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**CRITICAL ANALYSIS ON THE ROLE OF GENDER  
AND ACADEMIC PERFORMANCE IN  
MATHEMATICS IN PRIMARY AND SECONDARY  
SCHOOLS IN KENYA**

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**A RESEARCH PROJECT IS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE IN MASTERS OF EDUCATION MEASUREMENT AND EVALUATION IN THE DEPARTMENT OF PSYCHOLOGY AT THE UNIVERSITY OF NAIROBI.**

## **DECLARATION**

This research project is my original work and it has never been submitted for approval before for examination in any other University.

Sign \_\_\_\_\_ Date \_\_\_\_\_

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**(E58/78748/2015)**

This research project has been submitted for examination with my approval as the University supervisor.

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## **DEDICATION**

I dedicate this research work to my family members; my husband John Mburu, my children Mercy, Faith and Jesse, my sister Elizabeth Wairimu for always being there for me for moral and financial support.

## **ABSTRACT**

In Kenya, the capabilities of boys and girls in mathematics have persistently remained below even though mathematics is a primary contributor to the overall performance of the learner. When the performance of one gender in mathematics continues to be below that of the other gender it would eventually mean gender imbalance workforce qualification. This study focused mainly on establishing the role of gender on the academic performance in mathematic subject at primary and secondary schools in Kenya. The study's questions are; is there any significant difference in academic performance by gender on mathematics; if so what other factors affect the difference? This study has become necessary due to the need of education mostly on science and mathematics being viewed as an economic force conjointly with other forces perceived to contribute to the social and economic growth and development of a Nation. The country having a diverse population; comprising people of varying levels of social status, and its economic activities qualifies the country as an appropriate area of this study. The study used meta-analysis research design in coming up with study conclusions. Meta-analysis involves review of available literature over given period in arriving at conclusions. The study collected secondary data from previous studies done in the area of student performance in mathematics, both in primary and secondary schools. The data was qualitative in nature and in terms of assertions of authors and the conclusions arrived at by previous studies. The source of the data were published academic journals for the period 2015-2019. The study found that there were gender differences in the performance of mathematics in both primary and secondary school level. In most of the reviewed studies, it was established that boys performed better than girls in mathematics subject. The gender differences in the performance of mathematics was attributed to several factors. The study concluded that the student attitudes towards Mathematics affect the performance of the students in the subject; cultural factors affect the level of educational performance of students in both primary and secondary school level; family factors are a major contributor to gender differences in the academic achievement for students in Mathematics, both at primary and secondary level and that peer pressure among the students in primary and secondary level of education affect the academic achievement of the students in Mathematics. The study recommended that teachers to offer mentorship and motivational talks to girls in order to develop positive attitudes towards Mathematics Subject. The study further recommended schools to provide more Mathematics learning materials to girls and more contact hours for academic consultations with teachers in Mathematics in order to bridge the gap between girl and boy performance in the subject. The study also recommended schools to provide counselling services to students against negative peer pressure of students which could lead to poor performance of the students in academics.

## **LIST OF ACRONYMS**

<b>EFA</b>	Education for all
<b>INSET</b>	In-service education training
<b>JICA</b>	Japanese International co-operation agencies
<b>KCPE</b>	Kenya certificate of primary education
<b>KCSE</b>	Kenya Certificate of Secondary Education
<b>MDGs</b>	Millennium Development Goals
<b>UNESCO</b>	United Nation Education Scientific and Cultural Organization
<b>USAID</b>	United States Agency of African Development



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# CHAPTER ONE

## 1.0 INTRODUCTION

### 1.1 Background of the Study

In the 21<sup>st</sup>-century, numeracy skills are important due to the technology improvement and globalization experienced. Numeracy skills are needed to promote social and personal development (Baughman *et al.*,2017). According to Dlamini and Dlamini (2018), 90% of leaders and policymakers have recognized the importance of competency skills in labour forces as opportunities have become global. Priscah *et al.*, (2016) asserts that numeracy skills are important in the daily operations of a pupil as the skills prepare them for a better future through the values, virtues, and skills acquired. Ross *et al.*, (2018) indicated that pupils with numeracy competencies increase employability globally. Boahin (2018) and Halder *et al.*, (2018) add that employers are looking for individuals with these skills and not only with knowledge content. Theoretical knowledge cannot be used to solve the ever-changing challenges faced today (Marcellino, 2015). Numeracy competencies ensure even when dynamic challenges are experienced, through critical thinking skills acquired, one can solve them and better results achieved (Potvin, Dumont, Boucher-genesse, & Riopel, 2016). Muraraneza and Ntombi, (2018) states that numeracy competency skills are important that can be used to better their life in the future.

The achievement of these numeracy skills are measured in educational achievement tests. Education achievement means the ability learners achieve in learning institutions which includes the skills achieved, attitudes, knowledge and philosophy (Verniers & Martinot, 2016). Education has been greatly recognized as being an initial move for every human activity (Njenga, 2018). Education promotes the economic and social development of every nation by providing appropriate human manpower which enhances to raise productivity and gets rid of poverty, diseases and human ignorance (Ministry of Education, 2018). Education empowers the disadvantaged and is of great contribution to constructing society (UNESCO, 2019a). According to Melese (2017) education especially in mathematics and science is viewed as an economic promoter that encourages development of Nations. Nga'nga, Mureithi and Wambugu (2019) noted that gender equity is promoted through

education as there are no favoritism in education. The author added that teachers treat both boys and girls equally. Ntshangase (2017) noted that globally, nations are depending on the education sector to provide skilled manpower for the growth of the nation. The future workforce is highly dependent on the educational system as they have an obligation to train the necessary manpower needed (Katamei & Omwono, 2015).

Culture is a great determinant of the gender roles, mental, behavior and emotional characteristics of females and males. Society defines what is acceptable between males and females (Melese, 2017). According to Li and Qiu (2018) gender role is determined by the expectation the society has on an individual which is determined by the roles male and female play. Gender should be viewed as a concept that enhances recognition, utilization of competencies and development of the individual capabilities without depending much on whether one is male or female (Fredrick, 2017).

According to Ullah (2019) in developed countries the gender gap in educational performance has continued to grow in the last decade. Van Hek, Kraaykamp and Pelzer (2018) added that, globally, gender differences in academic performance have been some of the major contemporary issues in the current academic debates. This has compelled the relevant stakeholders, educators, trainers and researchers and has enhanced them to conduct researches on variables aimed towards equality in performance of learners female and male (Verniers & Martinot, 2016). The variables include the quality of education obtained, student ability, religious affiliation, geographical belonging, gender, parents' motivation and education level.

According to Panaoura and Panaoura (2016) the recent trends on gender issues are geared to promoting gender equality in both basic and secondary education. Over the years the national government has invested heavily to providing citizens with equal opportunity to access education. Since the inauguration on the world wide education for all (EFA) the human rights especially on gender equality the society has benefited more from the economic, political and social development. Globally, mathematics subject have been glimpsed as male students' oriented subjects (Panaoura & Panaoura, 2016). Although this

has been the case, mathematics has been cherished in societies as it forms a solid foundation to technology and scientific knowledge. Technological development is dependent on the performance of these sciences and mathematics.

Additionally, in secondary schools mathematics is mandatory to boost the political, and socio-economic performance of the nation. There is a great concern in U.S.A. due to mathematics preparation on large scale in public schools which is feared it might dwarf the United States' economy development in comparison to its principal competitors in future (Billett, 2016). The demeaned representation of girls in mathematics is a perilous weakness all over the developing world. Mutodi and Ngirande (2016) states that development problem would remain static till the women status is uplifted. One of the goals of the MDGs is gender equality, in education sector the goal was to eliminate gender disparity. United Nations, the University declaration of Human Rights of 1948 and the World have also been on the forefront to fight gender disparity in educational systems (Robert, 2018).

Kenya Universities and Colleges Central Placement Service (KUCCPS) uses the sciences and mathematics performance in the selection process of learners to science based degree programme. According to Awuor (2016) the declining number of females pursuing mathematics courses in Kenya's instruction institutions call for attention. Due to the dismal performance of mathematics especially among girls in both primary and secondary school, the performance have attracted more attention as the best interventions are cultivated. Though scientific knowledge is pivotal for the economic growth, formal education in Kenya and rest of Africa, girls are underrepresented in mathematics and science subjects (Mbaki, Joash, & Muola, 2016).

In Kenya, INSET for mathematics teachers have been implemented as a step to strengthening of mathematics in secondary schools education (SMASSE) project from a pilot phase (1998-2003) to national phase (2003-2008). Following consistent poor performance in mathematics subject over years, Kenya in collaboration with the Japanese government in an international co-operation agency (JICA) carried out research towards resolving the existing problem in mathematics subject. The way of addressing difficulties

that students experience in the classrooms is through intervention on teaching that can be acquired and enhanced through professional developments of mathematics teachers, hence birth of SMASSE Project in 1998 (Ministry of Education, 2018).

According to KSCE results of 2016, both boys and girls improved in their mathematics performance, although boys had performed better than girls. Brown and Kanyongo (2016) noted that girls can perform as well as boys in mathematics performance, when they are given enabling factors to boost their performance. Education stakeholders and teachers should always discourage gender stereotypes perception that have influenced the poor performance of girls (Arigbabu & Mji, 2017). Tetteh, Wilmot and Ashong (2017) revealed that mathematics performance for both girls and boys depends on the perception and process reality that both have developed. Brain lateralization explains the cognitive differences between boys and girls, as the brain lateralization favors the performance of boys (Enu, Agyman, & Nkum, 2019). Kenya is an ethnically diverse nation with many ethnic groups and a diverse population. In the society girls are more vulnerable than boys which can be one of the factors contributing to the difference in performance of mathematics. In respect to the issues affecting boys and girls in mathematics performance the current study aims at carrying further study on the effects of gender on mathematics performance.

