

# The Influence of Students' Attitude towards Gender Role Stereotypes on their Performance in Mathematics and Chemistry in Secondary Schools in Bomet District, Kenya

**Daniel K. Korir**

Department of Educational Psychology  
Moi University  
P.O. Box 3900 – 30100  
Eldoret  
Kenya

**Beatrice C. Laigong**

Department of Educational Psychology  
Moi University  
P.O. Box 3900 – 30100  
Eldoret  
Kenya

## Abstract

*This paper assesses the extent to which the attitudes held by boys and girls towards gender role stereotypes have influences on their performances in Mathematics and Chemistry in secondary schools in Kenya. The study was based on Erick Erickson's theory of psychosocial development. Purposive sampling was used to select the schools that were involved in the study and simple random sampling was used to select the participants of the study. A sample of 208 students was randomly selected from the form four classes, with an equal ratio of boys to girls. The main research instruments used were questionnaires and scores for mathematics and chemistry obtained from school records. Descriptive statistics and inferential statistics were used in data analysis. It was found that there was no difference in expression of attitude between boys and girls towards gender role stereotypes as well as no relationship between attitude held toward gender role stereotypes and performance in Mathematics and Chemistry. The Ministry of Education Science and Technology should organize training of teachers to correct their gender based attitudes. This would reduce biases based on gender roles held by teachers towards their students. The findings of the study should help teachers, students, parents and other stakeholder in education to look at the barriers of gender equity in performance in mathematics and chemistry.*

**Keywords:** Students Attitude, Gender Role Stereotypes, Performance, Mathematics, Chemistry, Secondary Schools, Bomet District, Kenya

## 1. Introduction

### 1.1 Gender Roles Stereotypes of Girls and Boys

According to Raven and Rubin (1983), gender stereotyping begins at home from birth. This is done through dressing, provision of toys for play and rewarding of activities that are gender appropriate. Through this children acquire a cognitive awareness of their gender roles. After acquiring the gender schema, children begin to behave in ways that correspond to their gender. The basic goal of socialization is to incorporate the society's value into the self to an extent that the violation of these standards produces a sense of guilt. In this way socialization limits achievement (Wortman, Loftus & Marshall, 1992).

Rubin, Provenzano and Luria (1974) have attempted to find parents' attitude towards their infants. The parents were given an adjective scale to respond to at 24 hours after the birth of their children. It was found that even though their children did not differ much in weight, they were given different attributes. Girls were described as soft and less attentive than the boys.

The implication of the finding was that the label parents ascribe to their infants may affect parents' subsequent perception about their own behaviour towards them. Both parents and children behave in ways that influence each other's perception and behaviour.

Among some Kenyan communities there is a strong belief that once married, girls become part of another family and parental investment in education is lost. This coupled with the issue of bride wealth influence the way parents offer their educational assistance to their boys and girls. Parents prefer to invest in their sons' education because of economic return (Odaga & Heneveld, 1995).

Rathus and Jeffrey (1992) assert that stereotyping has historically worked to the disadvantage of women. Chege and Sifuna (2006) underscore that women's participation in formal education is influenced by cultural expectations and values. These effects are even felt in regions where the importance of women education is appreciated. Beal (1994) consents that gender role expectations of children are still strong despite decades of societal change.

Cultural expectation can impact on educational outcomes of boys and girls. According to cognitive psychologists, once traditional stereotypes of 'boy things' and 'girl things' are firmly established in a child's mind, they tend to color and even distort what the child perceives and remembers (Wortman, Loftus & Marshal, 1992). Siann and Ugweubu (1980) state that the inability of girls to perform well at later end of secondary school and at the university is due to the widely held expectation that in marriage, a man is the chief wage earner while the woman is the chief home-maker. This expectation is held in many cultures and can be detrimental to gender participation in a range of activities.

