TLMs) and gender-bias tendencies among teachers as responsible for the disillusionment, low self-concepts and efficacy as well as reduced interest of female learners for the study of Mathematics. Throwing more light on the role of the teacher in building students attitudes, Yara (2009) revealed that, inappropriate teaching methodology employed by teachers has contributed greatly to killing the innate curiosity and aspirations of learners.

4.2.1.2 School Related Factors

The study identified the following as school factors responsible for the negative attitudes of female students towards the study of Mathematics at the Junior High Schools: First, most schools are having Mathematics in the afternoon on the school's general time table. Participants were of the view that, considering the difficult nature of Mathematics, the subject must be taught and learned in the morning since they are not yet exhausted to fully participate in every aspect of the study. Second, Mathematics is dominated by male teachers. In all the four schools visited,

the Mathematics teachers were men. Twenty-two respondents alluded that since Mathematics is dominated by male teachers, it is very easy to conclude that the subject is a male-dominated subject. Third, some classrooms are overcrowded due to large class size thereby making it difficult for teachers to pay individual attention on individual students. Fourth, inadequate Mathematics text books as well as other inadequate teaching and learning materials have also contributed to the dwindling interest in the subject in some schools. A student had this to say: *I think it is not good that we learn Mathematics in the afternoon, we are also too many in class and also our Maths teachers are all men so I think Maths is for men.*

These findings are in line with that of Asikhia (2010) and Gallagher & Kaufman (2006). They found that inconducive school environment such as large class size do not only lead to negative attitudes of learners but also, it results in poor academic performance of students.

4.2.1.3 Home and Family Factors

Some home and family factors that play critical role in influencing the attitudes of female students towards the study of Mathematics are: first, over burdening of girls with household chores. Eighteen respondents disclosed that many girls in the District do not like Mathematics because the subject demands constant practice, and yet they do not have the time to go through their books at home due to too much work such as cooking, sweeping, fetching water, fetching fire wood and washing. Second, the study also disclosed that most parents were illiterates and hence, do not even understand education let alone to support or encourage their wards to pursue Mathematics. Third, some parents do not also provide their female

children with the materials required for effective learning due to poverty. Fourth, most girls are living with foster parents (unties) who are most often very wicked towards the girls. Fifth, some girls also complained of lack of assistance from siblings at home as one of the factors accounting for their weakness in not only Mathematics, but also, in other subjects of study. A student had this to say: *My parents are illiterate so there is no one to assist me at home.* A female teacher made this observation: *Some parents engage their children in household chores; they do not supervise their studies at home and do not provide their children with Mathematics materials.*

These findings are in conformity with that of Dandala (2013). Dandala (2013) found that literate parents were more involved in their wards education and choice of courses than illiterate parents. This he said could account from the fact that illiterate parents might not be fully aware of the importance of education let alone to know the significance of parental involvement.

4.2.1.4 Societal and Cultural Beliefs

The study revealed that there are also some societal and cultural beliefs about girls and women that have an influence on their attitudes towards Mathematics. These are; first, the perception that girls' education is not as important as that of a boy. Twenty (20) respondents disclosed that many people and for that matter parents in their communities do not see the importance of girls' education. It is believed that girls do not need so much education because they would be married out to men who are supposed to take care of them; hence, there is no need in investing in them.

Second, there is also the belief that Mathematics is a very difficult subject and since females are not required to attain higher education due to marriage, there is no need wasting their time learning such a difficult subject. Third, the kitchen is the main place of a woman. In this light, girls are only expected to abreast themselves with the basic knowledge of mixing ingredients, caring for children and performing other household chores efficiently hence, Mathematics is not that important for her. Fourth, another socio-cultural belief about girls that has an impact on their attitude towards Mathematics is social stereotyping. It was revealed that in some communities, games that are mathematical in nature are a preserve for boys and must never be played by a girl. Fifth, in some schools and communities, girls who are good at Mathematics are perceived as witches because they are thought to be draining the knowledge of their classmates. A female teacher had this to say: *In this school girls who do well in Mathematics are called witches because they draw knowledge from their class mates in order to perform well.*

This study also revealed that in the communities people perceive that Mathematics is for boys and not girls, Mathematics teachers are always men and not women, girls are not supposed to play certain games which are mathematical inclined, the community thinks women talents are of house hold chores, that women responsibilities are for child bearing and that men are always superior over women in all matters. A teacher made this remark: *The people of this community always say Mathematics is for boys and not for girls, Mathematics teachers are always men and not women and they also believe that girls are not supposed to play certain games in the house but those games are mathematical oriented.*

Gallagher (1998) noted that from birth, children are socialized into male and female cultures by labelling some activities and subjects such as Mathematics as male domain and others such as Home Economics as feminine. The minds of many girls in Africa have been conditioned by the society to see themselves as subservient to boys. The expectations of many African families for girls is to be equipped with some basic Literacy and Numeracy skills to enable them manage their families well and as well preserve the culture. Boys on the other hand are expected to be decision makers and breadwinners in society. With these expectations, many parents and families prefer to invest heavily in boys' education than girls (Gallagher and Kaufman, 2006).