## **1.2 Statement of the Problem**

The education sector in Kenya have emphasized on the performance of mathematics in both primary and secondary schools to an extent of making it compulsory. The capabilities of boys and girls in mathematics have persistently remained below par even though mathematics is a primary contributor to the overall performance of the learner. As technology development is highly dependent on the performance of mathematics, poor performance means stunted level of technology and slow economic development. When the performance of girls in mathematics continues to be below that of boys it would eventually mean gender imbalance workforce qualification. The girl child's academic performance is generally below average, yet it is acknowledged that an educated girl plays

a romantic lead in society as compared to an educated boy in society where women have a critical role to play in promoting productivity, promoting fertility and mortality rates.

In respect to the gender inequalities in performance of mathematics, several studies have been done to curb this gap (Adamu, 2018; Awuor, 2016; Manoah, Indoshi, & Othuon, 2016; Mbaki et al., 2016; Silla, Muema, Mulwa, & Mailu, 2018). Although the studies have been done the gender inequality gap in the performance of mathematics have still remained high for several decades. Since both male and female genders have equal responsibilities in solving the hindrances of industrialization, gender equality in the performance of mathematics must be promoted. The study thus aimed to fill this research gap by establishing the role of gender on the mathematics performance of both primary and secondary schools. In doing this, the study sought to determine the differences in student's academic performance by gender on mathematics and also to find out societal factors that influence gender disparities in students' academic performance between male and female students in mathematics at primary and secondary schools in Kenya. The study also aims at reinforcing active participation in technology and industrial development in Kenya that can be promoted by mathematics performance by both boys and girls.

### **1.2.1 Research Questions**

1. What is the students' academic performance by gender on mathematics in primary and secondary schools in Kenya?
2. What is the role of gender on factors influencing the difference in academic achievement in mathematics among pupils and students at primary and secondary schools in Kenya?

### **1.3 Research Objectives**

The following research objectives guided the study;

1. To determine the differences in students' academic performance by gender on mathematics at primary and secondary schools in Kenya.
2. To find out societal factors that influence gender disparities in students' academic performance between male and female students in mathematics at primary and secondary schools in Kenya.



## **1.4 Justification of the Study**

Education is of paramount significance in building human capital necessary to the economic developments of a Nation (UNESCO, 2019b). A Nation with enlightened citizens is most certain to have sensible democracy and politics. Gender inequalities hitches development, and enhance discrimination resulting to poverty, lowering or totally halting of economic growth and development thus gender becomes a developmental key issue (Verniers & Martinot, 2016). As Nations throes to make most utilization of the available resources in promoting sustainable development, the dormant human potential represented by women, signifies grievous wastage (Kakooza, 2018). In Kenya the accessibility of quality education and learning opportunities have been challenged by the existing factors that do not favor education. This is evidenced by the high number of street children, children living in conflict areas, children living with HIV/AIDS and cannot access education, displaced and orphaned children and also children that are physically challenged (Awuor, 2016). Female children worsens the case as the environment is already challenging to them (Omao, 2017). According to Ullah (2019) in third world countries, girls enrollment to schools is likely to record less than that of boys, their sustainability in schools and having their needs met through non-formal means, acts as a hindrance to the utmost development investments not being fully utilized.

It is evident that Nations with higher level of female enrollment in the past, currently portrays higher levels of productivity than countries that have not achieved as high enrollment levels for girls such as Kenya. This could have led to the fact that Kenya is under-developed since it under-utilizes its human resource. As Kenya makes an exodus from agricultural based economy to industrialization by the 2020, the appetite for people with technical knowledge heightens and the services of scientists and engineers becomes paramount. Kenya would require training human resources to harness economic growth resulting to the need of educated men and women specifically in science and mathematics; and education at all levels. Kenyans goal of industrialization would only be achieved through the contribution of both genders. (Ministry of Education, 2015).

Women are placed at the heart to any development process (Brown & Kanyongo, 2016); therefore need arises for the improvement in scientific and technological literacy among women and girls (UNESCO, 2018). Kenya needs to involve 50% of its population inclusive of women being scientists who form part of most needed human resource as well as their male counterparts. To enhance the full utilization of human resource, the bias and backlog discrimination must be discarded. Discrimination prevents women from achieving total self-fulfillment as human beings and retards the societal progress (Silla et al., 2018) discrimination is unjust, and a wastage of valuable expertise which is very important for all Nations (Kakooza, 2018). Thus developing countries (Kenya inclusive) have to give attention to girl's education in mathematics. This study established gender factors influencing gender parity on academic performance in mathematics. The study identified causes of discrimination before addressing the situation.

Additionally, the study is useful to policy makers, researchers and academics in diverse ways. Gender parity in Mathematics performance may be considered when subject planners and policy makers (such as the Kenya Institute of Curriculum Development (KICD), The Ministry of Education, and UNESCO among others) need reliable and valid information on the underlying reasons for the low performance in mathematics. Furthermore, academicians and researchers may use the obtained results for their further investigations in the areas of gender parity in the performance of mathematics.

### **1.5 Scope and Limitations of the Study**

The aim of the study is to examine the effects of gender on the performance of mathematics at both primary and secondary schools in Kenya. In respect to that, the study aims to determine the differences in students' academic performance by gender on mathematics in primary and secondary schools in Kenya and to find out factors that influence gender disparities in students' academic performance between male and female students in mathematics in primary and secondary schools in Kenya. The study was delimited into a literature review for a period of five years that is 2015 to 2019 and made conclusions based on the meta-analysis. The study was delimited to nine factors that cause gender differences in the academic achievement of pupils in primary and students in secondary schools in Kenya.

## **1.6 Definitions of Key Terms**

**Academic Performance** – This the active participation, acquiring good grades enhancing performance on knowledge, skills and attitude acquired in a school.

**Factors** – Determinants that are identified and supposed to influence performance in mathematics.

**Gender** - It is the state of being a male or a female

**Gender Equity** –It refers to fair provision of education and elimination of discrimination by gender. Boys and girls having equal opportunities in learning science and mathematics’

**Influence** - To have an effect, in this case referring to how gender affects the academic achievement in reference to mathematics and science subjects

**Learning** – A process of acquiring knowledge, skills, attitudes, and values that are useful in life.

**Mathematics** - It is the act of playing about with numbers, quantities and shapes.

**Pedagogy** – Refers to teaching methods applied in teaching science and mathematics in schools

**Physical Science subjects** – This refers to biology, physics and chemistry in secondary schools and general science in primary schools.

**Private school** - A school owned and managed by private proprietors. Parents finance the education of their children

**Public school** – A school that receive financial support by the government

**Requisite resources** – The necessary material required to enhance effective teaching and learning, the relevant resources to effective teaching and learning in mathematics and science subjects.

**School**- An institution where teaching and learning takes place

## **CHAPTER TWO**

### **2.0 LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK**

#### **2.1 Introduction**

The objective of this literature review was to highlight the factors that influence mathematics performance at both primary and secondary schools in Kenya. This chapter's guidelines were the objectives which reflect on academic performance of boys and girls mathematics and also explored on other factors that led to academic performance disparity between the male and female students in both primary and secondary schools in Kenya. Current literature, not exceeding five years, was used in order to indicate the true status of academic achievement of students and pupils in Mathematics Subject.

In conducting the literature review for this study, the study focused on published research articles published between the year 2015 and the year 2019. The researcher used google scholar and Internet Download Manager (IDM) downloader to specifically gather research articles on student academic achievement in Mathematics and gender differences in the performance as well as factors leading to the differences for the period 2015-2019. Once the materials were downloaded, they were sorted based on the relevance of the findings and the heightened factors influencing gender disparity in the academic achievement of students and pupils in both primary and secondary schools. The sorted articles were reviewed in this section on the various sub-section based on the specific findings of each of the sorted article.

#### **2.2 The Review**

##### **2.2.1 Academic Performance**

Academic performance can be measured by how well a student or pupil meets the set objectives and goals set by an institution or a government (Mbaki et al., 2016). According to Fatih (2017) the performance of boys and girls are always different since the cognitive ability and the learning process of both boys and girls is different. Mutodi and Ngirande

(2016) carried out a study and found that at junior secondary school level boys performed better than girls especially in mathematics. Additionally, Susan and Imonje (2019) indicated that as boys and girls grow up their differences in mathematics performance continued to widen. Ngware, Ciera, Musyoka, and Oketch (2015) carried out a study and found that male and female students have low expectation on girls' performance in mathematics.

Steegh, Höffler, Keller, and Parchmann, (2019) carried out a systematic review on gender differences in mathematics competitions in Germany. The study found that attitudinal differences between boys and girls on Mathematics had been the major influence of gender differences performance of mathematics among junior students. The study further found that during mathematics competitions, boys outperformed girls. The study concluded that boys outperformed girls in mathematics in secondary schools as this is a crucial stage where both boys and girls develop their strengths and interests on their future. In another study Ullah (2019), investigated the boys and girls performance in mathematics in Pakistan. In one of the objectives, the author wanted to find out the reason boys outperform girls in Mathematics, the study found that the misconceptions that Mathematics is a technical subject and only boys can perform had been one of the major reasons of poor performance among girls. The study recommended teachers and other tutors to promote the performance of girls by engaging them more in Mathematics.

In Ghana, Tetteh and Wilmot (2017) assessed gender differences in performance in Mathematics among pre-service teachers. The study found that although there have been girls clinics to boost their performance in mathematics, there is still a high disparity between males and females, as the males outperform females. The authors concluded that administrators and mathematics tutors needed to develop strategies that boost the performance of females. Focusing in Nigeria, Arigbabu and Mji, (2017) found that mathematics performance favored male students as they performed better and with less efforts than their females counterparts. The author also found that male students spent most of their time revising mathematics while their females' counterparts only revised when it was most necessary, the less time the females spent on revising explained the reason for

their lower performance. The study concluded that the conventional nature of females in problem solving strategy is the main influence of their poor Mathematics performance compare to males who are unconventional.