Among some communities in Kenya male dominance is encouraged by culture and it filters in to the school and influences participation, be it in the classroom or in the field. Concerning schools in Uasin Gishu County, Kenya, Kamuyu (2001) asserts that rural schools were influenced by Nandi culture which is patriarchal. These prevailing circumstances suppress the girls in such a way that they are unable to participate fully in mixed sex discussions. In the abovementioned study, a mixed sex conversation was recorded. It was observed that males took more time to complete their turns unlike females who took little time to complete their turns. Males dominated the talk since they talked for too long besides interrupting and overlapping females a great deal. It was also observed that when a female tried to interrupt a male speaker the male speaker tried to curb this by trying to talk loudly hence overshadowing the interrupting female. This consequently made the female speaker to keep quiet or abandon the talk completely.

Meighan (1986) proposes that boys conform to this expectation by dominating class discussions or questions and answer session, while girls meet their expectation by being passive or by accommodating male-directed talk. Lindgren (1980) notes that sex-role stereotypes do not allow individuals to determine their destiny nor develop their personality. Hetherington, Locke and Parke (1999), propose that dependency is negatively related to intellectual achievement whereas independence, assertiveness and non-conformity are more likely to lead to creative thinking and problem solving.

Meighan (1986) proposes that girls who deviate from the expectation of conformity risk acquiring the label of 'dominating', 'talkative' or 'intellectual' while those who conform develop a self-concept that allows for their silence and their submissive role. According to Lahey (1995), those who fail to conform to the expectations made for them are viewed as abnormal and are often objects of anger and ridicule.

According to Kandaswamy (2005), few women still pursue careers in science and technology because parents set limits for their children. In India even though roughly 45 per cent of students in engineering colleges are women and many graduate with honours, less than 10 per cent go on and pursue a full time career as an engineer. Within the Indian middle class society, degrees in engineering and medicine are used as a status symbol for girls to land a husband. Children, especially boys, are still raised to believe that they are the prime wage earners while women's is just additional.

## **1.2 Gender Role Stereotypes and Academic Performance**

Feldman (1996) defines gender roles as the set of expectations defined by a particular society that indicate what appropriate behaviour is for men and women. He further notes that gender roles may produce stereotyping, a judgment about individual members of a group based on their membership in that group. Raven and Rubin (1983) refer to this as cognitive categorization.

Through it individuals produce gender schema that organize and guide a person's understanding on information relevant to gender. According to Beal (1994), shared assumptions about sexes become stereotypes that influence how we perceive others. This leads us to assume that they will behave in the ways expected and makes us overlook their unique characteristics as individuals. Sivard (1985) points out that stereotypes of what is natural and acceptable to each sex creates subtle barriers to the full development of intellectual abilities even when academic access is unlimited.

Parents, teachers and students attach certain attitudes based on gender towards the performance of academic subjects. Meece (1982) has found that parents do not expect girls to do as well in math as the boys. Girls internalize their parents' expectation, doubting their confidence even in first grade. Boys and girls as well as their teachers do have different attitudes and expectations about mathematics. This expectation affects children's attitude in math and their feeling of confidence in the subject. Mwanwenda (1989) points out that teachers are placed with the role of facilitating effective learning without discrimination.

Another study by Quinn (2001) has found that girls at junior high school expect to do less well than the boys on an upcoming classroom math test. After the test girls who had done well attributed their high scores to effort and were less proud of their success than the boys. Among those who had failed the test, girls were more likely to assume that they had a lower math aptitude and that hard work would help them to do better. They also reported that they would like to avoid math in future. On the other hand boys were optimistic, expecting to do better than they did.

An American study by Beal (1994) has found out that boys have superior feelings about themselves with regard to mathematics. Boys express greater expectations of success in mathematics while girls expressed greater uncertainty. This occurs when gender stereotypes have been internalized. Lahey (1995) agreeably notes that possible differences in mathematical ability is that women view success in mathematics as hard work while men look at it as an intellectual ability. Sivard (1985) also proposes that lack of confidence may be a greater barrier to women than lack of ability.