4.2.1.5 The Student's Factor

The study revealed that negative attitude towards Mathematics is also attributable to the student. Most of the respondents maintained that most female students are naturally lazy and do not want to work hard to understand so they label some subjects as difficult. Mathematics is a working subject and for that matter demands constant practice, yet most girls do not practice Mathematics at home. Instead of studying their books at home, some girls go out with men at night while others watch movies and go out for disco dance. Again, some girls are not academically good because of pride. Students who claim Mathematics is difficult are those who are not willing to seek help from friends due to pride. Some students are not serious. They engage themselves in play during lessons. When they finally find it difficult to perform giving tasks, they tend to say the subject is difficult. Another issue identified as a student factor is absenteeism and missing classes. Some girls are not only found of absenting themselves from school, but they also miss and dodge

classes which eventually tends to affect their performance and attitudes. *Sir, the thing is that some girls are very lazy; they don't practice Maths at home but they like to follow boys in the night or watch films and go to disco dance.* A respondent said. According to Gunderson et al (2012) and Cracker (2006), the world view of many girls about themselves are that they are weak in Mathematics and mathematical concepts, they are not gifted or talented in Mathematics and hence do not have what it takes to succeed in Mathematics tests.

4.2.1.6 Peer Influence

Last but not least, the study identified peer influence as another factor accounting for negative attitudes and poor performance of girls in not only Mathematics but in other subjects. Some respondents observed that most school girls are mostly influenced by successful returnee migrants (kayaye) who normally return from Accra and Kumasi with lots of goods such as cooking utensils, bags and clothing. With this, some school girls find it difficult to concentrate on their studies.

4.2.2 Objective 2: Motivational Levels of Female Students of Junior High Schools in the Tolon District towards the Study of Mathematics

According to the respondents, a great number of female students at the Junior High School in the District are characterized by low levels of motivation towards Mathematics as a subject of study. This accounts from the fact that most female students in the District fear Mathematics. Some dodge Mathematics lessons which eventually results in poor performance in the subject. For instance, Respondent J (Student) had this to say: *We do not like Maths because is very difficult to*

understand. A Mathematics teacher supported this with this statement: *I think they have low motivation levels towards Mathematics because they don't find it easy at all.*

It must however be noted that some female students have strong motivation for Mathematics because they are good in the subject. Out of the twelve students interviewed, only three claimed they are motivated to study Mathematics because they are not only good in the subject, but also, they pass it very well in examinations. A student said this: *I have a high motivation for Mathematics and I also pass my Mathematics test.*

With regards to the reasons accounting for the lack of motivation to towards Mathematics, respondents identified difficulties in understanding the subject and poor performance as the main factors. Others are lack of constant practice due to laziness, general fear for Mathematics as a school subject, inadequate Mathematics books and materials and negative perceptions of students towards the subject. *It is because we fear Mathematics and do not also pass it.* A student retorted.

The study also revealed that negative attitudes of female students towards Mathematics are also attributable to the educational authorities such as Directors and Head Teachers. Some respondents indicated that very few female students are selected to participate in District, Regional and National Mathematics and Science Quiz Competitions. Some respondents also blamed the situation on unstable educational policies and frequent curriculum changes. Again, most teachers believe in the intelligence of boys than girls when it comes to Mathematics and Science. Instead of providing girls with the needed assistance as well as motivational strategies

and rewards, most Mathematics teachers rather perceive girls as weak and lazy and hence discourage them with the statement that Mathematics is a difficult subject. For instance, respondent C (A Focused Group Female Teacher) made this remark: *The reason is that most people especially teachers think female students are lazy and that also makes them not to put more efforts.*

Furthermore, most Mathematics teachers in the District are men and that serves as a demotivation for girls. Lack of female Mathematics teachers in most Junior High Schools in the District serve as disincentive for many a female student in the study of Mathematics. Besides these, most girls complained of inadequate support from their parents with regards to the required materials for Mathematics and other subjects and that has been one of the demotivational factors. Some female students are not able to participate in extra classes organized by teachers due to house hold chores and lack of financial support from parents. *I think because they have financial problems and do not also see female Mathematics teachers in the schools who act as role models.* Respondent H (A Focused Group Female Teacher) remarked. Respondent C (A Mathematics Teacher) also made this observation. *Most of the girls do not even have time when you organized extra classes for them due to household chores. Also, there are no female Mathematics teachers in the District for the girls to look up to as role models so they think maths is men affair.*