In Ethiopia, Melese Simegn (2017) assessed the influence of attitude towards Mathematics achievement for grade 10 and 12 female and male students. The study found that females and males perform equally in their early years, the disparity is experienced in secondary schools. The study further noted that attitude towards Mathematics is highly correlated to the performance especially females. The study recommended teachers, parents and administrators to develop better ways to promote the attitude of female students. In Uganda, Kakooza (2018) examined Mathematics and gender in Primary Schools, the influence of teachers, learners and parents. The author found that in the country there is a significant gap between girls and boys in Mathematics achievement during the standardized examination boys outperform girls together with classroom participation. The study further found that lack of confidence and motivation among girls are the main factors enhancing poor mathematics performance.

Mbaki, Joash, and Muola (2016) carried out a study in Kitui Central on determinants of girls' performance in public secondary schools in Kenya. The study showed that women performed poorly in sciences and mathematics among all the education levels. The authors found that girls are majorly affected by gender insensitive infrastructure that adversely affect the girls' performance than boys. The study finally recommended learning institutions to develop pedagogical learning skills platforms to equip teachers with better skills on the way to handle girls in respect to Mathematics performance. Awuor (2016) conducted a study in Nairobi on the factors influencing girls' performance in Mathematics in public secondary schools. The author found that girls lacked interests in Mathematics that resulted in the girls' poor performance. The study also found that after the completion of form four most boys joined university to pursue science-based courses while most girls pursued art-based courses. The study concluded that unless teachers promote better interest on girls the performance on sciences and Mathematics would continue to go lower.

### **2.2.2. Differences in Mathematics Academic Performance by Gender**

Surveys in Kenya, and other African countries have in history allude that both male and female students have little optimism of female achievement in schools and of career prospects in mathematics areas (Akinyi & Musani, 2018; Awuor, 2016; Gull & Shehzad, 2015; Luketero & Kangangi, 2019). Likando (2017) concurs with the studies delineating that male students portray superior performance in comparison to female students. However, Njoroge and Githua (2017) documents that; there are no gender differences in achievement of boys and girls in early school. Gender differences become more pronounced in higher classes where boys perform better than girls in mathematics.

Robert (2018) ascribes differentiated performance between males and females to differences in hemispheric organization of the brain. Accordingly the right and left hemispheres are specialized to handle dissimilar cognitive tasks: In most people, the left hemisphere is more actively involved in verbal processing while the right hemisphere is more specialized in partial problems. This panorama suggest that women seem to be lateralized more strongly to the left for verbal processing and men more strongly to the right for spatial processing than women. Thus boys tend to have better aptitude in mathematics than girls. Such an outlook being held may affect the achievement of boys and girls in science and mathematics. However there is an manifestation that biological factors may be responsible for the disparity between boys and girls performance in science and mathematics (Ekperi, 2018).

One of the primal studies Okurut (2018) referring to the psychic and social differences between sexes, profess that the education outcomes of men and women would be different at college and graduate level. The debate on gender differences, in cognitive abilities has categorically evolved out of the debate on biological versus social determinism (Naa, Tetteh, Wilmot, & Ashong, 2018). The biological perspective on sex differences and cognitive performance considers social factors to be insignificant to biological element such as brain structure. Steegh *et al.*, (2019) asserts that males have larger average brain sizes than females and therefore would be expected to have higher average IQs. Arigbabu

and Mji (2017) on the other hand, asserts that there is no sex difference in general intelligence.

Brown and Kanyongo (2016) in an examination of sex differences in classroom performance establish that female students outperform the male in standardized test, measures of mathematics achievement such as the SAT-M in mathematics. However, Bleidorn *et al.*, (2016) in a study on sex differences among grade eight mathematics performance, found no significant evidence of gender gap in over 77,000 students in nineteen developing countries. Both cross national variation in sex differences in mathematical performance and the trend towards less of a difference between males and females, questions and innate male superiority intelligence.

## **2.2.3 Factors that Lead to Gender Disparities on Academic Performance by Gender**

### **2.2.3.1. Students Attitudes**

A positive attitude towards a subject is when one realizes his or her ability through achievement (Brown & Kanyongo, 2016). When a student have attained all the necessary skills and knowledge on a subject such student developed positive attitude (Muneja, 2015). Attitude towards mathematics can be seen by the participation of a student in class, the effort the student is giving the subject and the quality of work the student gives to mathematics (Obinna-Akakuru, Onah, & Opara, 2015). Seidel and Shavelson (2017) indicated that affirmatory attitude is critical in promoting mathematics performance among students. Ngisa, Muriungi and Mwenda (2017) noted that student's attitude, have been documented by surveys in Kenya and other African countries to impact positively on both genders achievement in school and of career prospects in science and mathematics areas.

In Netherlands, Van et al., (2018) noted that high school girls students perceives mathematics and science, engineering and technology as too laborious, boring and irrelevant. This could give a reason why some girls are not strongly committed in excellence in science and mathematics and thereafter establish a career for themselves



(Motanya, 2018). In South Africa, Mutodi and Ngirande (2016) investigated the influence of students attitude and perception on Mathematics performance. The study revealed that there was a significant difference in perceptions and attitude between males and females. The study found that there was a positive correlation between performance and attitude and perceptions.

Okyere (2019) carried out a study in Ghana on students' attitude on mathematics and performance among secondary school students. The study revealed that mathematics performance is highly related to the attitude of the student. The author also indicated that Mathematics teachers that had positive attitude towards the subject and their students developed a positive attitude especially among females that as a result improved the students' confidence hence better results. Mbaki et al., (2016) conducted a study in Kenya and established that there was a significant liaison between students' gender and attitude towards mathematics.

Nga'nga et al., (2019) noted that there prevailed a positive relationship between attitude and the academic achievement. Even though a relationship between attitude and academic achievement existed. Nga'nga et al., (2019) indicated that low performance cannot always be associated with a negative attitude. However, continuous poor performance in mathematics can result to a negative attitude that eventually leads to even worse grades. Samuelsson and Samuelsson (2016) believed that since one never performed well in the past they may as well fail in the future and vice versa. The students who report their liking of science's and mathematics perform better than those who do not like it (Samuelsson & Samuelsson, 2016).

Motanya (2018) investigated the influence of attitude on mathematics performance among females' students in Nyamira County, Kenya. One of the objectives of the study was to establish the relationship between attitude and Mathematics performance. The findings of the study indicated that female students perceived mathematics as a tedious subject and a difficult one. The author also found that most female students showed poor classroom participation during mathematics lessons as the students showed high level of fear and

anxiety. The study finally recommended education stakeholders to invest in changing students' mentality on Mathematics. Still in Kenya Manoah, Indoshi, and Othuon, (2016) undertook a study on the influence of attitude on performance of students in mathematics curriculum. The study found that academic achievement is highly linked to the students' attitude towards the subject. The study recommended administrators and Mathematics tutors to develop activities related to Mathematics to promote the attitude and perception of students on Mathematics.

### **2.2.3.2 Students Cognitive Development in Mathematics Ability**

Students opt for a particular subject because they believe they are good at it and have a good chance of passing it in the examination. This perception is reinforced by the girl's estimation of their own ability in the relative difficulty subject. An argument has been cited that few girls study Mathematics since they are less confident than boys of their own ability and to choose difficult questions. Many girls and women tend to down play their particular skills and abilities (Breda et al., 2020). Adamu (2018) concede that women tend to underestimate the capabilities in all areas of their lives such as the ability to learn, verbal spatial and aptitude skills.

Boys and girls attribute their success and failures to different factors. According to Soni and Kumari (2015) girls attribute the failure in terms of personal factors and their inability to succeed in terms inherent inadequacies. Boys on the other hand attribute their failures to external factors and they interpret their failures due to extraneous factors. Female students achieve higher grades in comparison to the males due to their capability to work harder and attend class more frequently than their male counter parts (Bahar, 2016). Other scholars (Seidel & Shavelson, 2017; Steegh et al., 2019) have a consensus that the performance of girls and women are curtailed by their abilities. On the other hand Enu et al., (2019) asserted that the differences between boys and girls in their academic performance are socially created and the effects experienced can be minimized through training and workshops. Females as compared to males have better study skills which can explain their academic performance.

Panaoura and Panaoura (2016) investigated the cognitive and metacognitive performance on mathematics in Middle East countries. The study found that processing speed, inhibition and control and working memory are the three main features that promote metacognitive performance of the mind. The author also added that processing speed and efficiency has a coordinator role on the cognitive system that either promoted metacognitive performance or delays it. The study further asserted that as Mathematics is a creative subject only students with better cognitive ability that can perform better. The study concluded that girls perform better in mathematics as they have better cognitive abilities. In Kenya Chesimet, Githua, and Ng'eno (2016) carried out a study on the effects of Experiential Learning Approach on Students' Mathematical Creativity among Secondary School Students. The study found that creativity is one of the primary goals of Mathematics taught in secondary schools, unless a student is able to follow given patterns both internally and externally the students cannot perform better in Mathematics. The authors further indicated that girls are better in following patterns than boys who they are at the same level, hence the better performance of mathematics by girls than boys.

### **2.2.3.3 Learning Environment**

This consists of physical, economic, social and cultural conditions prevailing in our world together with the forces from these that influence human development. The type of schools is imperative for effective learning. Awuor (2016) reported that inadequacy in facilities in the schools such as qualified teachers, sufficient classrooms, rest rooms, laboratories and laboratory equipment and other relevant resources strongly affect performance of learners differently by their gender. In Kenya the availability of learning resources is highly dependent on the level of the school especially in secondary schools. The different levels existing are private and public schools, whereas the public are further categorized into sub-county, county, extra county and national. Quality of teachers and physical resources are the two main resources that are unevenly distributed in the country. National schools have the best physical resources and highly experienced teachers, the learning resources diminish with the levels with sub-county levels having the lowest learning resources.

