# THE NATURE OF STAKEHOLDERS' ATTITUDES TOWARDS FEMALE TEACHERS OF MATHEMATICS IN LUSAKA DISTRICT OF ZAMBIA

**Norah Ngosa Simuchimba**
**and**
**Simeon Mbewe**

**Norah Ngosa Simuchimba** is Head of the Mathematics Department at Munali Girls Secondary School, Lusaka. She is also a senior examiner in mathematics with the Examinations Council of Zambia (ECZ) at School Certificate level**.** Her email address is: nsimuchimba@gmail,com

**Dr. Simeon Mbewe** is a Lecturer in Physics Education in the Mathematics and Science Education (MSE) Department, School of Education, at the University of Zambia, Lusaka. He is an external examiner in Science Teaching Methods in the Colleges of Education affiliated to the University of Zambia and is the immediate past Head of the MSE Department. His email address is: smbewe@unza,zm

## Abstract

*This study investigated the nature of attitudes of administrators, teachers, learners and parents towards female teachers of mathematics in secondary schools in Lusaka District. A descriptive survey research design was used for in the study. Data was collected from 136 respondents comprising 40 secondary school teachers, 80 learners, 8 parents and 8 administrators. Schools were selected using stratified sampling while simple random sampling techniques were used to select the teachers and learners. The parents and administrators were selected using purposive sampling technique. Data were collected using questionnaires and interview schedules. Questionnaires were administered to teachers and learners to obtain quantitative data. Interview schedules were used to gather qualitative data. Quantitative data were analyzed using statistical package for social sciences (SPSS) to generate descriptive statistics. Qualitative data were analyzed using the grounded theory to generate themes.*

*The findings of the study were that attitudes towards female teachers of mathematics generally do exist on a lesser extent among the learners, secondary school teachers, administrators and parents in the schools under study. Inferential statistics showed that there is a significant difference in the extent of occurrence of attitudes among the levels of education among the teachers (0.029). This means that level of education of teachers has an effect on the extent of occurrence and nature of attitudes towards female teachers of mathematics. Teachers with lower levels of education (Diploma holders) exhibited the extent of occurrence and nature of attitude on a lesser extent as compared to the other participants who did not show any extent of occurrence and nature of attitudes at all. In terms of learner age, the older learners showed some nature of occurrence of attitudes towards female teachers of mathematics. There exists a moderate correlation between the extent and nature as could be seen from the correlation coefficients found which are at least 0.60.*

Key Words: Attitudes, Mathematics, Female, Teacher, Occurrence, Nature.

## Introduction

In most African countries, including Zambia, the right to education is considered a privilege which has to be earned by the girl child. Even those who find themselves in school have problems in coping with education, especially in subjects like mathematics, science and technology, because these subjects are considered by society to be too difficult for girls to handle; these subjects are perceived to be in the male domain (Burton, 1990). As Blackwell in Harding (1986) says, there are institutional and organizational barriers which function to restrain access to or involvement of girls and women in mathematical and technological subjects. These barriers are mostly found in what is called the 'hidden curriculum'. Traditionally, the only roles available to women and girls were those of wives and mothers. These traditional beliefs about women and girls have negatively affected the development of girls' interest and ability to learn and study mathematics during their school life. At school, children are taught traditional expectations by teachers who are often unaware that the way in which they treat a pupil will carry subtle and persuasive messages about what is appropriate or right for a girl and for a boy (Harding, 1986: 33).

In Zambia, the Ministry of General Education has made the teaching of mathematics compulsory throughout the educational system. The rationale behind this policy is that all learners who will have gone through the education system should have acquired a base to enable them appreciate a mathematics environment in which various innovations and training are taking place. Despite such a policy being in place, most girls and women still opt out of mathematics in post-secondary school education, thus restricting their educational and career options (Herzig, 2004), including the teaching of mathematics.

Due to the foregoing, mathematics has been a male- dominated subject in Zambian secondary schools and higher learning institutions. There have been more male mathematics and science teachers than female teachers. As explained above, this is partly due to the fact many people believe that mathematics is not for female learners and women but for male learners and men. This means that there are still certain attitudes in Zambian society, families and schools towards female teachers of mathematics which need to be established and explained. It is against this background that this study aimed to investigate the nature of these attitudes towards female teachers of mathematics in Lusaka District of Zambia.

### Statement of the Problem

Traditionally in Zambia, the teaching of mathematics at secondary school and tertiary levels of education has been dominated by the male teachers. Despite efforts and interventions by the government through the Ministry of General Education to encourage and support women to pursue mathematics teaching and learning, there are still fewer female teachers of mathematics than male teachers of the subject. Research has generally attributed this trend to certain attitudes in society, family and schools towards the learning and teaching of mathematics by females. However, the nature of these attitudes remains unclear and this gap in our knowledge needs to be filled so that appropriate action can be taken to improve the situation. That is why this study was undertaken.

### Purpose and Significance of the Study

The purpose of this study was to establish the nature of attitudes of administrators, secondary school teachers, learners and parents towards female teachers of mathematics in secondary schools. The study was timely as it highlighted the much desired information relating to the nature of attitudes towards female teachers of mathematics in secondary schools whose numbers are

lower than those of male teachers. It is believed that the nature of attitudes towards individuals determines to a large extent how they successfully or unsuccessfully engage in an activity. Hence the concern of this study was that the nature of attitudes of some key stakeholders could be responsible for the low numbers of female teachers of mathematics in secondary schools.