With regards to the impacts of lack of motivation on students' performance and achievements in Mathematics, the study revealed that many female students earns up as maths-phobias without any zeal nor interest in the subject, they stay away from Mathematics lessons and develop negative attitudes towards the subject and its

teachers, which eventually leads to abysmal failure in Mathematics at the Basic Education Certificate Examination (BECE) and consequently, have challenges with placement into the Senior High Schools (SHS). Some respondents made these remarks. *They fear Maths, have an attitude towards the subject and the teacher and final fail in the subject at the BECE in Maths and other calculation subjects. It makes us hate the subject and its teachers and also we do not pass well in BECE and because Maths is a core subject some girls do not get placement to SHS.*

Akuamoah et al (2004) observed that, students who are provided with all or most of the things (mathematical sets, pupils' text books, graph books and pocket money among others) are more motivated to learn Mathematics than those without those necessary items.

4.2.3 Objective 3: The Effects of The Negative Attitudes of Female Students of Junior High Schools in the Tolon District on their Performance in Mathematics

This study found that negative attitudes of female students towards Mathematics affect their performance in Mathematics. According to the responses, the fear of Mathematics as a subject of study in schools has culminated into lack of or low interest in the subject. It has also resulted in lack of concentration among such students during Mathematics lessons. Some students also develop dislike for the Mathematics teacher. The study also found that most students absenteeism results from their dread for some subject and the teacher of the subject especially Mathematics. It also revealed that, due to the fear of the subject, some students find ways of dodging Mathematics lesson. In agreement with the findings of Coben (2003) and Smith (2004) on the negative effects of attitudes on students' performance

and achievements, the study revealed that a greater percentage of the poor performance of students especially the girl child in Mathematics and other Science subjects should be blamed on fear and dislike. The respondents indicated that the fear and dislike of Mathematics and Science is largely responsible for the poor performance of these subjects in the Basic Education Certificate Examinations (BECE). This failure also results in placement challenges of students into the Senior High Schools by the Computerized School Placement System. Again, the failure of many students serves as a demotivating and discouraging factor for siblings and other students at the Primary Schools towards the subject. Furthermore, the responses indicated that most female students in the District do not enjoy Mathematics as a subject but rather, they endure it because they cannot dodge it or they would have. A student had this to say: *That fear makes us hate the subject and also fail it in our final exams.* A Mathematics teacher also indicated that: *these negative attitudes often leads to poor and low Mathematics performance and discourages other female students at the basic levels from studying the subjects.*

4.2.4 Objective 4: Strategies to Addressing Negative Attitudes among Female Students of Junior High Schools towards the Study of Mathematics

The study identified a number of strategies that could be adopted to address the issue of negative attitudes towards the study of Mathematics among Junior High School female students. Among these strategies are:

i. There is the need for mentors as well as guidance and counselling coordinators in schools to help students develop interest in Mathematics.

ii. More female teachers should be trained to handle Mathematics in schools to serve as role models for female students and as well erase the notion that Mathematics is a masculine subject.

iii. Introduction of reward packages for female students who excel in Mathematics and other Science related subjects.

iv. Mathematics teachers must use appropriate teaching methods as well as innovate teaching and learning materials to make the subject more appealing and interesting to the female students.

v. There is the need to organize Mathematics quiz and competitions for girls with attractive motivational packages for those who excel.

vi. Teachers should avoid the use of cane during lessons.

vii. Parents should also get themselves involved in the academic work of their female wards by visiting them at school, encouraging them, monitoring their performance and homework at home, providing their educational needs and as well reducing their workload at home.

viii. Mathematics lessons should be scheduled for mornings to ensure full concentration of all students.

ix. Good and qualified or professional Mathematics teachers with the patience to assisting slow learners should be employed to teach Mathematics.

These strategies are not too different from the suggestions of other scholars. According to UNESCO/UNICEF (1993) using female Mathematics and Science teachers in Senior High Schools over the years as mentors to girls through Girls

Mentorship Programmes (GMPs) has yielded tremendous results in many parts of Africa. Girls tend to see themselves as capable of achieving greater heights in these subjects when the have role models to look up to. Despite the difficulties associated with learning the subject, female students are encouraged and motivated to take up Mathematics and Science courses if they are surrounded by role models in that field (CAMFED, 2012, GEU, 2001 and Allotey, 2012). Studies have also identified the role of the teacher in developing positive attitudes of students. In this regard, Akuamoah et al (2004) also called on all teachers to master their subject area as well as adopt appropriate child centred methodologies to be able to meet the different needs, abilities, aspirations and levels of their students. They added that, Mathematics and Science teachers must therefore make good use of teaching aids so as to arouse the interests and natural curiosity of learners in these subject areas.