According to Beijing declaration of 1998, discrimination of girl's access to education persists in many areas, due to customary attitudes that boy's education first and girls second. Saya (2017) noted in his study that when parents are confronted with constraints of resources or opportunities for schooling, they favored the male child; consequently a boy child accesses a better school with better resources in comparison to the girl child. Together with the school quality, Likando (2017) argues that a school might be an important factor in determining school attendance. Girls are easily affected by the accessibility of school and also its quality. Girls associate negative physical and psychological problems with menses (Van et al., 2018). Lack of the necessary items such as appropriate sanitary materials, lack of water, separate toilets create fear and discomfort in the girls resulting in poor learning and performance (Ullah, 2019).

Inadequate school facilities in most of African countries force many students to sit on the floor in very crowded classroom typically with a learner to teacher ratio of 60: 1 with girls finding it hard to study while squatting on the floor (Ngware *et al.*, 2015). Most governments allocate millions of shillings to cater for sanitary pads for older girls and priority given to slums and remote rural schools. Inadequate school facilities lead to other shortcomings, such as increased failure and class repetition rates, leading to high drop-out rates for girls (Asante, 2018).

Samuelsson and Samuelsson (2016) carried out a study on gender differences in teaching and learning Mathematics in Sweden. The study found that there exists difference in perception of classroom set-up among boys and girls. The study further found that boys felt more involved in classroom and discussion groups than girls. The study concluded that boys perceived mathematics as a more important subject than girls and this explained the reason boys performed better than girls. Van Hek, Kraaykamp, and Pelzer (2018) undertook a study on the effects of school resources and practices on the performance of boys and girls in Netherlands. The study found that positive effects on school resources positively affects the performance of boys than that of girls. The study also found that when the population of boys are high in a classroom they would perform better, but for girls a

small population in one classroom would promote the performance. The authors concluded that, girls benefitted more from schools that are social-economically advantaged.

Focusing in Kenya, Akinyi and Musani (2018) investigated the influence of school based factors on the performance of girls. The study found that Mathematics performance of girls is affected by several school based factors like indiscipline, relationships and wastage of time. The study further indicated that boys performed better even the school-based factors are affecting them negatively. The study recommended more guidance sessions and inviting resource persons to talk to girls as they are affected more negatively by school based factors than boys. In another study in Kenya Ngware, Ciera, Musyoka, and Oketch (2015) assessed the quality of teaching and learning achievement gains from primary schools. The authors found that the experiences and skills of teachers affected the performance of Mathematics. According to the study boys and girls performed the same when subjected to the same factors. The study further asserted that according to the KCPE performance there are no major gaps between boys and girls performance in Mathematics from the same school. The study concluded that the learning environment especially the teachers are the major influence of the performance of Mathematics.

#### **2.2.3.4. Parental and Family Attitudes**

Weerasinghe (2017) found that parents had a higher expectation on boys on mathematics performance than on girls. The doubting of the girls' performance lowered their confidence which resulted to their poor performance in mathematics. Mutodi and Ngirande (2016) discovered that parents either foster positive attitude to their children or negative. The negative attitude resulted in poor performance as the children had to prove their parents right even with poor performance that the parents had believed. The authors also added that parents promoted the development of naturalists and interpersonal skills in girls while promoting practical skills in boys. Bearing in mind that mathematics is more of a practical subject, boys were prepared before girls to handle it hence the better performance in boys. According to Saya et al., (2017) studies have indicated that parents promote gender inequality by the different expectations they have on their children.

A mother's education level was a determining factor of her daughters' chances in participating in science and mathematics at school. The mother becomes the child's educator and can introduce scientific explanation to the unexplained puzzles and events of the world in which a child find herself or himself. Hence, the science oriented mother enhances in the child a scientific thinking and reasoning in order to be able to solve a problem (Likando, 2017). Brown and Kanyongo (2016) concurred with these studies and added that the parental involvement in education and the resources the parents set on education either promoted or derailed the performance of students. When a student noticed that parents were not involved in their academic performance the students performed poorly than students' whose parents participated in their education wellbeing.

Kilic and Askin (2016) investigated the parental influence on students' mathematics performance in Turkey. According to the study, parents that discussed with their children on schoolwork were more successful than others. The study also found that the attitude parents had on children schoolwork and homework influenced the performance of mathematics. The study further indicated that parents considered girls to be more delicate hence they would get involved with their academic performance, it contributed to girls performing better than boys. The study concluded that parents had an active role in promoting the Mathematics performance of their children. Focusing in India, Soni and Kumari (2015) assessed the role of parental math attitude in their children achievement of Mathematics. The authors found that fathers' positive attitude towards Mathematics improved the performance of boys on Mathematics, mothers' attitude towards mathematics did not affect the performance of boys in Mathematics. While in girls, positive attitude from both parents significantly affected the girls' performance. The study conclude that parental positive Mathematics attitude was significant in promoting the performance of Mathematics. In China Li and Qiu (2018) carried out a study on how family background affect educational achievement of a child in primary education. The study found that parenting behavior and the educational support parents give to their children affect the performance of the children. The study also noted that the socio-economic status of parents affect the academic performance of children. The study further asserted that, since

Mathematics is one of the main subjects in primary school, creativity and a better family background is a motivation on the performance.

Sarah and Pouezevara (2016) carried out a research in Kenya on the reason boys underachieved in education compared to girls of the same level. The study found that trends of girls underperforming had been experienced in the past 20years which resulted in receiving a lot of attention hence neglecting the academic needs of boys. The study also indicated that gender stereotypes had resulted to boys being neglected more than girls hence the poor performance. The study concluded that high expectations on boys without meeting their education expectations causes the underperformance of boys in Mathematics compared to girls. In another study in Kenya Nga'nga, Mureithi, and Wambugu (2019) investigated the difference in resources that have caused mathematics gender gaps. The study found that the Mathematics gender gaps experienced in Kenya public and private primary schools can be attributed to differences in resources, differences in utilization of educational resources and unobservable factors between boys and girls. The study further indicated that both in private and public primary schools boys performed better than girls as boys take advantage of the resources available than girls. The study concluded that educational resources utilization have to favor girls for them to perform better in Mathematics.

### **2.2.3.5 Cultural Beliefs**

Non- traditional education was introduced to Kenya through the missionaries and colonialists. The parents resisted to these colonialists schools in the very early days and the idea of sending children, especially girls to the “enemy” school was unheard of. Women’s education was to promote domesticity in women, being good housewives and mothers, enhancing good wives for the male clerks and mission boys. Negative attitudes towards the ability of girls were deeply encapsulated in all cultures and education for domesticity was the norm (Ministry of Education, 2018). In Malawi, some subservient cultural practices such as kneeling to parents and elders have resulted in girls believing that boys are superior to them especially in handling difficult tasks like mathematics (Seidel & Shavelson, 2017).

Bahar (2016) noted that stereotypical perception have resulted in boys studying “hard” subjects while girls were left to study art subjects.

Saya, (2017) carried out a study on the effect of socio-cultural practices on the performance of girls in Kenya primary schools. The study found that since 2012 girls’ performance in Mathematics had been dismissing. The study also found that stereotype gender roles are the main factors leading to poor performance for girls than boys. The study recommended parents to equally share house chores among both boys and girls to enhance girls also focus on their academic performance. Ngware, Ciera, Abuya, and Oketch, (2017) conducted a study among primary schools in Kenya to establish the gender gap in mathematics achievement. The study found that boys performed better than girls in Mathematics primary school national examination. The study also found that boys received more encouragement follow-ups than girls. The study concluded that gender gap at the entry level there exists gender gaps, the gender gap that had been started from the community and other cultural differences cannot be closed by school.

On the other hand, Brown and Kanyongo (2016) assessed gender and Mathematics class participation. The study found that during early primary classes’ girls performed better than boys and the girls showed more eagerness to learn than boys. The study also indicated that there were no major cultural differences that would have affected the performance of either boys or girls. The study also observed that as boys and girls progress to upper primary years, mathematics performance of girls lowered while that of boys improved. The study concluded that gender stereotypes existing in the community affected girls as the technical subjects were believed to be hard and only boys would handle them successfully.

### **2.2.3.6 Teachers Characteristics and Attitude**

Mathematics teachers have also been accused of disrespecting the cognitive styles of learners through the use of teaching methods that do not agree with their learning styles and in ability to encourage girls to pursue mathematics (Enu et al., 2019). A teacher plays a climacteric role in teaching mathematics and doubtfully the teacher influences the learner acquisition of knowledge. The teachers and the pedagogy affect generation, constitution



or reduction of gender differences. Herman (2017) noted that, the teachers characteristics help in defining the student's attitude towards a subject.

Ntawiha (2016) asserted that girls that were taught by female teachers in mathematics performed better than when a male teacher taught them. Female teachers contributed to the development of positive attitudes to girls hence the high performance (Riswanto & Aryani, 2017). Although in most schools male teachers were more than the female teachers, there was a high discrepancy on the mathematics performance. Motivation and the ability of a teacher to academically satisfy the pupils were also determinant of the academic performance of both genders (Tarhan, Cendel, Karaman, Kemppinen, & Aerila, 2019). Alabekee, Egbulefu, Samuel and Osaat (2015) and Katamei and Omwono (2015) revealed that in Africa, mathematics is perceived as a technical puzzle that only men can solve hence discouraging the performance of girls.

Ekperi (2019) investigated the impact of teacher characteristics on students a case study of public secondary schools in Nigeria. The study found that teacher's knowledge on a subject and the teaching method adopted by the teacher correlated positively with the students' academic performance. The study further noted that in secondary schools, mastery of relevant knowledge on the subject was an important concept in promoting the performance of the students. The study concluded that teacher's characteristics which is a determinant of the quality of knowledge they transmit to their student is an important component in promoting performance. The study recommended periodic evaluation and monitoring of teachers to provide better teaching methods that would facilitate the performance of the students'.