A study by Spenser, Steele and Quinn (1999) has found that women perform significantly worse than men in a mathematics test when the participants are made to believe that the test would produce gender difference. In contrast, women and men performed equally well when the participants were led to believe that test did not produce gender differences. The findings suggest that negative stereotypes can and do affect performance even when the stereotype has not been internalized or incorporated into the view of the self. Stereotypes can negatively affect performance by increasing anxiety.

In a Kenyan study, Ondiek (2001) has found out that there is a significant relationship between students' gender and attitude towards mathematics. The study involved 205 respondent selected from various secondary schools within Eldoret Municipality. The study found out that 93.7 per cent of the boys had a positive attitude towards Mathematics compared with 59.5 per cent girls. The implication is that there is a tendency for girls to be negatively inclined towards Mathematics and a likelihood of averagely lower performance of girls in mathematics in comparison to the boys. This indicates how attitude affect performance.

Twoli (1986) and Njuguna (1998) have found that a positive relationship exists between attitude and academic achievement. The attitude of boys towards science is more favourable than that of the girls. They also found that boys have higher aspirations than girls. Furthermore, they found out that teachers had stronger expectations for boys than girls concerning science achievement. Quinn (2001) observes that when girls are exposed to a situation where stereotypes are applied there emerges extra anxiety and decreased performance for girls than for boys. Quinn (ibid.) asserts that stereotypes adds pressure and impairs performance.

A study by Raymond (as cited in Beal, 1994) which involved mathematically talented students concludes that stereotypes about math being unfeminine do not inhibit girls from getting good grades. Such beliefs did not also explain the male advantage. The talented boys and girls reported no difference in their view of math as either masculine or feminine subject. They liked math equally and reported equal levels of parental encouragement for studying mathematics. However, girls took one semester less of math while the boys stuck on to their math classes. The possible explanation for this is that girls enjoy other classes than do the boys. Girls also opt to do other subjects in future and had concerns of combining a science career with their anticipated family responsibilities. Comparatively, the boys consider Mathematics important to their future career.

In another study by Dorn (1975), it is concluded that there is a significant relationship between higher career aspirations and freer sex role attitude. The research adopted an experimental design. The treatment group consisted of discussion and activities designed to heighten awareness of societal sex role stereotyping as well as sensitizing subjects to the effects of their own stereotypic socialization. It was hypothesized that the subjects' fear of success level would decrease and sex role attitudes would become more liberal as a result of treatment. It was also hypothesized that these changes would be significantly related to one another. The implication of the study was that sex role attitudes can be altered via a relatively short therapeutic intervention. Another implication of the study findings was that teachers can help children explore and develop their abilities not just those prescribed by cultural sex roles. This will pave way for fuller more creative living.

Weiten (1983) attributes differentiated performance between males and female to differences in hemispheric organization of the brain. Accordingly, the right and left hemispheres are specialized to handle different cognitive tasks. In most people, the left hemisphere is more actively involved in verbal processing while the right hemisphere is more specialized in spatial problems. This view suggests 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.

These findings show the attitudes held by parents, students and teachers influences the performance of mathematics and sciences. There is a tendency to assume that boys have a better aptitude in mathematics and sciences than girls. When such an attitude is held it may affect the achievement of boys and girls in sciences and mathematics. However there is also an indication that biological factors may be responsible for the disparity between boys' and girls' performance in sciences and mathematics.

### **1.3 Sex Labels in the School Curriculum**

Meighan (1986) theorizes that some aspects of the secondary curriculum are based on sex label. These include decisions made on the time tables, subjects, punishment, sports and games and career advice. In Kenya, Thuo (1986) has found out that resources account for the variance in science achievement between boys and girls. It is observed that many girls' schools lack basic learning resources and qualified science teachers (*ibid.*).

A Tanzanian study revealed that primary text books portray gender. Content analysis of gender roles on 40 textbooks indicated gender stereotyping in terms of number of characters, occupation, activities, power relations and biased language. The study recommends that textbook assessment instrument should be improved (Mkuchu, 2004). Obura (1991) points that negative societal perceptions regarding female involvement in science and technology are transmitted within the education system through textbooks. This reinforces the alienation of females from scientific fields.