4.3 CONCLUSSION

This chapter presented the findings and excerpts from the various respondents (female students, Mathematics teachers and female non-mathematics teachers) as well as the discussion of findings based on the study objectives. The chapter concludes that, the main factors contributing to the negative attitudes of female students towards the study of Mathematics are factors related to the Mathematics teachers, school environment (both in and outside the classroom), socio-cultural, home and family, student and peer influence.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

The study revealed six main factors contributing to negative attitudes of female students towards the study of Mathematics. They are factors associated with Mathematics teachers, the school environment (both in and outside the classroom) and home and family factors. Others are factors relating to socio-cultural beliefs, factors relating to the female student and peer influence.

The study also revealed that though some few female students in the District were highly motivated to study Mathematics, majority of them were characterized by low levels and reduced interests in Mathematics due difficulties in understanding the subject and poor performance in the subject. Poor performance in Mathematics tests, end of term examinations and BECE resulting in Computerized School (Senior High School) Placement challenges were identified as the major effects of Mathematics anxiety.

The study also identified Mathematics Quiz Competitions with reward packages, more female Mathematics teachers, as well as provision of Mathematics learning materials and parental involvements as some strategies to addressing negative attitudes among female students.

5.2 CONCLUSION

The main concern of this study was to identify the factors contributing to the negative attitudes of female students towards the study of Mathematics in selected Junior High Schools in the Tolon District in the Northern Region of Ghana. The first

chapter provided an introduction to the study. The second chapter provided a broader purview of existing knowledge on factors contributing to the negative attitudes of female students towards the study of Mathematics in Junior High Schools. The gap in the reviewed literature was partly filled by the findings of the study. Chapter three was focused on the key methodologies employed in the research processes whiles the fourth chapter presented and discussed the findings of the study. This chapter therefore, encapsulates the summary, conclusions and recommendations of the study. Below are some of the major findings of the study:

The study revealed that factors within Mathematics teachers (teachers' beliefs, attitudes, knowledge, professionality, demeanour and personality) are the major contributory factors to female students' negative attitudes towards the subject. The school environment (both in and outside the classroom) was also identified as the second most contributory factor to female students negative attitudes towards Mathematics. Also, the study identified factors within the home and the family as another major contributory factor to the development of negative attitudes towards Mathematics and education as a whole among female students. Closely linked to this is the societal and cultural factor. The study revealed that most female students in the District are influenced by societal and cultural factors such as gender stereotyping among others. Furthermore, the study revealed that laziness, lack of constant practice, absenteeism and fear which are all within the purview of the female student are also contributory factors. Again, peer influence was also identified as other factors accounting for female students negative attitudes towards Mathematics.

The study also identified a number of strategies that could be adopted to address the issue of negative attitudes towards Mathematics among Junior High School female students. Among these strategies are: first, training more female Mathematics teachers to serve as role models for female students and as well erase the notion that Mathematics is a masculine subject. Second, reward packages should be introduced for female students who excel in Mathematics and other science related subjects. Third, Mathematics teachers must use appropriate teaching methods as well as innovate teaching and learning materials to make the subject more appealing and interesting to the female students and four, Teachers should avoid the use of cane during lessons.

5.3 RECOMMENDATIONS

In the light of the findings of the study, a number of recommendations were made.

First, with regards to the problem of male-dominated Mathematics teachers in the study area, Ghana Education Service (GES) in conjunction with Colleges of Education should train and encourage more female teachers to handle Mathematics in schools so as to erase the notion that Mathematics is a masculine subject.

Second, Ghana Education Service (GES) should sanction teachers especially males, who have amorous/sexual relationships with the female students as revealed in the study, in accordance with the Teachers Code of Conduct as provided in Clause 8 c i & ii (GES, 2008: 9).

Third, with regards to the factors relating to the attitudes, beliefs, demeanour and professionalism of the Mathematics teacher, there should be an infective and regular training workshops and in-service training for teachers to refresh themselves with the appropriate pedagogical, motivational, mentoring and counselling skills and strategies to enable them effectively motivate and arouse the interest of female students in Mathematics.

Fourth, Mathematics teachers should be patient, discipline and gender sensitive. They should also adopt appropriate teaching methods and use innovative teaching and learning materials to make the subject more appealing and interesting for female students. Again, they should avoid the use of cane during lessons since the study identified impatience and the use of cane as the cause of Maths anxiety among many female students.

Fifth, with regards to strategies to addressing negative attitudes of female students towards the study of Mathematics, Ghana Education Service (GES) in conjunction with Head Teachers should also organize regular Maths quiz competitions and promote reward packages for female students who excel in Mathematics and other Science related subjects.