Gordon (2016) sought to examine the effect of teacher characterizes and attitude on the students' performance. The study found that the positive attitude of teachers towards Mathematics promoted the students' performance. The study also found that there were no major performance differences from either male or female teachers. The author further found that teachers' quality and experience the teacher has had over years are the main indicators of how well the boys or girls were performing. The study concluded that teachers

praise on students and having time beyond the classroom are important factors teachers must consider to improve Mathematics performance. Sanda (2016) carried out a similar study on factors affecting achievement of Mathematics in secondary schools. The study indicated that teachers' qualifications and lesson preparation were the significant factors that contributed to the performance of students on Mathematics. The author also noted that the teaching experience and teachers' attitude had a positive correlation to the achievement of students in Mathematics. The study concluded that some teachers' behavior like teacher's enthusiasm and the degree of orientation are positively correlated to the students' performance.

### **2.2.3.7 Teaching Methodologies**

Teaching of Mathematics has shifted from traditional and exhibits methods to a more hands- on- approach as recommended by the SMASSE project (2009). Mathematics education need to use the student based activities to enhance retention. Pedagogy applied need to harness learner centered approach, together with integration of other methods when teaching since not all scientific areas can be delivered practically such as mastery learning approach (MLA) (Bunyi, Wangai, Magoma, & Limboro, 2015). Teachers need to use teaching approaches in consideration of gender (either boys or girls) are being taught is serious. Mathematics teachers have also been accused of disrespecting the cognitive styles of learners through the use of teaching methods that do not agree with their learning styles and in ability to encourage girls to pursue mathematics (Susan & Imonje, 2019).

In Ghana, Enu and Nkum (2019) investigated the factors influencing students mathematics performance, among other objectives the study focused on school-based factors like teaching and learning methodologies. The findings of the study revealed that inadequate teaching and poor learning materials had resulted to poor mathematics performance. The finding also indicated that teachers teaching methodologies and the students' self-motivation are important factors in promoting mathematics performance. The study concluded that students need a holistic understanding on Mathematics before applying it in examination hence the importance of teachers to use holistic concepts while handling mathematics models.

Ganyaupfu (2014) carried out a study on teaching methods and students' academic performance. The study found that a teacher-interactive teaching methods are the most effective teaching methods that promote the performance of students. The study also noted that student centered methods were more effective than teacher centered approach. The study concluded that students-centered teaching methods have a positive correlation on Mathematics performance. Silla, Muema, Mulwa, and Mailu (2018) undertook a concurrent study on the relationship between teaching method and student performance in mathematics. The findings of the study indicated that mathematics performance in secondary schools had continued to be performed dismally by both boys and girls. The study further established that a positive correlation between teaching methods and students' achievement existed. The study concluded that the introduction of ICT in teaching Mathematics is one of the major factors that would improve mathematics performance in the country.

### **2. 2.3.8 Lack of Positive Role Models**

Girl child performance in education is most likely to be influenced by role models. In Malawi research shows that school girls lack female role models in mathematics and this affect their skill, interest and attainment in these subjects. The ratio of women teachers in mathematics in most African countries is particularly low because few women with the necessary mathematics' background get on to the teacher training programs. According to Breda *et al.*, (2020) lack of girls' schools and female teachers is a basic and important constraint for them. In congruence according to gender policy and education (2007) in Kenya, there is lack of women teachers (especially for SMT subjects) to act as positive role models for girls. In education management, girls have fewer role models to emulate, example, Ghana, provinces with a high proportion of women teachers have a girl completion rates for girls (Enu et al., 2019). The impact of females head teachers on girls is considered stronger than that of female teacher. Government of Sierra Leone (2020) reported that their education system has very few- models to effectively motivate the girls to aspire for higher education.

According to a study done by Sharma, Vaishali and Bindal (2013) girls out-performed boys in the subjects where the women teachers' outnumbered their male counterparts. In France, Breda *et al.*, (2020) undertook a study on the influence of role-models on the academic performance. The findings of the study indicated that girls were more motivated to perform better in schools with female teachers in Mathematics. The study also found that boys relied less in their mathematics performance on role models compared to girls their counterparts. The study further found that female role models promoted the performance of mathematics as it raised the interest of the girls to study the subject. From the study it was also clear that girls that were taught by female teachers performed better than those taught by male teachers. The study concluded that girls needed more role models in mathematics for them to perform better in mathematics, unlike boys.

Verniers and Martinot (2016) carried out a study on the virtues of a hardworking role model to improve girls' mathematics performance in Paris. The findings of the study indicated that both boys and girls scored the same on a difficult mathematics test even after exposure to a hardworking female role model. Further, the findings indicated that hardworking role models promoted the performance of both boys and girls in equal measures. The study concluded that self-efficacy, which is a motivation for better mathematics performance is promoted by hardworking role models of both genders. In another study Nkuene (2017) carried out a research on the factors affecting girls performance and one of the aims of the study was the influence female role models have on the performance of the girls. The study found that girls who had received female role models since their young age continued to perform better as a solid foundation had been developed. The authors also noted that girls that performed better in their KCPE had had female role models in their final year in addition to their early years. The study concluded that female role models have a positive influence on the performance of girls in their KCPE and more so in Mathematics.

### **2.2.3.9 Peer Influence**

Gender identity is developed during the early years by the interaction a child gets from their peers and adults (Saya et al., 2017). As primary and secondary education takes place during adolescence, this is the stage gender identity is also developed. As the children interact with their peers their gender identity would be solidified and influence their daily activities. Peer interactions impact academic performance. According to Brown and Kanyongo (2016) girls are more influenced by

their peers than boys as girls are more emotional than boys. Due to this, working together for academic achievement is conveyed as a feminine activity.

As there is positive and negative peer influence, when girls influence one another positively better performance are achieved even when dealing with the “hard” subjects (Manoah *et al.*, 2016). Boys are likely to be influenced less either the positive or negative as they consider it a more feminine activity. Mbaki *et al.*, (2016) noted that boys are ridiculed by their peers when they work hard in school. This has resulted in girls performing better as girls can involve one another in their study. Additionally, peer pressure influences learners in believing there are boys and girls subjects which has created gender norms that are very hard for individuals to break (Ullah, 2019). When used positively it can promote the performance and the vice versa is true (Awuor, 2016; Okyere, 2019).

Likando (2017) carried out a study in Zambia on the factors causing poor academic performance among girls, among other factors, the study found that peer pressure is among the leading causes. The study that girls are affected by peer pressure than boys as the issue of low self-esteem affects girls more than boys according to the study. The study also revealed that humble background and lack of the necessary learning materials contributed to peer pressure among girls. The study concluded that peer pressure was mainly experienced in the senior years more than among the juniors.

In another study Biton and Gonzaga (2019) investigated the influence peer pressure has on students’ academic performance. The study revealed that peer pressure and influence is a major influencing factor on either good performance or negative performance of students. The study also found that parents and teachers have a role to play in promoting or reducing peer pressure. The study concluded that peer pressure when positively utilized can be promote the performance of students, the negative influence can also promote poor performance of students. Luketero and Kangangi (2018) investigated the influence of peer pressure on academic performance of students in Kirinyaga County. The study found that peer pressure is among the major factors contributing to students’ poor performance. The study also revealed that the less motivated students dragged the motivated students in performing poorly. The authors also noted that peer pressure contributed

to alcohol and substance abuse that contributed to poor academic performance. The study concluded that the performance of every student is either dragged or promoted by peer pressure.

### **2.3 Theoretical Framework**

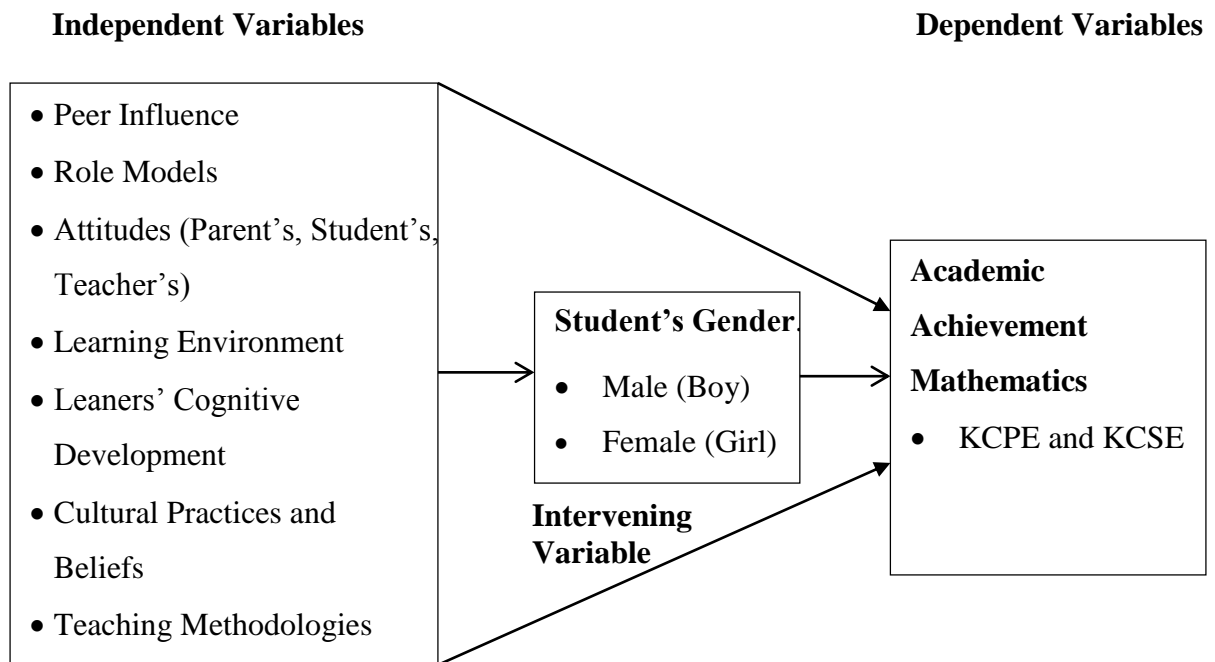
This study employed the theory of feminism. The theory was developed in 1974 by Mary Wollstonecraft. The theory was formulated to explain for gender inequality where in any given society there is women and men social roles (Mary & Brow, 1974). According to the feminism theory both men and women are equal socially, politically and economically. If men and women are not different this should lead to equal treatment under the law, have same rights and equivalent education and work opportunities. However, the theory noted that the society is the determinant of gender inequality but not individuals. The liberal feminism asserted that male and female are biologically equal and the gender differences emerge from the society. Adamu (2018) noted that the society have a false belief that women are naturally weaker and are less in their intellectual capability compared to men. In the context of this study, boys and girls tend to perform different in their academics based on these cultural beliefs. Similarly, in the school context, girls are believed to perform well in art subjects while boys are perceived to perform better in mathematics and sciences.