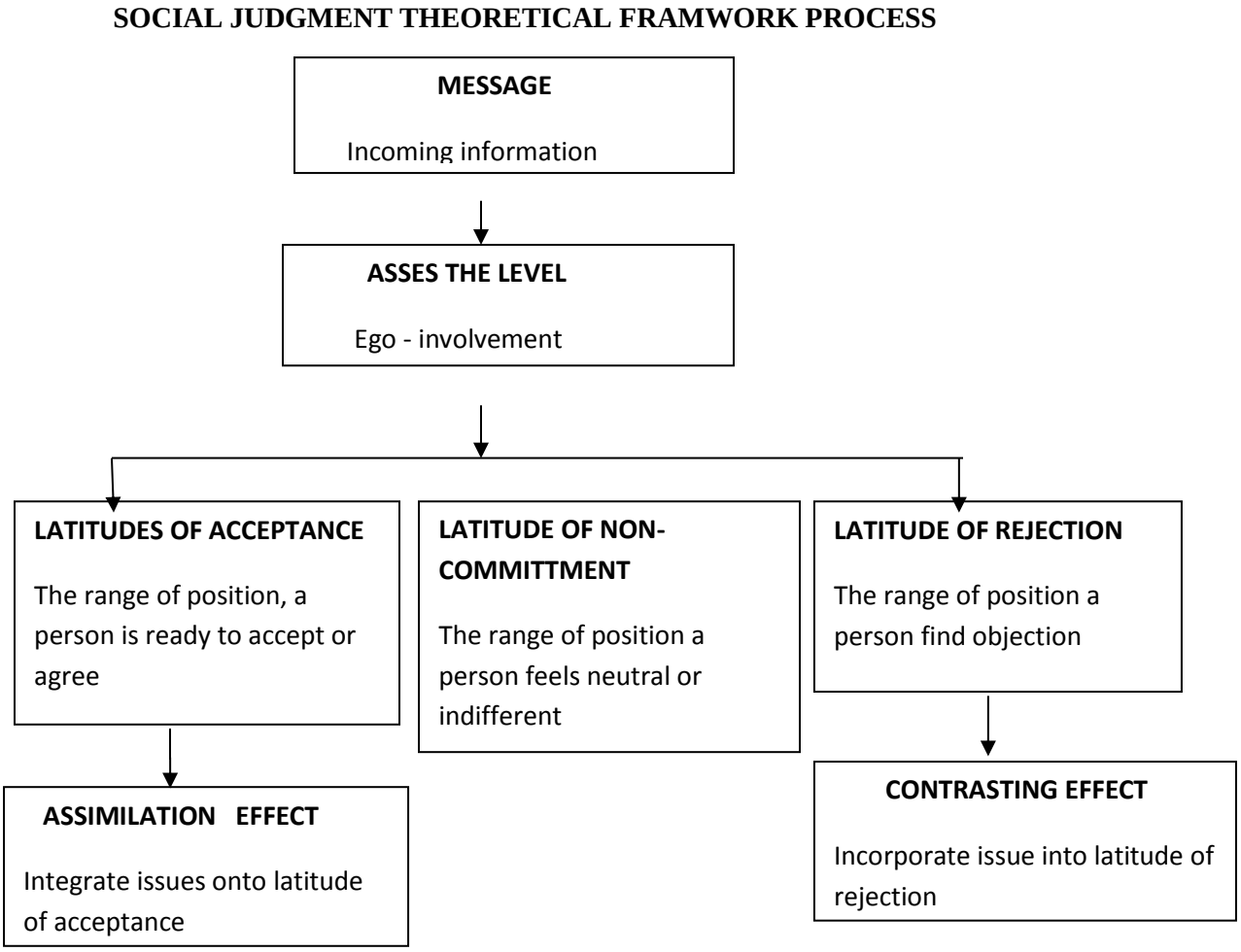
So the findings of this study might be useful to the Ministry of General Education (MOGE), education administrators, teachers and researchers. First, the findings might help the Ministry of General Education (MOGE) to concentrate on relevant plans to increase the number of female teachers of mathematics in secondary schools. Second, school administrators are likely to use the researched information on the nature of attitudes towards female teachers of mathematics to discourage the negative attitudes and encourage full participation in mathematics teaching among all the staff in their institutions. Third, this study might act as an eye opener to teachers in secondary schools. Thus the findings of the study might help them to change their negative thinking about female teachers' lack of confidence and adopt more positive attitudes towards them so they can begin to perform beyond inefficiencies that go beyond gender disparities. Fourth, the study might also prompt more research in the area related to the nature of attitudes towards female mathematics teachers, which will lead to generation of more knowledge on the topic. Fifth, the study has added to the existing body of knowledge on the nature of attitudes towards female teachers of mathematics at secondary school and tertiary level.

**Theoretical framework**

This study was guided by the Social Judgment theoretical framework. This is the theory of attitude change developed by Carolyn Sheriff in 1980. Theoretically, social judgment theory deals with perception and evaluation of ideas by comparing the in-coming information with the existing or current attitudes. This theory claims that an individual's position on an issue depends on, first, the preferred position on an issue; second, the position depends on alternatives which are classified as acceptable, rejected and non-committed; and finally the third component of some one's position on an issue depends on the personal ego of involvement.

This theory applies to this study on the nature of attitudes of others towards female teachers of mathematics in education. The attitudes towards female teachers of mathematics form a basis of perception and evaluation by the female teachers of mathematics. In reacting to other attitudes, the female teachers are likely to take positions in any of the three categories that may affect or enhance their participation in the teaching of mathematics. First, the female teachers of mathematics may be aware of the positions as indicated by the attitudes held towards them. Second, they may be aware of the alternatives of either to accept, reject or remain non- committal to the displayed attitudes. Third, they may use their personal ego of involvement to either participate or not.

Figure 1 below shows the Social Judgment Theoretical Framework process.




Adapted and modified from Corolyn Sherif (1980).

## Methodology

This study adopted the descriptive survey research design in order to establish and explain the nature of attitudes of administrators, teachers, learners and parents of the learners towards female teachers of mathematics. In this study, the descriptive research design involved making a description of administrators', secondary school teachers', learners' and parents' attitudes and to seek, discover and explain the nature of these attitudes towards female teachers of mathematics in secondary schools. The study was conducted in four selected secondary schools of Lusaka District of Zambia. The study population included all administrators, teachers and learners and parents of learners in the secondary schools of Lusaka district. The sample size from the four selected secondary schools included eight (8) administrators, forty (40) secondary school teachers, eighty (80) learners and eight (8) parents. Therefore data were collected a total of one hundred and thirty six (136) respondents.