Sixth, Head Teachers of Basic Schools should schedule Mathematics lessons on the schools' general time table for mornings so as to ensure full concentration of all students. They should also monitor the attendance, punctuality and performance of their teachers regularly. This would go a long way to improve upon effective teaching and learning in schools by contributing to the reduction of teacher absenteeism and misuse of contacts hours as revealed in the study.

Seventh, Ghana Education Service and Head Teachers through the Parent Teacher Associations (P.T.A) should also sensitize and encourage parents to involve themselves in the education of their female wards. Parents should also be encouraged to provide the educational needs of their wards, and as well reduce their workload at home to enable them to study after school hours. This is because, lack of parental involvement and excessive workloads were identified as serious setbacks to girls education in the study area.

Eighth, the government through the Ghana Education Service should also provide the schools with the needed books, logistics and teaching and learning materials so as to ensure effective teaching and learning and improved academic performance. The study revealed that, inadequate TLMs, texts books and other logistics are the major handicaps in Maths and Science education in many schools in the study area.

5.4 SUGGESTIONS FOR FURTHER RESEARCH

Findings of this study attest that there are a myriad of factors that contribute to the negative attitudes of female students towards the study of Mathematics in the study area. In view of the adverse effects of these negative attitudes not only on the female student, but Ghana, Africa and the world at large, it is imperative that further research is carried out on the issue. The findings of this study could be a tip of the iceberg since its focus was on some selected Junior High Schools in the Tolon District; hence, there is the need for other researchers to go beyond the Tolon District.

It is, therefore, recommended that further research be undertake on the strategies for addressing the social and cultural beliefs about the capabilities of female students in the study of Mathematics and Sciences. Other areas of research are challenges confronting female Mathematics teachers or the role of Ghana Education Service in promoting the study of Mathematics and Science among girls.

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APPENDIXES

APPENDIX A: INTERVIEW GUIDES

UNIVERSITY FOR DEVELOPMENT STUDIES

FACULTY OF EDUCATION

INTERVIEW GUIDE (STUDENTS)

Title of Study: Factors Contributing to the Negative Attitudes of Female Students towards the Study of Mathematics in Selected Junior High Schools in the Tolon District

Purpose of the Study: The main purpose of this study is to investigate into the factors contributing to the negative attitudes of female students' towards the study of Mathematics in selected Junior High Schools in the Tolon District of the Northern Region of Ghana.

Question 1a: What school factors are responsible for the negative attitudes of Junior High School female students towards the study of Mathematics?

……

……

Question 1b: What are the societal and cultural beliefs about women and girls that have an impact on their attitude towards the study of Mathematics?

……

……

Question 1c: What are the factors within your Mathematics teachers that have an influence on your negative attitude towards the study of the Mathematics subject?

……

……

Question 1d: As a student, what are the home and family factors that play critical roles in influencing your attitudes towards the study of Mathematics?

……

……

Question 2a: What is the level of motivation of Junior High School female students towards the study of Mathematics?

……

……

Question 2b: What could be the reasons for the lack of motivation to study Mathematics by the Junior High School female students?

……

……

Question 3a: How has the lack of motivation towards Mathematics for the Junior High School students affect their study of the Mathematics subject?

……

……

Question 3b: What other factors do you think can also contribute to the female students at the Junior High Schools to performance poorly in the Mathematics subject?

……

……

Question 4a: In your opinion, what can be done to address the negative attitudes of female students of Junior High Schools in the Tolon District towards the study of Mathematics?

……

……

Question 4b: What do you think can be done to ensure an improve performance in the Mathematics subject by the female students at the Junior High Schools?

……

……

Thank you very much for your time.

UNIVERSITY FOR DEVELOPMENT STUDIES

FACULTY OF EDUCATION

INTERVIEW GUIDE (MATHEMATICS TEACHERS)

AND

FOCUSED GROUP DISCUSSION GUIDE FOR (FEMALE NON-MATHEMATICS TEACHERS)

Title of Study: Factors Contributing to the Negative Attitudes of Female Students towards the Study of Mathematics in Selected Junior High Schools in the Tolon District

Purpose of the Study: The main purpose of this study is to investigate into the factors contributing to the negative attitudes of female students' towards the study of Mathematics in selected Junior High Schools in the Tolon District of the Northern Region of Ghana.

Question 1a: What school factors are responsible for the negative attitudes of Junior High School female students towards the study of Mathematics?

……

……

Question 1b: What are the societal and cultural beliefs about women and girls that have an impact on their attitude towards the study of Mathematics?

……

……

Question 1c: What are the factors within your Mathematics teachers that have an influence on your negative attitude towards the study of the Mathematics subject?

……

……

Question 1d: As a student, what are the home and family factors that play critical roles in influencing your attitudes towards the study of Mathematics?