Kandaswamy (2005) argues that for generations textbooks have failed to mention the pioneering women in science, technology, business, literature and history. An example is that Florence Nightingale is popularly known for her role in nursing while the fact that she was a famous statistician, who invented the pie chart, is unknown. This does not only deny the girl a role model but also a subtle message is sent that girls do not play significant role. Since boys read the same textbooks they also learn the same message.

### **1.4 Statement of the Problem**

There are a host of factors that affect academic performance at the secondary school level. Performance by gender at the secondary school level differ in that girls perform better than boys in language subjects and relatively poor in mathematics and key sciences. Girls in single sex schools perform equally and even better than boys when those in mixed secondary schools perform poorer. The disparity of performance by gender has been the trend in Kenya for a long time.

The study therefore attempted to compare the performance of girls and boys in Mathematics and Chemistry among Form Four students in mixed secondary schools. In Kenyan education system, emphasis is laid mathematics and sciences because these subjects are considered important in this modern age of science and technology. Mathematics is employed in all science and Chemistry is contained in both Biology and Physics. In the Kenyan secondary school curriculum, Mathematics is compulsory and any two sciences. Biology and Physics cannot be pursued without Chemistry thus making the subject significant in the school curriculum and also to this study. The performance of girls in these subjects is low yet they contribute significantly to the overall mean grade. A negative perception about girls being involved in sciences is what affects their performance more than the ability.

The society has a perception of male and female roles and these perceptions are transmitted within the education system. Meighan (1986) points out that when labelling is applied often, girls are predisposed to behave according to the label thus affects their perception of self, their motivation and performance. Feldman (1996) adds that gender stereotypes are typically more positive for men than women. The study therefore sought to find out whether the same holds for students in Bomet District, in regard to performance in mathematics and chemistry. This study also attempted to find out whether the attitude held towards gender stereotyping by students has any influence in the performance of Mathematics and Chemistry.

### **1.5 Limitations of the Study**

The results of the study may not reflect what happens in other parts of the country, thus the findings were only considered applicable to the area of the study. This therefore limits the generalization of the study to other districts within Kenya. The sample size of the study was drawn from Form Four classes in mixed secondary schools; therefore, the results were only generalized to mixed secondary schools within Bomet District. It did not reflect what happens in primary and single sex secondary schools or even at higher institutions of learning. The sampling method would not give a true representative sample since the ratio of boys to girls varied from one school to another. The scores in Mathematics and Chemistry were not obtained from standardized test and therefore may not be a true reflection of what a student may obtain in KCSE.

### **2. Materials and Methods**

This study was carried out in Bomet District of the Rift Valley Province, Kenya. The District lies on a latitude of  $0^{\circ} 29'$  and  $1^{\circ} 03'$  south of the equator and between a longitude of  $35^{\circ} 05'$  and  $0^{\circ} 35'$  East. The neighbouring districts include Nakuru to the east, Kericho to the north east, Nyamira to the west and Narok to the south. The research study adopted a causal-comparative (ex-post facto) research design. This design enabled the use of both descriptive and inferential statistics.

There were 52 secondary schools in Bomet District out of which 38 are mixed secondary schools and 14 are single sex. The study involved Form Four students in the mixed secondary schools. The schools that were selected were those that had a sizeable student population of Form Four classes so as to obtain a good random size. The estimated number of secondary school going age from 1997 to 2001 had a ratio of 103 to 100 males and females respectively. The secondary school going age population ranges from 13 to 21 years. The target population was all the secondary school going age students within Bomet District. The research population was all the Form Four students enrolled in mixed secondary schools in Bomet District.

The study involved eight mixed secondary schools within Bomet District. The subjects were sampled from form four classes. The purpose of using Form Four was that they would have also sat for the three previous consecutive ends of term examinations in Mathematics and Chemistry as was required by the study. The Form Four are also in a better position to respond to the questionnaires. From each school, 26 students selected for the study, thus the total sample size was 208 Form Four students. The sample size was made up of 13 boys and 13 girls from each school and consequently a total of 104 of each gender. The sample size was expected to bear the characteristics of the entire population.