In terms of sampling techniques, the participating schools were selected using stratified sampling while simple random sampling techniques were used to select the teachers and learners. The parents and administrators were selected using the purposive sampling technique. Data were collected using questionnaires and interview schedules. Questionnaires were administered to teachers and learners to obtain quantitative data. The negative statements towards female teachers of mathematics were reverse coded. Interview schedules were used to gather qualitative data from administrators, teachers, learners and parents. Quantitative data were analysed using the Statistical Package for Social Sciences (SPSS) to generate descriptive statistics. Qualitative data were analyzed using the grounded theory to generate themes.

## Literature Review

According to Becker *et al* (2010), it is important for administrators and policy makers at higher levels of learning such as high school and college to know that more desperate gender gaps emerge when students are given the option to opt out of mathematics. When given the option, females tended to opt out from mathematics mandatory up to a certain level in order to avoid this detrimental self-selection. Career centres in the upper grades were also recommended so that students could learn about the formal education required for certain careers and make sure they enrol in those classes. Policy makers at the national level should begin or continue to have their countries participate in international assessments in order to regularly monitor gender differences in mathematics achievement and collaborate with other countries to improve all educational systems (Becker *et al*, 2010).

According Crockcroft (1982), teachers are not immune to holding negative stereotypes about females in mathematics. It is worth noting that some teachers also still think that most female teachers prefer to teach languages and art subjects whereas male teachers mostly prefer science and mathematics. This scenario is consciously registered in the minds of the teachers and in the process they unconsciously form negative attitudes towards teaching and learning in general, particularly when they are female teachers teaching mathematics.

In one study reported by Becker *et al* (2010), twelve out of fourteen teachers considered mathematics a male domain. Some teachers overrated males' mathematical capability, had more positive attitudes towards males, and had higher expectations of males. Other research also shows that teachers believe that men are 'naturally' better than females at mathematics and that females have to work harder and make a greater effort in order to be successful in this subject (Hall, 2010). Although this belief is no longer socially acceptable, the belief is pervasive even among teachers who consciously repudiate such a claim. These beliefs affect teacher-student interactions, limiting females' mathematical learning while enhancing that of males.

Research further shows that even in class, teachers select girls to answer questions less frequently than they select boys. And when girls are selected, teachers systematically pose lower-level questions to them compared with boys (Becker *et al*, 2010). These behaviours reflect lower expectations of female students and result in less attention being given to female teachers of mathematics. Females report feelings of being overlooked, neglected, and unsupported by other

teachers more often than their male counterparts. Due to these actions, timed tests appear to under-predict girls' mathematical abilities.

Females' self-confidence in mathematics is one of the strongest predictors of their success in the subject. However, research shows that female students commonly attribute their mathematical successes to character traits such as effort, dedication and obedience, while they tend to attribute their failures to internal factors that are out of their control, such as lack of intelligence or lack of understanding of the subject matter (Becker *et al*, 2010). This system of blaming success solely on work ethic and failure on internal, innate sources prevents females from gaining self-confidence in mathematics. In short, females believe that their successes are a result of simple hard work and their failures as a result of their own lack of intelligence. On the other hand, males attribute their successes on their own mathematical intelligence, and their failures to outside influences. Both extremes are inaccurate representations of the truth since a persons' success or failure involves both external and internal factors (Becker *et al*, 2010).

Some attitudes hinder mathematical success for females, while others facilitate success. An eight-year longitudinal study by Lambertus, Bracken, and Berenson (2010) showed that girls who were successful in mathematics tended to share the following characteristics: strong academic support from their families, the desire to understand math concepts at more than a superficial level, assertiveness, and a belief in hard work. Another study found the additional common characteristics of stubbornness, determination, organisation, and an aptitude and love for mathematics who viewed as a tool for problem solving, thinking about and connecting to real world contexts, building confidence and pursuing careers in mathematics and science (Becker *et al*, 2010). Successful females often desire to discuss their future career options and other dreams. This personal characteristic and others are common among females who are successful in mathematics (Becker *et al*, 2010).

Parents could positively affect their daughters' educational attitudes. Parents who took the time to explain concepts to their children and asked thought provoking questions help them gain mathematical knowledge. In one study (Hall, 2010) interviewed successful female students about their parents, and all of them reported that their parents valued education, supported the girl's educational choices, and wanted them to have successful careers.

Unfortunately, parents also contribute to negative attitudes towards female teachers of mathematics by perpetuating negative stereotypes. Several research studies focus on how both males and females (including parents and teachers) tend to assume that males are more naturally gifted in mathematics than females and that females should work harder to be successful in mathematics (Becker *et al*, 2010). One study showed that parents of sons believed that their sons had higher mathematical ability than did parents of daughters, even when the daughters earned higher grades (Hall, 2010). Another study found that parents tend to underestimate their daughters' abilities and overestimate their sons' abilities (Hall, 2010).

Gunderson *et al* (2012) proposed that "the development of negative mathematic attitudes in young children, especially girls, sets the stage for life-long behavioural and attitudinal patters, such as

mathematics anxiety and mathematics avoidance, which can eventually lead to lower levels of mathematical course-taking and career choices among women versus men". Thus it is important to investigate the factors that have an impact on the development of a child's attitude towards mathematics. A student's attitude can be influenced by the attitudes of their peers, parents, and teachers. Children tend to develop similar attitudes to their parents, especially at younger ages. If a student's parents have negative attitudes towards mathematics, it is likely that the student will take on some of those same beliefs. The same goes for positive attitudes. This also applies to mathematics anxiety and mathematics self- concept. Becker *et al* (2010) reported that in Korea, some parents were not receptive to the notion that girls could learn mathematics and science sufficiently well to continue into careers in the fields of science or engineering. These types of negative parental beliefs could have contributed to females internalising the belief that they were inferior to males.

In conclusion, all the foregoing studies are important to this study in that they provide the relevant theoretical foundation on which this study will build. The studies usefully identify and categories the various negative attitudes towards girls and women as well positive attitudes towards boys and men in society and in the education sector. However, the studies do not explain the nature of the negative attitudes exhibited by various stakeholders towards girls and women or females. This is what this study aims to do, thereby filling the existing gap.