……

……

Question 2a: What is the level of motivation of Junior High School female students towards the study of Mathematics?

……

……

Question 2b: What could be the reasons for the lack of motivation to study Mathematics by the Junior High School female students?

……

……

Question 3a: How has the lack of motivation towards Mathematics for the Junior High School students affect their study of the Mathematics subject?

……

……

Question 3b: What other factors do you think can also contribute to the female students at the Junior High Schools to performance poorly in the Mathematics subject?

……

……

Question 4a: In your opinion, what can be done to address the negative attitudes of female students of Junior High Schools in the Tolon District towards the study of Mathematics?

……

……

Question 4b: What do you think can be done to ensure an improve performance in the Mathematics subject by the female students at the Junior High Schools?

……

……

Thank you very much for your time.

APPENDIX B: LETTER OF INFORMED CONSENT TO THE DISTRICT DIRECTOR OF EDUCATION, TOLON

Woribogu D/A Junior High School

Post Office Box 16

Tolon

January 20, 2016

The District Director

Ghana Education Service

Post Office Box 16

Tolon

Dear Sir,

INFORMED CONSENT

I would be very grateful if you could grant me permission to conduct a research on the topic "**Factors Contributing to the Negative Attitudes of Female Students towards the Study of Mathematics in Selected Junior High Schools in the Tolon District, Ghana**" in fulfilment of the requirements for the award of a Master of Philosophy Degree in Development Education at the Faculty of Education in the University for Development Studies, Tamale.

The researcher is assuring you the strictest confidentiality and anonymity. Therefore no school or individual shall be identified in this study and at the same time schools academic activities shall not be disrupted by this study. The researcher will strive to be honest, objective and empathetic. Participants will be allowed to withdraw at any time without penalty or victimization and will be protected from any form of abuse. The outcome of this study will be communicated to the District Education Directorate.

Thank you, in advance for your time and co-operation.

Yours faithfully,

Samuel Kassim Salifu

(Student Researcher)

Student ID: UDS/MDE/0018/14

APPENDIX C: LETTER OF REPLY FROM THE DISTRICT DIRECTOR OF EDUCATION, TOLON

GHANA EDUCATION SERVICE

In case of reply the number and date of this letter should be quoted

Our Ref: SS. 38/GES/NR/TD
E-mail: gestolon@yahoo.com

Your Ref. No:.....

REPUBLIC OF GHANA

District Education Office
P .O. Box 16
Tolon N/R
03720-93372

22nd January, 2016

RE: INFORMED CONSENT
STUDENT ID.: UDS/MDE/0018/14

Reference to your letter of 20th January, 2016 on the above subject matter, I wish to inform you that permission has been granted you to undertake your research in the selected schools of the district as requested.

It is expected that fruitful outcomes would emerge from your research for the growth of education in the District.

AMOLI ABAKO
DISTRICT DIRECTOR

SAMUEL KASSIM SALIFU
WORIBOGU D.A JUNIOR HIGH SCHOOL
WORIBOGU

APPENDIX D: LETTER OF INFORMED CONSENT TO THE HEADMASTERS OF SELECTED JUNIOR HIGH SCHOOLS

Evangelical Church of Ghana

Post Office Box 348 E/R

Tamale

February 1, 2016

The Headmaster

Tali E/A Junior High School

Post Office Box 16

Tolon

Dear Sir,

INFORMED CONSENT

I would be very grateful if you could grant me permission to conduct a research on the topic **"Factors Contributing to the Negative Attitudes of Female Students towards the Study of Mathematics in Selected Junior High Schools in the Tolon District, Ghana"** in fulfilment of the requirements for the award of a Master of Philosophy Degree in Development Education at the Faculty of Education in the University for Development Studies, Tamale.

The researcher is assuring you the strictest confidentiality and anonymity. Therefore no school or individual shall be identified in this study and at the same time schools academic activities shall not be disrupted by this study. The researcher will strive to be honest, objective and empathetic. Participants will be allowed to withdraw at any time without penalty or victimization and will be protected from any form of abuse. The outcome of this study will be communicated to the District Education Directorate.

Thank you, in advance for your time and co-operation.

Yours faithfully,

Samuel Kassim Salifu

(Student Researcher)

Student ID: UDS/MDE/0018/14

APPENDIX E: LETTER OF REPLY FROM A HEADMASTER OF A SELECTED JUNIOR HIGH SCHOOL

Tali E/A Junior High School

Post Office Box 16

Tolon

20th February, 2016

Evangelical Church of Ghana

Post Office Box 248 E/R

Tamale

Dear Sir,

RE–INFORMED CONSENT

STUDENT ID: UDS/MDE/0018/14

With reference to your letter dated February 1, 2016 on the above subject, I wish to inform you that permission has been granted you in my school to undertake your research as requested.