The secondary schools were selected by means of purposive sampling. The schools that were selected were those which had a sizeable number of boys and girls to enable good random selection of students. Those who had been in a school for not less than a period of three previous consecutive terms were involved in the random selection. To be involved in the random selection a student must have sat for end term exam for three previous consecutive terms. Small pieces of paper correspond to the number of students, boys and girls were used were marked Y while the rest were marked N. The pieces of paper equivalent to the number of boys were placed in a container. The students were allowed to pick a piece of paper each. Those who picked papers indicated Y, were included in the study sample. The same procedure was separately applied for the girls.

The main instrument used in collecting data was questionnaire. Scoring was based on a five-point Likert scale, whereby the students were supposed to indicate whether they strongly agree (SA), agree (A), undecided (U) disagree (D), or strongly disagree (SD). (SA) was given a score of 5 points, (A) a score of 4 points (U) a score of 3 points, (D) a score of 2 points, and (SD) a score of 1 point. Possible highest score was 100 points and the least possible score was 20 points. The attitude scores were categorized into two, the positive and negative attitude.

Attitude scores ranging from 60-100 points were treated as positive attitude while scores from 20-59 points were treated as negative attitude.

The academic performance was obtained from the school records with the assistance of the class teachers or any other relevant teacher in the absence of a class teacher. Mathematics and chemistry scores for three previous consecutive terms were obtained for the students who were involved in the study. The mean average scores for each gender were worked out. If the average was above 40 percent that would be treated as high performance and below that was treated as low performance.

The data was analyzed using the Statistical Package for Social Sciences (SPSS) computer program. Descriptive statistics such as means and standard deviations were used to compare performance in Mathematics and Chemistry as well as the attitudes towards gender role stereotypes between boys and girls. Inferential statistics to determine the existing differences in performance between subjects and attitude towards gender role stereotypes were t-test. To test whether there were relationships between gender role stereotypes and performance and age existed, Pearson correlation and ANOVA.

### 3. Results

The study aimed at determining whether or not there was a difference in attitude towards gender role stereotypes between boys and girls. To achieve this objective a research question was formulated as follows: Is there a difference between the attitude of boys and girls towards gender role stereotypes? To answer this question a null hypothesis was formulated thus: There is no significant difference between the attitude of boys and girls towards gender role stereotypes.

The attitude scores were obtained from the questionnaire measured on a Likert Scale. The attitude was categorized into two, the positive (60-100) and negative (20-50) points attitude. The average attitude scores for both male and female students were obtained as shown in Table 1.

The null hypothesis was tested using t-test as shown in Table 2. The findings indicated that there is no difference in attitude towards gender role stereotypes between male and female students. The test indicates that there is no significant difference at  $t(206) = 4.99, P = 0.618 > 0.05$ . The null hypothesis was accepted implying that there is no significant difference in the attitude held towards gender role stereotypes between boys and girls.

The study further sought to investigate the relationship between the performance of boys and girls in Mathematics and their attitude towards gender role stereotypes. To achieve this objective two research questions were formulated as follows: Research question: Is there a relationship between the performance of boys in Mathematics and their attitude towards gender role stereotypes?

To answer this question, the null hypothesis was stated: There is no relationship between performance of boys in Mathematics and their attitude towards gender role stereotypes. The attitude towards gender role stereotypes is maintained as positive and negative. The academic performance is also categorized as High (40-100) and Low (Below 40%). A determination of how many boys with a positive attitude had a high performance and low. The same procedure was followed for those with negative attitude. The findings were as shown in Table 3. They indicate that boys who have positive attitude towards gender role stereotypes tend to score Low in Mathematics and those with negative attitude tend to score high in Mathematics.