## Findings

The research question was: 'What is the nature of attitudes exhibited by administrators, secondary school teachers, learners and parents of the learners, towards female teachers of mathematics in secondary schools?' The data collected were analyzed both quantitatively and qualitatively.

### *Findings from quantitative analysis*

#### *a) the teachers*

The sampled teachers were given a questionnaire to respond to by rating the agreement to statements on female teachers of mathematics in order to determine the nature of attitudes among them. Their responses are as shown in Table 1 below.

Table 1: Teachers' responses to statements on the nature of attitudes towards female teachers of mathematics

| S/N | Negative Statements | 1 | | 2 | | 3 | | 4 | | 5 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | % | F | % | F | % | f | % | F | % |
| 1. | Female teachers of mathematics are as competent as their counterparts. | 1 | 2.9 | 2 | 5.7 | 7 | 20 | 17 | 48.6 | 8 | 22.9 |
| 2. | Female teachers of mathematics are more patient with the learners as they teach this subject. | 3 | 8.6 | 5 | 14.3 | 10 | 28.6 | 12 | 34.3 | 5 | 14.3 |
| 3. | Female teachers of mathematics can perform just as well as male teachers. | 1 | 2.9 | 2 | 5.7 | 1 | 2.9 | 13 | 37.1 | 17 | 48.6 |
| 4. | Female teachers of mathematics can achieve their goals just as male teachers of mathematics. | 1 | 2.9 | 3 | 8.6 | 1 | 2.9 | 13 | 37.1 | 17 | 48.6 |
| 5. | Female teachers have the intellectual capability to effectively teach secondary school mathematics. | 1 | 2.9 | 3 | 8.6 | 1 | 2.9 | 20 | 57.1 | 11 | 31.4 |
| 6. | Female teachers of mathematics show deep interest in the teaching of the subject. | 2 | 5.7 | 8 | 22.9 | 11 | 31.4 | 8 | 22.9 | 6 | 17.1 |
| 7. | Female teachers of mathematics have adequate content knowledge to teach secondary school classes. | 1 | 2.9 | 3 | 8.6 | 9 | 25.7 | 14 | 40 | 8 | 22.9 |
| 8. | Female teachers of mathematics motivate their learners effectively. | 1 | 2.9 | 5 | 14.3 | 5 | 14.3 | 11 | 31.4 | 13 | 37.1 |
| 9. | Female teachers of mathematics teach | 3 | 8.6 | 15 | 42.9 | 8 | 22.9 | 3 | 8.6 | 2 | 5.7 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | better than male teachers. | | | | | | | | | | |
| 10. | Female teachers of mathematics enhance the development of learner interest in the subject. | 7 | 20 | 6 | 17.1 | 7 | 20 | 15 | 42.9 | 4 | 11.4 |
| 11 | Only male teachers must teach mathematics at secondary school. | 1 | 2.9 | 2 | 5.7 | 2 | 5.7 | 4 | 11.4 | 26 | 73.4 |
| 12 | Traditional chores of women hinder female teachers from teaching mathematics at secondary school level. | 4 | 11.4 | 7 | 20 | 5 | 14.3 | 10 | 28.6 | 9 | 25.7 |
| 13 | Female teachers of mathematics do not have the drive to succeed | 3 | 8.6 | 4 | 11.4 | 2 | 5.7 | 8 | 22.9 | 15 | 42.9 |
| 14 | Lessons taught by female teachers of mathematics are boring. | 2 | 5.7 | 5 | 14.3 | 1 | 2.9 | 12 | 34.3 | 15 | 42.9 |
| 15 | Only men should choose careers which need mathematics | 3 | 8.6 | 2 | 5.7 | 2 | 5.7 | 6 | 17.1 | 22 | 68.9 |
| 16 | The majority of female teachers of mathematics do not teach the subject well. | 4 | 11.4 | 6 | 17.1 | 11 | 31.4 | 9 | 25.7 | 5 | 14.3 |
| 17 | Female teachers of mathematics should teach in girls secondary school. | 4 | 11.4 | 6 | 17.1 | 2 | 5.7 | 10 | 28.6 | 13 | 37.1 |
| | **Average** | **3** | **7.2** | **4.9** | **13.1** | **5** | **14.3** | **11.9** | **31.1** | **5.9** | **33** |

**N = 34**

Table 1 shows that 33% and 31.1 % of the teachers in the study strongly agreed and agreed with the statement on the nature of attitudes towards female teachers of mathematics, respectively, while13.1% and 7.2% of the teachers in the study disagreed and strongly disagreed with the statements on the nature of attitudes toward female teachers of mathematics, respectively. Fourteen point three 14.3% of the teachers in the study were not of whether to agree or disagree**.**

However, further scrutiny of the Table shows that only 11.4% of the teachers agreed to the statement that "the majority of female teachers of mathematics do not teach the subject well." The Table also showed that only 5.7 % of the teachers strongly agreed to the statement that "Female teachers of mathematics teach better than male teachers," only 11.4% of the teachers strongly agreed with the statement that "Female teachers of mathematics enhance the development of learner interest in the subject" and also only 14.3% agreed with the statement that "Female teachers of mathematics are more patient with the learners as they teach this subject."

Therefore, the results showed that most of the teachers disagreed with the negative statements while agreeing with the positive statement about female teachers of mathematics. This means that they held the views that males teachers must not be the only ones to teach mathematics at secondary school, traditional chores of women do not hinder female teachers from teaching mathematics at secondary school level, female teachers of mathematics have the drive to succeed, lessons taught by female teachers of mathematics are not boring, males should not be the only ones to choose careers which need mathematics and that female teachers of mathematics should not teach in girls secondary schools only. However, a few of the teachers still hold the view that the majority of female teachers of mathematics do not teach the subject well.

The results also showed that most of the teachers agreed with the positive statement towards female teachers of mathematics. This means that they held the views that: female teachers of mathematics are as competent as their male counterparts, female teachers of mathematics can perform just as well as male teachers, female teachers of mathematics can achieve their goals just as male teachers of mathematics, female teachers have the intellectual capability to effectively teach secondary school mathematics, female teachers of mathematics show deep interest in the teaching of the subject, female teachers of mathematics have adequate content knowledge to teach secondary school classes and that female teachers of mathematics motivate their learners effectively. However, a few of them still hold the views that female teachers of mathematics cannot teach better than male teachers, female teachers of mathematics cannot enhance the development of learner interest in the subject, and that female teachers of mathematics are not more patient with the learners as they teach this subject.