All the necessary arrangements have been made for this programme, as it is not only going to benefit the selected female students, but the entire girl child and the school as a whole.

Yours faithfully,

.....

Dawuda Ibrahim

(Headmaster)

THE HEADTEACHER
TALI E/A J. H. S.
P. O. BOX 16
TOLON

APPENDIX F: PARTICIPANTS' INFORMED CONSENT FORM

UNIVERSITY FOR DEVELOPMENT STUDIES

FACULTY OF EDUCATION

DEPARTMENT OF DEVELOPMENT EDUCATION STUDIES (DDES)

PARTICIPANT'S INFORMED CONSENT FORM

Title of Study: Factors Contributing to the Negative Attitudes of Female Students towards the Study of Mathematics in Selected Junior High Schools in the Tolon District, Ghana

Programme of Study: Master of Philosophy (MPhil) in Development Education

Name of Researcher: Samuel Kassim Salifu

Name of Supervisor: Dr. Mohammed Issah

Name of Co-Supervisor: Mr. Simon Iddrisu Alhassan

The purpose of the study and the extent to which I would be involved was explained to me by the researcher in a language I understood. I have therefore agreed to take part in this study voluntarily. I understand that I am free to withdraw from the study at any time at any stage at my own will.

Full Name of Participant: ……

Address of Participant: …… ……..

Signature of Participant: ……...

Signed at: (Place) …… Date.....

Witness Name: ……

Witness Signature: ……. Date …….

Researcher's Signature …… Date …….

APPENDIX G: UNIVERSITY'S ETHICAL REVIEW FORMS

UNIVERSITY FOR DEVELOPMENT STUDIES (UDS)
FACULTY OF EDUCATION (FOE)

ETHICAL REVIEW FORMS

Name of Researcher/Group:
SAMUEL KASSIM SALIFU

Institutional Affiliation:
UNIVERSITY FOR DEVELOPMENT STUDIES

Department:
DEVELOPMENT EDUCATION AND EDUCATIONAL FOUNDATION STUDIES

Programme of Study:
MASTER OF PHILOSOPHY (M.PHIL) IN DEVELOPMENT EDUCATION

Title of Research
FACTORS CONTRIBUTING TO THE NEGATIVE ATTITUDES OF FEMALE STUDENTS TOWARDS THE STUDY OF MATHEMATICS IN SELECTED JUNIOR HIGH SCHOOLS IN THE TOLON DISTRICT

Purpose of Research
TO INVESTIGATE INTO THE FACTORS CONTRIBUTING TO THE NEGATIVE ATTITUDES OF FEMALE STUDENTS' TOWARDS THE STUDY OF MATHEMATICS IN SELECTED JUNIOR HIGH SCHOOLS IN THE TOLON DISTRICT

Description of Research Methodology
THE STUDY IS SITUATED WITHIN THE INTERPRETIVIST PARADIGM
THE STUDY EMPLOYS THE QUALITATIVE RESEARCH DESIGN
CASE STUDY RESEARCH DESIGN STRATEGY EMPLOYED
PURPOSIVE SAMPLING STRATEGY EMPLOYED
FACE-TO-FACE IN-DEPTH SEMI-STRUCTURED INTERVIEWS
THROUGH THE USE OF INTERVIEW GUIDE

Description of Research Target (I.E., Persons, Animals, Community Resource, etc)

3 FEMALE STUDENTS OF SELECTED JUNIOR HIGH SCHOOLS
A MATHEMATICS TEACHER EACH FROM SELECTED SCHOOL
3 - 5 FEMALE TEACHERS IN SELECTED JUNIOR
HIGH SCHOOLS ENGAGED IN FOCUS GROUP DISCUSSION

Description of Field Protocols to be followed (Community Entry, Support):

SEEKING PERMISSION FROM THE DISTRICT
DIRECTOR OF EDUCATION AND HEAD TEACHERS
OF SELECTED SCHOOLS

Description of Sources of Data:

PRIMARY SOURCES OF DATA FROM FEMALE
STUDENTS, MATHEMATICS TEACHERS
AND FEMALE TEACHERS

CHECKLIST

1. HUMAN SUBJECTS

a. Does your research involve minors (persons younger than 18)? NO
b. Does your research involve the collection of primary data from human subjects? YES
c. Are your questions requiring data that are considered personal? NO
d. Does your research require the revelation of the identities? NO

2. ANIMALS

a. Does your research involve the use of animals?
b. Are any endangered species involved in the study?
c. Is the animals' health or life likely to be compromised in any way?

3. CULTURAL RESOURCES

a. Will you be collecting data of ethnographic nature?
b. Will your data be requiring revelations of sacred places?
c. Are you going to be photographing sensitive sites of the community?