To further verify this finding a correlation test was carried out using Pearson Correlation. The result of the test confirmed that there is no significant relationship between the performance of boys in Mathematics and their attitude towards gender role stereotypes at  $(r = 0.095, P = .337 > 0.05)$ . The results confirmed that there is no relationship between the performance of girls in mathematics and attitude towards gender role stereotype at  $N(104) r = 0.109, P = .273 > 0.05$ . The null hypothesis was accepted implying that there was no relationship between the performances of girls in mathematics and their attitude towards gender role stereotypes. Consequently it was concluded that there is no relationship between the performance of boys and girls in mathematics and their attitude towards gender role stereotypes.

The study further sought to investigate the relationship between performance in Chemistry and attitude towards gender role stereotypes. To achieve this objective research questions were formulated followed by testing respective hypotheses. The research question stated: Is there any relationship between the performances of boys in chemistry?

To answer this question, the attitude male student was categorized as positive (60-100 points) and negative (20-59). The next step was to find out how many male students in the two categories score high (40-100%) or low (below 40%) marks in Chemistry. This is shown in Table 4.

The results show that boys who had a positive attitude towards gender role stereotypes had a low performance in chemistry and those with a negative attitude had a high performance. Further analysis was carried out to test the hypothesis which stated that there is no significant relationship between the performance of boys in Chemistry and their attitude towards gender role stereotypes. Pearson Correlation was carried to test for significance.

Pearson correlation test results indicated that there is no significant relationship between the performance of boys in chemistry and their attitude towards gender role stereotypes at  $P=0.181 \geq 0.05$ . The null hypothesis was therefore accepted implying that there no significant relationship between the performance of boys in chemistry and attitude towards gender role stereotypes. ANOVA test indicated that there is a weak relationship between boys' attitude toward gender role stereotypes and performance in Chemistry. Therefore the null hypothesis was accepted.

The next research question six was: Is there any relationship between performance of girls in Chemistry and their attitude towards gender role stereotypes? To answer this question, the same procedure was followed. The findings were as shown in Table 5.

The findings indicate that girls with positive attitude toward gender stereotype tend to score low in chemistry as depicted in the table above. The findings indicated that girls with a positive attitude scored low in Chemistry and those with Negative attitude scored High.

The null hypothesis was tested using Pearson correlation. The results indicated that there is no significant relationship between the performance of girls in Chemistry and their attitude towards gender role stereotypes at  $.065 > 0.05$ . This implied that there was no significant relationship between performance of girls in Chemistry and their attitude towards gender role stereotypes. The null hypothesis, that there is no significant relationship between the performance of girls in Chemistry and their attitude towards gender role stereotypes was therefore accepted. It was finally concluded that there is no relationship between the performance of boys and girls in Chemistry and their attitude towards gender role stereotypes.

#### **4. Discussion**

The objective of the study was to determine whether or not boys and girls held the same attitude towards gender role stereotypes. This study found that there was no difference in attitude between boys and girls. The mean attitude scores for boys and girls were 53.81 and 53.15 respectively. The study also found that there was no statistical significant difference  $0.618 \geq .05$  in the attitude held by boys and girls toward gender role stereotypes. Both genders hold a slightly negative attitude towards gender role stereotypes. This finding indicates that there is no measured difference between what boys and girls belief about gender role stereotypes. This finding was not expected because other earlier findings suggest that boy and girls are treated at home and school differently.

Parents have different expectations about boys and girls. Raven and Rubin (1983) posit that gender role stereotyping begins at home and that after acquiring their gender schema they behave in ways that corresponds to it. Odaga and Heneveld (1995) also highlight that among some Kenyan communities male dominance is encouraged by culture and that this culture filters to school. Confirming this, Kamuyu (2001) has found that males dominated talking and interrupted female' talk and did not allow any interruption from the females. With this in mind it was expected that boys and girls and girls would have different attitudes towards gender role stereotypes. Differences in attitude towards gender role stereotypes were also expected because other findings seem to suggest that boys and girls under go differentiated treatment while they are in school. Dezolt and Hull (as cited in Santrock, 2004) aver that there are ways in which the classroom is biased against girls and in other ways against boys. Rathus and Jeffrey (1992) crown this argument by saying that stereotyping has worked to the disadvantage of women.