An independent samples t- test was conducted to determine if differences existed in the nature of attitudes on the statements towards female teachers of mathematics between groups of teachers in areas of gender and grade taught. Table 2 below shows the results.

Table 2: Nature of attitudes between groups of teachers' gender and grade taught towards female teachers of mathematics

| Group | | N | Mean | SD | t | df | Mean difference | Sig | Constraint |
|---|---|---|---|---|---|---|---|---|---|
| ` | Female | 17 | 26.39 | 5.656 | 0.707 | 32 | 1.419 | 0.719 | |
| Gender | Male | 17 | 24.74 | 5.311 | | | | | Nature |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 8 and 9 | 4 | 24.38 | 6.363 | -1. 349 | 32 | -1.375 | 0.651 | |
| Grade Taught | 10 -12 | 30 | 23.8 | 5.111 | | | | | Nature |

**N= 34**

Table 2 shows that there was no significant difference in the mean score of nature of attitudes between female teachers (M = 26.39, SD = 5.656) and male teachers (M = 24.74, SD = 5.311) towards female teachers of mathematics, t(32) = 1.419, p = 0.719. The table further showed that there was no significant difference in the mean score of nature of attitudes between teachers who taught grades 8 and 9 (M = 24.38, SD= 6.363) and teachers who taught grades 10 to 12 (M = 23.8, SD = 5.111) towards female teachers of mathematics, t (32) = -1.375, p = 0.651.

This implies that both male and female teachers regardless of whether they teach grades 8 and 9 or grades 10 to 12 do not exhibit any nature of attitudes towards female teachers of mathematics, but a few portrayed the view that the majority of female teachers of the subject do not teach the it well.

A One way Analysis of Variance (ANOVA) was also carried out to determine if any differences existed in the nature of attitudes on the statements on attitudes towards female teachers of mathematics among groups in the areas of age, current qualification, years of teaching experience and subject specialisation. Table 3 below shows the results.

Table 3: Nature of attitudes among groups of teacher's age, current qualification, years of teaching experience and subject specialization towards female teachers of mathematics

| Group | | N | Mean | SD | df | F | Sig | Constraint |
|---|---|---|---|---|---|---|---|---|
| Age | Less than 30 | 8 | 25.82 | 3.812 | 2 | 3.993 | 0.641 | |
| | Between 30 – 40 | 12 | 25.38 | 3.975 | 32 | | | |
| | More than 40 | 14 | 25.94 | 3.465 | | | | |
| | Total | 34 | 25.7 | 3.317 | | | | Nature |
| Current Qualification | Diploma | 10 | 26.52 | 4.741 | 2 | 0.73 | 0.029 | |
| | 1st Degree | 21 | 24.76 | 5.468 | 32 | | | |
| | 2nd Degree | 3 | 24.24 | 4.473 | | | | |
| | Total | 34 | 25.7 | 5.791 | | | | Nature |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Less than 10 | 16 | 26.25 | 6.485 | 2 | 0.796 | 0.735 |
| Year of | Between 10 – 20 | 8 | 26.04 | 6.090 | 32 | | |
| Experience | Above 20 | 10 | 24.55 | 5.556 | | | |
| | Total | 34 | 25.7 | 5.48 | | | Nature |
| | Mathematics | 3 | 25.51 | 2.337 | 2 | 0.761 | 0.589 |
| Subject | Natural Science | 10 | 25.05 | 4.553 | 32 | | |
| Specialization | Social Sciences | 10 | 25.62 | 6.372 | | | |
| | Others Specify | 11 | 26.96 | 5.616 | | | |
| | Total | 34 | 26.7 | 5.48 | | | Nature |

The Table above shows that there was no significant difference among the three age groups of teachers on the nature of attitudes towards female teachers of mathematics thus F(2,32) = 3.993, p = 0.641. The Table also showed that there was no significant difference among the teachers' current qualifications on the statements about the nature of attitudes towards female teachers of mathematics, thus F (32) = 0.730, p = 0.029.

In terms of years of teaching experience, the Table shows that the three teacher groups based on number of years of teaching experience did not differ significantly about the nature of attitude towards female teachers of mathematics, thus F (2,32) = 0.796, p = 0.735. The Table also shows that teachers who specialise in different subjects did not differ significantly on the nature of attitudes towards female teachers of mathematics, thus F (2, 32) = 0.761, P 0.589.

This implies that teachers of all ages regardless of their current qualifications, number of years of teaching experience and subject specialization do not exhibit any nature of attitudes towards female teachers of mathematics. However, a few hold the view that the majority of female teachers of mathematics do not teach the subject well.

The foregoing findings show that most teachers regardless of gender, grade taught, age group, current qualifications held, number of years of teaching experience, and subject specialisation, do not exhibit any nature of attitudes towards female teachers of mathematics, although a few may hold the view that the majority of female teachers of mathematics do not teach the subject well.

***b) the learners***

Learners in the sample were also given a questionnaire to respond to by rating the agreement to statements in order to determine the nature of attitudes among them. Their responses are shown in Table 4 below.