4. SOCIAL SENSITIVITY CONCERNS

a. Will your research not revive an old conflict that has not been managed well?
b. Will your research not prejudice or damage a particular social, ethnic, cultural or religious group?
c. Will your research lead to a closure of opportunities to a particular social group?

5. ECOLOGICAL CONCERNS

a. Will your research involve felling economic trees?
b. Will your research lead to deforestation of your study area?
c. Will your research lead to environmental pollution of one form or another?
d. Will your research lead to ecological hazards in a way?

APPENDIX H: FACULTY OF EDUCATION CONSENT FORM

UNIVERSITY FOR DEVELOPMENT STUDIES (UDS)
FACULTY OF EDUCATION (FOE)

FOE CONSENT FORM

Name of Researcher/Group:
SAMUEL KASSIM SALIFU

Institutional Affiliation:
UNIVERSITY FOR DEVELOPMENT STUDIES

Title of Research:
FACTORS CONTRIBUTING TO THE NEGATIVE ATTITUDES OF FEMALE STUDENTS TOWARDS THE STUDY OF MATHEMATICS IN SELECTED JUNIOR HIGH SCHOOLS IN THE TOLON DISTRICT

Purpose of Research:
TO INVESTIGATE INTO THE FACTORS CONTRIBUTING TO THE NEGATIVE ATTITUDES OF FEMALE STUDENTS TOWARDS THE STUDY OF MATHEMATICS IN SELECTED JUNIOR HIGH SCHOOLS IN THE TOLON DISTRICT

What are the nature and the degree of participants' involvement?
JUST TO RESPOND TO INTERVIEW QUESTIONS

What measures will you put in place to ensure the confidentiality and anonymity of your respondents?
RESPONSES FROM RESPONDENTS WOULD BE REPRESENTED BY ALPHABETICAL LETTERS AND NOT THEIR NAMES OR ANY FORM OF IDENTITY THAT MAY LEAD TO ANY FORM OF TRACES TO THEM

What are the possible risks that you think the research may expose the participants to?

NOT APPLICABLE

What precautionary measures will you put in place to prevent/minimize/address the risks?

NOT APPLICABLE

What are the benefits that the participants may accrue from the research?

FINDINGS OF THE STUDY WOULD BE COMMUNICATED TO THE DISTRICT DIRECTORATE OF GHANA EDUCATION SERVICE (GES) FOR IMPROVED PRACTICE THAT WOULD RESULT IN POSITIVE ATTITUDE

Signature of RPI ..... Date: 11-03-2016

(Responsible Project Investigator)

Signature of Witness: ..... Date: .....

(Member of Ethics Committee/Research Coordinator)

APPENDIX I: UNIVERSITY'S RESEARCH AGREEMENT FORM

UNIVERSITY FOR DEVELOPMENT STUDIES (UDS)
FACULTY OF EDUCATION (FOE)

RESEARCH AGREEMENT FORM

1. RESEARCHER(S): SAMUEL KASSIM SALIFU

2. DEPARTMENT: DEVELOPMENT EDUCATION STUDIES

3. TITLE OF RESEARCH: FACTORS CONTRIBUTING TO THE NEGATIVE ATTITUDES OF FEMALE STUDENTS TOWARDS THE STUDY OF MATHEMATICS IN SELECTED SENIOR HIGH SCHOOLS IN THE TOLON DISTRICT

4. Please Indicate whether the following pieces of information have been addressed with a mark of X:

(X) Identity/Background of Researcher

(X) Process of obtaining informed consent including sample cover letters to participants. Note specific guidelines for child participants

(X) Research Instruments .e.g. Questionnaire, Structured interviews, experimental procedures etc

(X) Procedures for ensuring confidentiality/anonymity

( ) Means of discussing risks/benefits with participants

( ) Precautionary measure regarding risks and confidentiality

UNIVERSITY FOR DEVELOPMENT STUDIES

C. Declaration:

I am familiar with the current Ethical Procedures and those of relevant institutions in Ghana and elsewhere and have made provisions that adequately address all ethical concerns. As the principal researcher, I take sole responsibility of any eventualities.

Signature of Principal Researcher (s): ..... Date: ...11-03-2016...

Signature of Supervisor: ..... Date: ...11/03/2016...

Signature of Research Coordinator: ..... Date: .....

APPENDIX J: PICTURE OF A FACE-TO-FACE INTERVIEW SESSION WITH A FEMALE STUDENT

APPENDIX K: PICTURE OFA FACE-TO-FACE INTERVIEW SESSION WITH A MATHEMATICS TEACHER

APPENDIX L: PICTURE OF A FOCUSED GROUP DISCUSSION SESSION WITH SOME FEMALE NON-MATHEMATICS TEACHERS