Affirmative action is required to vigorously seek out qualified personalities to re-dress the gender and ethnic imbalance in workplaces. This implies that men be encouraged to train for jobs which are labeled feminine (nursing, teaching and secretary) and women to train in fields like engineering, and construction which has been termed as masculine. This theory works well for this study since the male learners would be encouraged to study the feminine subjects to enhance their future careers and the girls be encouraged to study the so known as male subject to ensure the masculine careers in the future. This perspective works towards leveling the playing field that would allow women to seek the same opportunities as men, particularly the opportunity to excel in various fields. The feminism theory focuses on freeing women from oppressive gender roles: sexual and gender inequality. This would lead to girl learners being less loaded from the gender roles reciprocating to the female students attending schools frequently and less tired in their

respective classes which offers them equal opportunities in access of education. Therefore the theory of feminism will be useful in guiding the study towards establishing the gender differences in mathematics as well as the factors that cause the gender differences.

## **2.4 Conceptual Framework**

Nayak and Singh (2016) defines conceptual framework as a model of representation where a researcher demonstrates relationship between variables and represents them graphically. The conceptual framework aimed at demonstrating the effects on the academic performance regarding to science and mathematics. The framework explores the interrelationship between dependent, independent and intervening variables. Dependent variables are those that are influenced or altered by other variables, it consists of academic performance in mathematics and science subjects. Independent variables are the variables that are not affected by other variables that is, student's gender (male or female). Intervening variables are those that may occur and interfere with other variables such as peer influence, role models, teachers and parents and student's attitude, school environment. The opportunity propensity model was utilized in this study. The model was developed by Byrnes and Miller (2007) in the recent years, in the field of mathematics learning. The opportunity propensity model was used to demonstrate the availability of educational opportunities and the factors influencing the strategies students use while consuming these opportunities.



**Figure 1: Conceptual Framework**

**Source:** Adopted from Byrnes and Miller (2007).



# CHAPTER THREE

## 3.0 METHODOLOGY

### 3.1 Study Area

The study was conducted in Kenya among both primary and secondary schools. At 580,367 square kilometers (224,081 sq. meters), Kenya is the world's 48th largest country by total area. Kenya has a population of more than 47.6 million people. As of 2020, Kenya is the third largest economy in sub-Saharan Africa after Nigeria and South Africa (Kenya Population and Housing Census, 2019). In the year 2019, there were 31218 primary schools in which about 8,000 were private primary schools and about 23,000 were public primary schools. On the other hand, there was a total of 11,822 secondary schools in Kenya by the year 2019 in which about 3,000 were private secondary schools and approximately 8,000 were public secondary schools.

By the year 2018, 11.5 million learners from both primary and secondary schools were registered according to the National Education Management Information System (NEMIS). Ministry of Education data indicate that there are 8.88 million pupils in primary schools secondary schools has 2.6 million. For primary schools, the government pays Sh.1,420 per child per year while in secondary schools, it pays Sh. 22,244 per child. By 2018, there were 31218 primary schools in Kenya with 9,734 secondary schools. In both primary and secondary schools, Mathematics is a compulsory subject (Ministry of Education 2019).

### 3.2 Study Design

The study used meta-analysis research design in coming up with study conclusions. The study was both quantitative and qualitative in nature and used non-probabilistic purposeful sampling to collect secondary data from published journal articles. Meta-analysis involves review of available literature over given period in arriving at conclusions (Lin & Jeng, 2015). This design is deemed appropriate since it provides qualitative data from previous related studies without going to field to collect data. This method is cheap and can be done in the shortest time possible (Nayak, 2016). Upagade and Shende (2012) states that meta-

analysis makes conclusion by combining findings of other researchers and reports available in the area of study and making recommendations in respect to available evidence. A total of 32 published journals were used for the study and thus forming the population of the study. All the 32 articles were used in the data analysis and thus a census sampling method was used.

### **3.3 Data Type and Sources**

The study collected secondary data from previous studies done on student performance in Mathematics, both in primary and secondary schools. In respect to this, data was collected on the following variables; academic achievement of pupils and students in mathematics, peer influence, role models, attitudes of parent's, student's, teacher's, learning environment, learners' cognitive, development, cultural practices and beliefs, teaching methodologies and the gender of the pupils and students. The data was both quantitative and qualitative. Quantitative data was in terms of statistics while the qualitative data was in terms of assertions of authors and the conclusions arrived at by previous studies. The sources of data were published academic journals for the period 2015-2019. Google Scholar acted as major source of the published journals. The various sources of journals used for this study is as shown in the Reference section of this research project.

### **3.4 Data Collection**

The study collected data empirical literature in respect to the performance of mathematics in both primary and secondary schools. The data was extracted from published research journals between the year 2015 and 2019. According to Nayak (2016) in collecting secondary data, a five year current data sources are useful in making inferences and conclusions about a phenomena under investigations. The study ensured good representation of findings in regard to country, context and methodologies. In respect to this, data was collected on the differences in students' academic performance by gender on mathematics in primary and secondary schools and on factors that influence gender disparities in students' academic performance between male and female students in mathematics at primary and secondary schools in different contexts; global, regional and local context. The researcher used google scholar and Internet Download Manager (IDM) downloader to specifically gather research articles on student academic achievement in

Mathematics and gender differences in the performance as well as factors leading to the differences for the period 2015-2019. Once the materials were downloaded, they were sorted based on the relevance of the findings and the heightened factors influencing gender disparity in the academic achievement of students and pupils in both primary and secondary schools. To ensure that the data was reliable to make conclusions for the study, several journals and results were used.

### **3.5 Data Processing and Analysis.**

#### **3.5.1 Data Processing**

Secondary data obtained from the published journals were cleaned to ensure that they articles were in line to the objectives of the study and within the targeted period of 2015-2019. The key findings were then typed in word document in preparation for content analysis. Data integrity was adhered to by ensuring that the data was accurate and consistent throughout the data processing. In respect to this, findings from the reviewed journals were accurately typed and cross-checked for possible errors. Consistency was ensured in transferring the data files from the computer to the NVivo software. Themes were identifying using the original data files without any alterations.

#### **3.5.2 Data Analysis Techniques**

The study used Nvivo version 12 to analyze literature reviewed in this study. Using the software, emerging themes were analyzed from the data files that were cleaned and validated. The key findings for the sample studies were typed, and the data files uploaded into NVivo version 12. The data was analyzed and interpreted by organizing data themes being pegged on the study objectives then establish the relations among the themes or topics presenting the study findings. In respect to this, the data analysis was conducted to determine the differences in students' academic performance by gender on mathematics in primary and secondary schools in Kenya. Secondly, the data was analyzed to find out societal factors that influence gender disparities in students' academic performance between male and female students in mathematics at primary and secondary schools in Kenya.

# CHAPTER FOUR

## 4.0 RESULTS DISCUSSIONS

### 4.1 Introduction

The study collected data from empirical literature in respect to the performance of mathematics in both primary and secondary schools. The data was extracted from published research journals between the year 2015 and 2019. The study ensured good representation of findings in regard to country, context and methodologies. In respect to this, data was collected on the differences in students' academic performance by gender on mathematics in primary and secondary schools and on factors that influence gender disparities in students' academic performance between male and female students in mathematics in primary and secondary schools in different contexts; global, regional and local context.

### 4.2 Gender and Performance in Mathematics

Appendix III shows the summary results from meta-analysis based the literature review from published research journals between the year 2015 and 2019. The meta-analysis results indicate that in most instances boys performed better than girls in mathematics in both primary school level and secondary school level. In primary school level for example, Kakooza (2018) found that boys performed better in mathematics than girls as the boys were found to be more motivated and confident. Saya (2017) found that boys performed better than girls in mathematics subject. Nkuene (2017) noted that the performance of girls in mathematics was below the average. However, Ngware, Ciera, Musyoka, and Oketch (2015) found that there were no significant differences in the performance of both girl and boys in mathematics. The study concluded that when the quality of education is the same for girls and boys, mathematics performance is also the same. Brown and Kanyongo (2016) found that there were no significant differences in the performance of mathematics by student gender.

Various reasons and factors were highlighted which could have resulted to the gender differences in performance of mathematics in primary level of education. Manoah, Indoshi,

and Othuon, (2016) found that girls had negative attitudes towards mathematics and thus leading to low performance. The study concluded that negative attitudes of pupils towards mathematics would be improved by developing mathematics related activities as lack of these activities had contributed to the negative attitude hence the poor mathematics performance. Saya (2017) noted that socio-cultural factors have favored boys as gender roles are mainly on girls hence the outperformance of boys. The study by Nkuene (2017) concluded that having female role models positively affects the performance of girls. However, Brown and Kanyongo (2016) concluded that there are no major cultural differences among boys and girls that have affected their performance.

In secondary school level, majority of studies showed that boys tended to perform better in mathematics than in girls. For example, Tetteh and Wilmot (2017) found that there were gender disparity differences among boys and girls. Arigbabu and Mji (2017) found that boys outperformed girls in mathematics tests. Melese and Simegn (2017) noted that girls' performance was lower than that of boys. Okyere (2019) found that boys performed better than girls. However, Chesimet, Githua, and Ng'eno (2016) concluded that due to the girls' ability to follow patterns they performed better in mathematics than boys. Panaoura and Panaoura (2016) concluded that girls outperformed boys in Mathematics since the girls had better cognitive ability. Sarah and Pouezevara (2016) found that girls performed better in mathematics compared to girls.