Table 4: Learners' responses to the statements on the nature of attitudes towards female teachers of mathematics

| S/N | Positive Statements | 1 | | 2 | | 3 | | 4 | | 5 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | % | F | % | F | % | f | % | F | % |
| 1. | Female teachers of mathematics are as competent as their counterparts. | 4 | 5.2 | 10 | 13 | 24 | 31.2 | 20 | 26 | 19 | 24.7 |
| 2. | Female teachers of mathematics are more patient with the learners as they teach this subject. | 15 | 19.5 | 5 | 6.5 | 20 | 26 | 18 | 23.4 | 19 | 24.7 |
| 3. | Female teachers of mathematics can perform just as well as male teachers. | 7 | 9.1 | 3 | 3.9 | 6 | 7.8 | 26 | 33.8 | 35 | 45.5 |
| 4. | Female teachers of mathematics can achieve their goals just as male teachers of mathematics. | 7 | 9.1 | 3 | 3.9 | 9 | 7.8 | 20 | 26 | 38 | 49.1 |
| 5. | Female teachers have the intellectual capability to effectively teach secondary school mathematics. | 3 | 3.9 | 11 | 14.3 | 10 | 13 | 31 | 40.3 | 22 | 28.6 |
| 6. | Female teachers of mathematics show deep interest in the teaching of the subject. | 6 | 7.8 | 12 | 15.6 | 23 | 29.9 | 23 | 39.9 | 13 | 16.9 |
| 7. | Female teachers of mathematics have adequate content knowledge to teach secondary school classes. | 8 | 10.4 | 5 | 6.5 | 14 | 18.2 | 37 | 48.1 | 13 | 16.9 |
| 8. | Female teachers of mathematics motivate their learners effectively. | 6 | 7.8 | 10 | 13 | 13 | 16.9 | 35 | 45.5 | 13 | 16.9 |
| 9. | Female teachers of mathematics teach better than male teachers. | 19 | 24.7 | 22 | 28.6 | 21 | 27.3 | 6 | 7.8 | 9 | 11.7 |
| 10. | Female teachers of mathematics enhance the development of learner interest in the subject. | 9 | 11.7 | 12 | 15.6 | 18 | 23.4 | 25 | 32.5 | 13 | 16.9 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11. | Only male teachers must teach mathematics at secondary school. | 5 | 6.5 | 5 | 6.5 | 3 | 3.9 | 9 | 11.7 | 55 | 74.1 |
| 12. | Traditional chores of women do not hinder female teachers from teaching mathematics at secondary school level. | 6 | 7.8 | 11 | 14.3 | 18 | 23.4 | 22 | 28.6 | 12 | 15.6 |
| 13. | Female teachers of mathematics do have the drive to succeed | 2 | 2.9 | 7 | 9.1 | 15 | 19.5 | 22 | 28.6 | 31 | 40.3 |
| 14. | Lessons taught by female teachers of mathematics are not boring. | 11 | 14.3 | 14 | 18.2 | 10 | 13 | 26 | 18.2 | 31 | 40.3 |
| 15. | Only male should choose careers which need mathematics | 8 | 10.6 | 3 | 3.9 | 7 | 9.1 | 13 | 16.9 | 46 | 56.7 |
| 16. | The majority of female teachers of mathematics do teach the subject well | 10 | 13 | 14 | 18.2 | 16 | 20.8 | 14 | 18.2 | 23 | 29.9 |
| 17. | Female teachers of mathematics should teach in girls secondary school | 17 | 22.1 | 9 | 11.7 | 12 | 15.6 | 18 | 23.4 | 21 | 27.3 |
| | **Average** | **10.2** | **10.9** | **9.2** | **12** | **14.1** | **18** | **21.1** | **27.9** | **24.2** | **31.5** |

**N = 77**

Table 4 shows that 31.5 % and 27.9 % of the learners in the study strongly agreed and agreed with the statement on the nature of attitudes towards female teachers of mathematics, respectively; while 10.9% and 12 % of the learners in the study disagreed and strongly disagreed with the statements on the nature of attitudes towards female teachers of mathematics, respectively. Eighteen (18 %) of the learners in the study were not sure of whether to agree or disagree**.** Further scrutiny of the Table shows that only 15.6 % of the learners disagreed to the statement, "Traditional chores of women hinder female teachers from teaching mathematics at secondary school level." However, a few of them still hold the view that traditional chores of women do not hinder female teachers from teaching mathematics at secondary school level. The Table also shows that only 11.7 % of the learners strongly agreed to the statement, "Female teachers of mathematics teach better than male teachers," only 16.9% of the learners agreed with the statement, "Female teachers of mathematics show deep interest in the teaching of the subject," only 16.9% of the learners

agreed with the statement, "Female teachers of mathematics motivate their learners effectively", and that only 16.9 % of the learners agreed with the statement, 'Female teachers of mathematics enhance the development of learner interest in the subject.'

Therefore, the results above show that most all the learners did not support the negative statements towards female teachers of mathematics. In other words, they disagreed with the statements. This means that they held the views that: males teachers must not be the only ones to teach mathematics at secondary school, female teachers of mathematics have the drive to succeed, lessons taught by female teachers of mathematics are not boring, males should not be the only ones to choose careers which need mathematics, and that female teachers of mathematics should not teach in girls secondary schools only.

In the same vein, the results show that most of the learners supported the positive statements towards female teachers of mathematics. In other words, they agreed with the statements. This means that they held the views that: female teachers of mathematics are as competent as their male counterparts, female teachers of mathematics are more patient with the learners as they teach the subject, female teachers of mathematics can perform just as well as male teachers, female teachers of mathematics can achieve their goals just as male teachers of mathematics, and female teachers have the intellectual capability to effectively teach secondary school mathematics. However, a few of them still hold the views that female teachers of mathematics cannot teach better than male teachers, female teachers of mathematics do not show deep interest in the teaching of the subject, female teachers of mathematics do not motivate their learners effectively, and that female teachers of mathematics cannot enhance the development of learner interest in the subject.

This implies that, while most of the learners have positive attitudes towards female teachers of mathematics, a few (7.8% ) portrayed the views that female teachers of mathematics cannot teach better than male teachers, 3.9% portrayed that female teachers of mathematics do not show deep interest in the teaching of the subject, 2.9% portrayed that female teachers of mathematics do not motivate their learners effectively, and that female teachers of mathematics cannot enhance the development of learner interest in the subject. Additionally, 7.8% portrayed the view that traditional chores of women do not hinder female teachers from teaching mathematics at secondary school level.

An independent samples t- test was conducted to determine if differences existed in the nature of attitudes towards female teachers of mathematics between groups of learners in the area of gender. Table 5 below shows the results.