Other literature also reveals that boys and girls as well as teachers either consciously or unconsciously behave in ways that are consistent to gender role stereotypes. Kamuyu (2001), Dezolt and Hull (as cited in Santrock, 2004), and Karjel (2005) also show ways in which the school behaviour is inclined towards gender role stereotypes. It is postulated that evident stereotypes in school affect the students differently in regard to the subjects that are considered masculine. The boys feel that they own the masculine labelled subjects while the girls are less confident at it.



Some studies have however shown that similarity in expression towards gender role stereotypes is possible. In agreement with this view, Santrock (2004) says that once stereotypic views are established, they are maintained and the expression would be the same even at a later stage in life. This possibly explains why the findings of the study revealed a similarity in the attitude held toward gender role stereotypes. The fact that boys and girls have the same attitude is because of changes in cultural beliefs. Through government efforts boys and girls are offered equal education opportunities. There are also more female teachers teaching mathematics and sciences than before. This might have assisted in neutralizing the attitudes held towards gender role stereotypes.

The reason there was no significant differences in attitude towards gender roles stereotypes could explained by the fact that cultural dynamics and how much communities have accommodated change. Most of the respondents of the study were from the same ethnic community. This fact is a possible explanation as to why the respondents expressed the same attitude towards gender role stereotypes. The community could have possibly adopted a different attitude toward gender roles over time.

The study also sought to determine whether or not there was a relationship between performance in Mathematics and attitude toward gender role stereotypes. It was found that there was no significant relationship between the performance of boys and girls in mathematics and their attitude towards gender role stereotypes. Pearson correlation co-efficiency obtained for boy and girls were .095 and .109 respectively. ANOVA test also revealed that there were no significant relationships. Even though the boys had a higher mean score in Mathematics attitude towards gender role stereotypes could not explain why. In the same way girls' lower mean score in Mathematics could not be explained by their attitude towards gender role stereotypes.

The findings of the study contradict those of earlier studies that attributed gender disparity in mathematics performance to gendered stereotypes. Beal (1994) and Quinn (2001) are of the view that because of stereotypic attitudes, boys are expected to do well in Mathematics while girls are expected to do worse. This also contrasts the findings of Ondiek (2001) who found that a relationship existed between attitude and performance in Mathematics. This means that other variables relating to gender role stereotypes could be considered to cast doubts on whether there is a relationship between gender role stereotypes and performance in mathematics.

The study found that a negative attitude towards gender role stereotypes existed. It is when the stereotypes are positive that they can have an effect on behaviour. This could explain why attitude towards gender role stereotypes had no relationship with performance in Mathematics. The findings of the study could also be attributed to disparities in the methods used to collect data, time and geographical difference. Some of the studies on gender role stereotypes have used experimental research methods. This therefore influenced the outcome of the findings thus the difference.

However, some studies are in agreement with the finding of the study. A study which involved mathematically talented students has found that stereotypes about math being unfeminine do not inhibit girls from getting good grades. What this means is that such beliefs cannot explain the male advantage in the subject (Beal, 1994). This implies that girls can be at par with boys in performance in mathematics if individual attention is accorded. The problems could also be with teacher, as Quinn (2001) suggests, that if parents and teachers should become more aware of subtle ways, they may shape math situation for girls and women.

It also implies that the teachers and parents could help girls build their confidence in math and encourage them on the possibility of taking math based courses at higher institutions of learning. Dorn (1975) concludes that a significant relationship exists between a higher career aspiration and freer sex role attitude. Teachers and parents should be able to help their children to explore and develop their abilities not just as prescribed by traditional expectations.

The study further sought to determine the relationship between the attitude towards gender role stereotypes and performance in Chemistry. Correlation co-efficiency obtained for attitude towards gender role stereotypes between boys and girls were .132 and .065 for male and female students respectively. ANOVA test showed that there was no significant relationship between the attitude held by boys and girls and their performance in Chemistry. Even though the boys had better performance in Chemistry, the findings of the study cannot attribute it to the attitude toward gender role stereotypes. The lower performance of girls cannot also be attributed to their attitude toward gender role stereotypes.