Reasons and factors given for the difference in the performance of boys and girls in secondary school level included cultural beliefs, peer influence, teaching methodologies, attitudes towards mathematics and gender roles among others. In respect to student attitudes, Steegh, Höffler, Keller, and Parchmann, (2019) found that boys had positive attitudes towards mathematics while girls had negative attitudes. Positive attitude towards mathematics of boys resulted in better Mathematics performance compared to girls. Similarly, the study by Okyere (2019) concluded that positive attitude contributed to students' confidence hence better performance. Motanya (2018) concluded that fear and anxiety were the main form of negative attitude that contributed to poor mathematics performance in girls as compared to boys.

The study by Melese and Simegn (2017) concluded that there was a positive correlation between Mathematics performance and attitude especially among girls. Samuelsson and Samuelsson (2016) concluded that boys perceived mathematics as a more important subject than girls perceived. This explains the reason boys outperformed girls. Awuor (2016) found that lack of interest among girls in Mathematics was the main factor contributing to the girls' poor performance compared to boys who were more interested in mathematics. Soni and Kumari (2015) concluded that students' positive attitude towards mathematics positively contributed to the performance of the students, regardless of gender.

Focusing on family factors, Ullah (2019) study found that the belief that boys outperform girls in Mathematics encouraged boys to perform better than girls. The study by Arigbabu and Mji (2017) concluded that the conventional and unconventional nature of females and males respectively were the primary contributor of performance differences among girls and boys. Hek, Kraaykamp, and Pelzer (2018) concluded that social norms in communities in Netherlands favored boys than girls hence the better performance of boys. These included domestic chores being left to girls while boys concentrate on studies. A study by Sarah and Pouezevara (2016) noted that boys had been neglected more in their academic performance than girls which resulted in girls outperforming them. Kilic and Askin (2016) concluded that students who discussed their academic performance with their parents performed better than those students who did not discuss, both boys and girls. Li and Qiu (2018) concluded that as mathematics is a creative subject, a better family background promotes the performance the subject regardless of gender.

In respect to school factors, Nga'nga, Mureithi, and Wambugu (2019) found that educational resources have favored boys in the country hence the better performance of boys compared to girls. Community could be willing to raise school fees for boys than girls. Gordon (2016) concluded that teachers who created more time for students and encouraged students to perform, promoted mathematics performance among boys and girls. Sanda (2016) concluded that teachers that are enthusiastic promoted positive performance of students. However, boys were found to perform better than girls.

Ganyaupfu (2014) found that students-centered teaching methods have a positive correlation on the mathematics performance of students. According to Silla, Muema, Mulwa, and Mailu (2018), mathematics performance among students can be improved by integration of ICT in teaching mathematics. In respect to this, boys performed better than girls when ICT was integrated in the mathematics teaching. Mbaki et al., (2016) found that gender insensitive infrastructure have promoted poor mathematics performances among girls as girls were more sensitive to poor infrastructure than boys. Akinyi and Musani (2018) concluded that school-based factors favored boys than girls hence the poor performance of girls.

In respect to peer pressure, Likando (2017) concluded that negative peer pressure affected girls more than boys hence the poor performance of girls in mathematics than boys. According to Biton and Gonzaga (2019), negative peer pressure resulted into poor academic performance while positive peer pressure motivated students to work hard hence better performance. Boys in this regard were found to be more motivated towards mathematics. Luketero and Kangangi (2018) concluded that negative peer pressure led to substance abuse and other misbehavior hence poor performance among students. Boys performed lower than girls in academics due to peer pressure towards substance abuse.

# **CHAPTER FIVE**

## **5.0 SUMMARY CONCLUSION AND RECOMMENDATIONS**

### **5.1 Introduction**

The study sought to determine the differences in students' academic performance by gender on mathematics in primary and secondary schools in Kenya. The study further sought to find out factors that influence gender disparities in students' academic performance between male and female students in mathematics in primary and secondary schools in Kenya.

### **5.2 Summary of Findings**

The study found that there were gender differences in the performance of mathematics in both primary school and secondary school level. In most of the reviewed studies, it was established that boys performed better in mathematics subject compared to girls. The study found that girls had negative attitudes towards mathematics and thus leading to low performance. In respect to this, it was found that boys had positive attitudes towards mathematics while girls had negative attitudes. Positive attitude contributed to students' confidence hence better performance. It was also noted that fear and anxiety were the main form of negative attitude that contributed to poor mathematics performance in girls as compared to boys. Boys perceived mathematics as a more important subject than girls perceived. Lack of interest among girls in Mathematics was the main factor contributing to the girls' poor performance compared to boys who were more interested in mathematics.

It was also noted that socio-cultural factors have favored boys as gender roles are mainly on girls hence the outperformance of boys. The society belief that boys outperform girls in Mathematics encouraged boys to perform better than girls. Conventional and unconventional nature of females and males respectively were the primary contributor of performance differences among girls and boys. Social norms in communities in Netherlands favored boys than girls hence the better performance of boys. These included domestic chores being left to girls while boys concentrate on studies. A better family



background promotes the performance of the subject regardless of gender. It was in this respect that students who discussed their academic performance with their parents performed better than those students who did not discuss, both boys and girls.

The study also established that school-based factors favored boys than girls hence the poor performance of girls. It was found that educational resources have favored boys in the country hence the better performance of boys compared to girls. Additionally, the study found that gender insensitive infrastructure have promoted poor mathematics performances among girls as girls were more sensitive to poor infrastructure than boys. Students-centered teaching methods have a positive correlation on the mathematics performance of students. It was also noted that boys performed better than girls when ICT was integrated in the mathematics teaching.

Negative peer pressure was found to have affected girls more than boys hence the poor performance of girls in mathematics than boys. Negative peer pressure resulted into poor academic performance while positive peer pressure motivated students to work hard hence better performance. Boys in this regard were found to be more motivated towards mathematics. Negative peer pressure led to substance abuse and other misbehavior hence poor performance among students. Boys performed lower than girls in academics due to peer pressure towards substance abuse.

### **5.3 Conclusion**

This study made the following conclusions;

- i. There were gender differences in the academic performance of Mathematics subject. The academic performance of boys are higher than that of girls at both primary and secondary school level.
- ii. Student attitudes towards Mathematics subject affect the performance of the students in the subject. Most of boys have positive attitudes and interest towards Mathematics Subject and thus leading to better academic performance of boys in the subject compared to girls.

- iii. Cultural factors affect the level of educational performance of students in both primary school level and secondary school level. In respect to this, cultural beliefs support the cognitive abilities and education of boys than girls and thus bringing gender differences in the performance of boys in Mathematics Subject.
- iv. Family factors are a contributor to gender differences in the academic achievement for students in Mathematics, both at primary and secondary level. Family chores keep girls more engaged than boys and thus leading to poor academic achievement of girls compared to boys whose education is given priority by family.
- v. Peer pressure among the students in primary and secondary level of education affect the academic achievement of the students in Mathematics. Boys are more attracted to negative peer pressure and thus affecting the performance in Mathematics more negatively than girls.

## **5.4 Recommendations**

The study makes the following recommendations;

- i. The study recommends educational stakeholders and policy makers such as KNEC to address that issues of gender disparity in the academic achievement of students in Mathematics by enacting a standardized scoring method in Mathematics based on the mean grade of each gender rather than general standardized manner of marking.
- ii. Teachers to offer mentorship and motivational talks to girls in order to develop positive attitudes towards Mathematics Subject.
- iii. Family, community members and other society members to encourage and support the education of girls in coming against the belief that girls cannot outperform boys in Mathematics.
- iv. Schools to provide more Mathematics learning materials to girls and more contact hours for academic consultations with teachers in Mathematics in order to bridge the gap between girl and boy performance in the subject.
- v. Schools to provide counselling services to students against negative peer pressure of students which could lead to poor performance of the students in academics.

## **5.5 Suggestion for Further Studies**

The current study observed some research gaps that the current study did not fill and makes the following recommendations;

- i. A study to be conducted to establish the gender differences in the performance of humanities subjects at secondary schools in Kenya.
- ii. A study also could be conducted to evaluate the gender differences in discipline levels of students in secondary schools in Kenya.
- iii. Evaluation of individual, school, family and community factors affecting the educational participation of students in secondary schools in Kenya.

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## APPENDIX I: RESEARCH AUTHORIZATION LETTER



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**PSYCHOLOGY DEPARTMENT**

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NACOSTI  
P. O. BOX 30623-00100  
NAIROBI

20<sup>TH</sup> August 2020

Dear Sir/Madam,

**REF: PERMISSION TO CARRYOUT RESEARCH**

The student whose name appears below is a fulltime registered student at the University of Nairobi (UON), she/he hopes to collect data and is seeking permission from your office.

Please accord her all the assistance she/he needs.