Table 5: Nature of attitudes between groups of learners' gender towards female teachers of mathematics

| Group | | N | Mean score | SD | t | df | Mean difference | sig | Constraint |
|---|---|---|---|---|---|---|---|---|---|
| | Girl | 38 | 24.16 | 6.198 | 0.933 | 75 | 1.195 | 0.643 | |
| Gender | Boy | 39 | 22.91 | 6.118 | | | | | Nature |

Table 5 above shows that there was no significant difference in the mean score of nature of attitudes between girls (M = 24.16, SD = 6.198) and boys (M = 22.91, SD = 6.118) towards female teachers of mathematics, t(75) = 1.195, p = 0.643. This implies that most girls and boys do not exhibit nature of attitudes towards female teachers of mathematics, except only a few who portrayed the view that traditional chores of women do not hinder female teachers from teaching mathematics at secondary school level.

A One way Analysis of Variance (ANOVA) was also carried out to determine if any differences existed in the nature on the statements towards female teachers of mathematics among groups in the areas of grade, age, area of residence and parents/ guardian's status.

Table 6: Nature of attitudes among groups of learners' grade, age, area of residence and Parents/ Guardian's Status towards female teachers of mathematics

| Group | | N | Mean | SD | df | F | Sig | Constraint |
|---|---|---|---|---|---|---|---|---|
| Grade | 8- 9 | 25 | 24.84 | 5.263 | 2 | 1.884 | 0.309 | |
| | 10 | 4 | 26.88 | 5.223 | 74 | | | |
| | 11 | 9 | 28.95 | 8.707 | | | | |
| | 12 | 39 | 25.07 | 6.992 | | | | |
| | Total | 77 | 25.47 | 6.844 | | | | Nature |
| Age | Less tha 15 | 13 | 24.48 | 5.158 | 2 | 1.560 | 0.169 | |
| | Between 15 – 20 | 61 | 26.58 | 6.983 | 74 | | | |
| | Greater than 20 | 3 | 26.67 | 2.372 | | | | |
| | Total | 77 | 25.46 | 6.844 | | | | Nature |
| Area of Residence | Compound | 37 | 24.97 | 5.212 | 2 | 0.770 | 0.516 | |
| | Township | 30 | 26.67 | 6.581 | 74 | | | |
| | Suburb | 10 | 26.70 | 8.574 | | | | |
| | Total | 77 | 25.47 | 6.844 | | | | Nature |
| Parents / Guardian Status | Employed | 56 | 26.33 | 6.212 | 2 | 0.581 | 0.698 | |
| | Unemployed | 13 | 25.46 | 5.574 | 74 | | | |
| | Retired | 8 | 26.51 | 5.912 | | | | |
| | Total | 77 | 25.47 | 6.844 | | | | Nature |

Table 6 above shows that current grade of the learners had no significant difference on the nature of attitudes towards female teachers of mathematics, F (2, 74) = 1.884, p = 0. 309. The Table also shows that different age groups showed no significant difference on the nature of attitudes towards female teachers of mathematics, F(2,74) = 1.560, p = 0.169.

In terms of area of residence, the Table shows that the three learner groups did not differ significantly on the nature of attitudes towards female teachers of mathematics, F(2,74) = 0.770,

p = 0.516. The table also shows that learners with parents or guardians who are employed, unemployed and retired showed no significant difference on the nature of attitudes towards female teachers of mathematics, F(2,74) = 0..581, p= 0. 698.

This implies that almost all the learners of all grades regardless of their age, area of residence, and parents or guardians status do not exhibit any form of nature of attitudes towards female teachers of mathematics, except only a few who portrayed the view that the traditional chores of women do not hinder female teachers from teaching mathematics at secondary school level.

The foregoing findings show that almost all the learners regardless of gender, age, learners' grade, area of residence, and parents' or guardians' status do not exhibit any nature of attitudes towards female teachers of mathematics, except only a few who portrayed the view that the traditional chores of women do not hinder female teachers from teaching mathematics at secondary school level.

## *Findings from qualitative analysis*

### *a) School administrators*

A total of 8 school administrators were involved in the study. Being the administrators of the secondary schools where female teachers teach mathematics, the head teachers and deputy head teachers were asked how they found the performance of female teachers of mathematics in their schools. In response to the question, 6 administrators expressed the view that the female teachers' performance was good. One of these head teachers (A2) said: *'Female teachers of mathematics perform very well; in fact a good number of female teachers who have taken up this responsibility of teaching mathematics are very committed, active and confident'.* Another one (A3) added that the performance of female teachers of mathematics was very good, especially at junior secondary school level. She explained that this was because female teachers were motherly and better suited to deal with younger learners. With regards to the question on expectations, one administrator (A5) said, '*I expect female teachers of mathematics to perform just like male teachers'*. He further indicated that since female teachers of mathematics were as good as their male counterparts, head teachers expected them to find the subject to be as easy as the male teachers found it.

However, two administrators (A7 and A8) said they did not expect much from the female teachers of mathematics because they were not committed and lacked confidence. In addition, one of the two (A8) said : *'Female teachers of mathematics often find themselves in problems in terms of performance and achievement due to lack confidence and commitment'.* Apart from the two types of responses above, there were 2 head teachers (A5 and A6) whose views were mixed; they believed that female teachers' performance was not consistently good. One of the two (A6) explained further as follows : *'Female teachers easily lose interest when they encounter difficulties in the teaching of certain difficult topics in the syllabus and this often leads to poor performance by pupils'*.

The results or data above showed that most of the administrators did not exhibit any nature of attitudes towards female teachers of mathematics except for a few who still held negative views like the one that female teachers of mathematics were not committed and lacked confidence as they easily lost interest when they encountered difficulties in the teaching of certain difficult topics in the syllabus, thereby leading to poor performance by pupils.