This finding was also not expected because girls' lower performance in Chemistry has been largely attributed to gender role stereotypes. Generally, a label about Chemistry in the past is that it is masculine while languages and humanities are labelled feminine. Chemistry is closely related to Mathematics and involves experiments which make it to be seen as a male dominated field. Based on this knowledge it was expected that possibly a relationship between attitude towards gender role stereotypes exist. Other findings preceding the study have also attributed the discrepancy in the two subjects to gender role stereotypes.

### **5. Conclusion and Recommendations**

Evidently, there is no relationship between gender and attitude towards gender role stereotypes since the attitude mean scores were the same for boys and girls. Both genders expressed a negative attitude towards gender role stereotypes. The conclusion therefore is that the attitude held towards gender role stereotypes is not dependent on gender.

The study tested the relationship between the attitude held by each gender and their performance in mathematics. It found that there was no relationship between gender role stereotypes and Performance in mathematics. Whether or not the performance is higher or lower it does not depend on the attitude held towards gender role stereotypes for both boys and girls. Gender disparity in the performance cannot be explained by attitude towards gender role stereotypes.

The study tested the relationship between attitude towards gender role stereotypes and performance in Chemistry per gender. It found that there was no relationship between attitude held by each group towards gender role stereotypes and their performance in Chemistry. It was therefore concluded that the disparity in performance in chemistry ca not be explained by the attitude held towards gender role stereotypes by both boys and girls.

The study also found that there was no relationship between attitude toward gender role stereotypes and gender. The attitudes held by both genders were negative. Teachers should be cautious about their own attitudes towards student. The Ministry of Education Science and Technology should organize training of teachers to correct their attitudes based on gender. This would reduce biases based on gender roles held by teachers towards their students. The study found that there is no relationship between attitude towards gender role stereotypes and performance of mathematics and chemistry. Co-educational schools should work towards minimizing biases based on gender typing at school. Teachers of Mathematics and sciences should try techniques such as teaching boys and girls separately during Mathematics lessons to optimize equal participation in the two subjects. This will prevent the girls from concealing their participation as they do so in the presence of boys.

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**Table 1: Respondents Attitude towards Gender Role Stereotypes**

	<b>Gender</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Std. Error Mean</b>
Attitude score	Male	102	53.8725	10.0185	.9920
	Female	106	53.1509	10.8011	1.0491

**Table 2: t-Test for Attitude towards Gender Role Stereotypes**

	<b>t</b>	<b>df</b>	<b>Sig. (2-tailed)</b>	<b>Mean Difference</b>	<b>Std. Error Difference</b>	<b>95% Confidence Interval of the Difference</b>	
						Lower	Upper
Attitude score	.499	206	.618	.722	1.446	-2.129	3.572
	.500	205	.618	.722	1.444	-2.125	3.568

**Table 3: Performance of boys in Mathematics and Attitude towards Gender Role Stereotypes**

<b>Level of score</b>	<b>Negative Stereotype</b>	<b>Positive Stereotype</b>	<b>Total</b>
Low	60	20	80
High	12	12	24
<b>Total</b>	<b>72</b>	<b>32</b>	<b>104</b>

Level of score (40 and above reflects high performance and vice versa).

**Table 4: Relationship between Performance of Boys in Chemistry and Attitude toward Gender Role Stereotypes**

<b>Chemistry Score</b>	<b>Negative Stereotype</b>	<b>Positive Stereotype</b>	<b>Total</b>
Low	46	15	61
High	26	17	43
<b>Total</b>	<b>72</b>	<b>32</b>	<b>104</b>

**Table 5: Performance of Girls in Chemistry and Attitude towards Gender role stereotypes**

<b>Chemistry score</b>	<b>Negative stereotype</b>	<b>Positive Stereotype</b>	<b>Total</b>
Low	60	20	80
High	16	8	24
<b>Total</b>	<b>76</b>	<b>28</b>	<b>104</b>