**ESTHER WANGARI MBURU –E58/78748/2015**


**TOPIC: Meta – Synthesis of Gender and Mathematics Performance in  
Primary and Secondary in Kenya**

Sincerely yours

**Dr. Karen T. Odhiambo**  
Lecturer – University of Nairobi  
Coordinator- Masters in Education  
Measurement and Evaluation




# APPENDIX II: RESEARCH PERMIT



**REPUBLIC OF KENYA**

Ministry of Education, Science and Technology


Ref No: **512854**



**NATIONAL COMMISSION FOR  
SCIENCE, TECHNOLOGY & INNOVATION.**

Date of Issue: **23/October/2020**

**RESEARCH LICENSE**




**This is to Certify that Miss. ESTHER WANGARI MBURU of University of Nairobi, has been licensed to conduct research in Nakuru on the topic: META-SYNTHESIS OF GENDER AND MATHEMATICS PERFORMANCE IN PRIMARY AND SECONDARY IN KENYA for the period ending : 23/October/2021.**

Licensee No: **NACOSTI/P/20/7035**

Applicant Identification Number  
**512854**

*Walter Mburu*  
**Director General**  
**NATIONAL COMMISSION FOR  
SCIENCE, TECHNOLOGY &  
INNOVATION**

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### APPENDIX III: META-ANALYSIS

Author(s)	Country/Area	Topic	Findings/Conclusions
<b>Primary Schools</b>			
Kakooza (2018)	Uganda	Mathematics and Gender in Ugandan Primary Schools: Influence on Teachers, Parents and Learners	The study found that boys performed better in mathematics than girls as the boys were found to be more motivated and confident.
Manoah, Indoshi, and Othuon, (2016)	Kisumu county, Kenya	Influence of attitude on performance of students in mathematics curriculum	The study found that girls had negative attitudes towards mathematics and thus leading to low performance. The study concluded that negative attitudes of pupils towards mathematics would be improved by developing mathematics related activities as lack of these activities have contributed to the negative attitude hence the poor mathematics performance.
Ngware, Ciera, Musyoka, and Oketch (2015)	Nairobi, Kenya	Quality of teaching mathematics and learning achievement gains: evidence from	The study found that there were no significant differences in the performance of both girl and boys in mathematics. The study concluded that when the quality of education is the

<b>Author(s)</b>	<b>Country/Area</b>	<b>Topic</b>	<b>Findings/Conclusions</b>
		primary schools in Kenya	same for girls and boys, mathematics performance is also the same.
Saya (2017)	Kakamega, Kenya	Effect of Socio-Cultural Practices on Girl-Child Performance in Kenya Certificate of Primary Education	The study found that boys performed better than girls in mathematics subject. It was noted that socio-cultural factors have favored boys as gender roles are mainly on girls hence the outperformance of boys
Brown and Kanyongo (2016)	Nairobi, Kenya	Gender differences in mathematics performance: Examining affective factors	The study found that there were no significant differences in the performance of mathematics by student gender. The study concluded that there are no major cultural differences among boys and girls that have affected their performance
Nkuene (2017)	Meru county, Kenya	Factors Influencing academic performance of girls in Kenya certificate of primary Education (KCPE) In public	The study noted that the performance of girls in mathematics was below the average. The study concluded that having females role models positively affects the performance of girls.

Author(s)	Country/Area	Topic	Findings/Conclusions
		primary schools in Kenya	
<b>Secondary schools</b>			
Steegh, Höffler, Keller, and Parchmann, (2019)	Germany	Gender differences in mathematics and science competitions: A systematic review	The study found that boys had positive attitudes towards, mathematics while girls had negative attitudes Positive attitude towards mathematics of boys resulted in better Mathematics performance compared to girls.
Ullah (2019)	Pakistan	Boys versus girls' educational performance: Empirical evidences from global north and global south	The study found that the belief that boys outperform girls in Mathematics encouraged boys to perform better than girls.
Tetteh and Wilmot (2017)	Ghana	Gender differences in performance in mathematics among pre- service teachers in the Brong-Ahafo region of Ghana Helena	The study found that there were gender disparity differences among boys and girls that could be resolved by the development of better instructional strategies by administrators and mathematics tutors.

<b>Author(s)</b>	<b>Country/Area</b>	<b>Topic</b>	<b>Findings/Conclusions</b>
Arigbabu and Mji (2017)	Nigeria	Is gender a factor in mathematics performance among Nigerian pre-service teachers?	The study found that boys outperformed girls in mathematics tests. The study concluded that the conventional and unconventional nature of females and males respectively were the primary contributor of performance differences among girls and boys.
Melese and Simegn (2017)	Ethiopia	Assessing the Influence of Attitude Towards Mathematics on Achievement of Grade 10 and 12 Female Students in Comparison with Their Male Counterparts: Wolkite, Ethiopia	It was noted that girls' performance was lower than that of boys. The study concluded that there was a positive correlation between Mathematics performance and attitude especially among girls.
Mbaki, Joash, and Muola (2016)	Kitui Central Sub County , Kenya	Determinants of girls' performance in science, mathematics and technology subjects in public secondary schools in Kenya	The study found that gender insensitive infrastructure have promoted poor mathematics performances among girls as girls are more sensitive to poor infrastructure than boys.

<b>Author(s)</b>	<b>Country/Area</b>	<b>Topic</b>	<b>Findings/Conclusions</b>
Awuor (2016)	Nairobi, Kenya	Factors influencing girls' performance in mathematics and science subjects in the Kenya Certificate of Secondary Education in public secondary schools in Westlands District, Nairobi County, Kenya	The study found that lack of interest among girls in Mathematics was the main factor contributing to the girls' poor performance compared to boys who were more interested in mathematics.
Chesimet, Githua, and Ng'eno (2016)	Kericho East Sub-county, Kenya	Effects of Experiential Learning Approach on Students' Mathematical Creativity among Secondary School Students	The study concluded that due to the girls' ability to follow patterns they performed better in mathematics than boys.
Okyere (2019)	Ghana	Student attitude towards Mathematics and performance: Does the teacher Student attitude towards Mathematics and performance: Does	The study found that boys performed better than girls. The study concluded that positive attitude contributed to students' confidence hence better performance.

<b>Author(s)</b>	<b>Country/Area</b>	<b>Topic</b>	<b>Findings/Conclusions</b>
		the teacher attitude matter?	
Motanya (2018)	Nyamira county, Kenya	Impact of students attitude on mathematics performance among public secondary schools students in Nyamira county, Kenya	The study concluded that fear and anxiety were the main form of negative attitude that contributed to poor mathematics performance in girls as compared to boys.
Panaoura and Panaoura (2016)	Middle East	Cognitive and Metacognitive Performance on Mathematics	The authors concluded that girls outperformed boys in Mathematics since the girls had better cognitive ability.
Samuelsson and Samuelsson (2016)	Sweden	Gender differences in boys' and girls' perception of teaching and learning mathematics	It was concluded that boys perceived mathematics as a more important subject than girls perceived. This explains the reason boys outperformed girls.
Hek, Kraaykamp, and Pelzer (2018)	Netherlands	Do schools affect girls' and boys' reading performance differently? A multilevel study on the gendered effects	The study concluded that social norms in communities in Netherlands favored boys than girls hence the better performance of boys. These included domestic chores

<b>Author(s)</b>	<b>Country/Area</b>	<b>Topic</b>	<b>Findings/Conclusions</b>
		of school resources and school practices	being left to girls while boys concentrate on studies.
Akinyi and Musani (2018)	Nakuru, county. Kenya	Economic Factors Affecting Girls Academic Performance (KSCE) In Mixed Secondary Schools	The study concluded that school-based factors favored boys than girls hence the poor performance of girls.
Kilic and Askin (2016)	Turkey	Parental Influence on Students' Mathematics Achievement: The Comparative Study of Turkey and Best Performer Countries	The study concluded that students who discussed their academic performance with their parents performed better than those students who did not discuss, both boys and girls.
Soni and Kumari (2015)	India	The Role of Parental Math Attitude in Their Children Math Achievement	The study concluded that parents' positive attitude towards mathematics positively contributed to the performance of the students, regardless of gender.
Li and Qiu (2018)	China	How does family background affect children's educational achievement?	The study concluded that as mathematics is a creative subject, a better family background promotes the performance the subject regardless of gender.



<b>Author(s)</b>	<b>Country/Area</b>	<b>Topic</b>	<b>Findings/Conclusions</b>
		Evidence from Contemporary China	
Sarah and Pouzevara (2016)	Nairobi, Kenya	Measurement and research support to education strategy goal 1	The study found that girls performed better in mathematics compared to boys. Boys had been neglected more in their academic performance than girls which resulted in girls outperforming them.
Nga'nga, Mureithi, and Wambugu (2019)	Kiambu, Kenya	Mathematics gender gaps in Kenya: Are resource differentials between boys and girls to blame? Mathematics gender gaps in Kenya: Are resource differentials between boys and girls to blame?	Educational resources have favored boys in the country hence the better performance of boys compared to girls. Community could be willing to raise school fees for boys than girls.
Gordon (2016)	Eldoret, Kenya	The effects of teacher characteristics and attitudes on student achievement in KCSE economics examination	The study concluded that teachers who created more time for students and encouraged students to perform, promoted mathematics performance among boys and girls.

<b>Author(s)</b>	<b>Country/Area</b>	<b>Topic</b>	<b>Findings/Conclusions</b>
Sanda (2016)	Nigeria	Influence of teacher characteristics on students' academic achievement among	The study concluded that teachers that are enthusiastic promoted positive performance of students. However, boys were found to perform better than girls.
Ganyaupfu (2014)	South Africa	Teaching Methods and Students' Academic Performance Teaching Methods and Students' Academic Performance	Students-centered teaching methods have a positive correlation on the mathematics performance of students.
Silla, Muema, Mulwa, and Mailu (2018)	Garissa County, Kenya	Relationship Between Teaching Method And Students' Performance in Mathematics in Public Secondary Schools	According to the study mathematics performance among students can be improved by integration of ICT in teaching mathematics. In respect to this, boys performed better than girls when ICT was integrated in the mathematics teaching.
Likando (2017)	Zambia	School and Home Factors Contributing To Poor Academic Performance Among Female Secondary	The author concluded that negative peer pressure affected girls more than boys hence the

<b>Author(s)</b>	<b>Country/Area</b>	<b>Topic</b>	<b>Findings/Conclusions</b>
		School Pupils In Lusaka: The Views Of Teachers, Pupils and Parents.	poor performance of girls in mathematics than boys.
Biton and Gonzaga (2019)	Nairobi, Kenya	Students, peer pressure and academic performance	According to the study negative peer pressure resulted into poor academic performance while positive peer pressure motivated students to work hard hence better performance. Boys in this regard were found to be more motivated towards mathematics.
Luketero and Kangangi (2018)	Kirinyaga County, Kenya	Influence of peer pressure on academic performance	The study concluded that negative peer pressure led to substance abuse and other misbehavior hence poor performance among students. Boys performed lower than girls in academics due to peer pressure towards substance abuse.

Source (Researcher, 2020)