***b) Secondary school teachers***

During the interviews 3 teachers clearly showed that they had a negative attitude towards female teachers of mathematics. When asked why, they maintained that females were naturally unable to handle difficult subjects, including mathematics, because they were born like that. One of the teachers (T7) said: '*Females are not born with innate ability to handle difficult subjects like mathematics.'* Another one (T8) added: *'Some of us strongly believe in the traditional view that females lack mathematical ability and this can still be seen in the poor performance of girls compared to boys in mathematics and the sciences'.* Another teacher, a female (T6) said: *'It is a fact that most females prefer to specialise in languages and arts subjects to mathematics; therefore, when there is a female teacher of mathematics in school, we are naturally not sure how well she is able to present the content'*. Similarly, the 5 teachers who had mixed feelings about female teachers of mathematics were asked why they had such views towards them. In response, they reiterated their belief that despite being equally capable of teaching mathematics at secondary school level, female teachers had inborn characteristics that could not allow them to teach the subject very well. One of these teachers (T2) said: *'Females are occupied by so many family commitments such that they do not have enough time to research and do more complicated calculations, but nowadays the situation is slowly changing as females are showing potential of doing the same level of work as males'.*

Like the other two categories of teacher respondents above, the 16 who had positive attitudes towards female teachers of mathematics were asked why they had such views towards female teachers of the subject. In response, they also repeated most of the points they gave to the earlier question they were asked under part 4.1.3 above. The responses indicated that secondary school teachers did not show any nature of attitude at all except for a few who still had negative views towards female teachers of mathematics.

***c) Learners***

As earlier indicated, apart from responding to a questionnaire, learners were also interviewed using semi-structured interview schedules. During the interviews, learners were asked what they thought about female teachers of mathematics. In response, at all the schools, all learners generally indicated that female teachers of mathematics were capable of teaching the subject well and in the same way as the male teachers of the subject. At the girls' secondary school, all the 5 learners said that they did not see any difference in terms of teaching between male and female teachers of mathematics. One leaner (L4) said: *'Female teachers of mathematics teach even better, and are more committed than some male teachers'.* In addition, the girls indicated that the presence of female teachers of mathematics encouraged them to participate and work hard in mathematics. They added that being taught by female teachers of mathematics made them believe that they too could specialise in mathematics related careers like teaching mathematics.

Asked whether they were comfortable to be taught by female teachers of mathematics, 17 of the 20 respondents at selected secondary schools indicated that they were very comfortable, while 3 indicated the opposite. When asked to explain why, most of the 17 learners indicated that the female teachers were as good as the male teachers. One of these learners (L6) said: *'The female teachers also know the subject content knowledge; they help us to understand the methods of solving the questions, and make sure that we take the work seriously in class'*. On the other hand,

the three (3) learners who were not comfortable to be taught by female teachers of mathematics pointed out that the female teachers were not always present to teach their classes. One of these learners (L18) said: *'Female teachers, especially the married ones, are fond of going on maternity leave, making pupils in their classes remain behind and fail to finish the syllabus.'*

When asked the question, 'Do you think female teachers can produce good examination results at grades 9 and 12 levels', the respondents (both boys and girls) at all the selected schools were of the view that both female and male teachers of mathematics were able to produce good examination results. One girl (L2) further explained as follows: *'The performance of the teacher does not depend on his or her gender.'* Another leaner, a boy (L12) said: *'I am sure there are many female teachers of mathematics who produce good examination results in their schools'.* Yet another learner (L14) added: *'If we compare the results in different schools we may find that more pupils in a female teacher's class have passed than in a male teacher's class.'*

***d) Parents***

Asked on what they thought about female teachers of mathematics teaching the subject at secondary school level, the majority of the parents (7 out of 8) thought that the female teachers had the knowledge and competence to teach the subject at secondary school level. One male parent (P1) said: *'Female teachers can teach mathematics at secondary school level; in fact personally I have a lot of confidence in the female teachers of mathematics'.* In addition, another parent (P4) indicated that most parents used to have the traditional belief that men and women had different abilities, but this was no longer the case. She said: '*In the past, many people had the traditional belief that women or females could not take up male dominated jobs like teaching mathematics, but nowadays peoples' beliefs and expectations have become neutral and females are expected to do even traditionally male dominated jobs such as the teaching of mathematics at secondary school level'*.

However, one parent (P7) indicated that he was of the opposite view. He said: '*I still hold the traditional belief about the abilities of males and females; in my view, female teachers cannot handle hard subjects like mathematics and science due to lack of consistence and commitment*.'

## Discussion

From the data presented above, the nature of attitudes that exist among the different stakeholders in the study could be inferred as positive. The positive nature includes such views as 'males teachers must not be the only ones to teach mathematics at secondary school, traditional chores of women do not hinder female teachers from teaching mathematics at secondary school level, female teachers of mathematics have the drive to succeed, lessons taught by female teachers of mathematics are not boring, males should not be the only ones to choose careers which need mathematics and that female teachers of mathematics should not teach in girls secondary school only. In addition, both male and female teachers regardless of whether they teach grades 8 and 9 or grades 10 to 12 did not have any negative attitudes towards female teachers of mathematics. Only positive ones such as traditional chores of women do not hinder female teachers from teaching mathematics at secondary level

Therefore, the results show that most of the teachers and learners supported the positive statements towards female teachers of mathematics. In other words, they agreed with the statements. This

means that they held the views that: female teachers of mathematics are as competent as their male counterparts, female teachers of mathematics can perform just as well as male teachers, female teachers of mathematics can achieve their goals just as male teachers of mathematics, female teachers have the intellectual capability to effectively teach secondary school mathematics, female teachers of mathematics show deep interest in the teaching of the subject, female teachers of mathematics have adequate content knowledge to teach secondary school classes and that female teachers of mathematics motivate their learners effectively. However a few of them still hold the views that female teachers of mathematics cannot teach better than male teachers, female teachers of mathematics do not show deep interest in the teaching of the subject, female teachers of mathematics do not motivate their learners effectively and that female teachers of mathematics cannot enhance the development of learner interest in the subject.

The results or findings of the study further show that most of the administrators, secondary school teachers, learners did not exhibit any negative nature of attitudes towards female teachers of mathematics except for a few who still held negative traditional views such as female teachers of mathematics not being committed, lacking confidence, and easily losing interest when they encounter difficulties in teaching certain difficult topics in the syllabus, which often leads to poor performance by pupils.

The foregoing results on the nature of attitudes confirm that the attitudes towards female teachers of mathematics in secondary schools among administrators, secondary school teachers, learners and parents of the learners are generally positive. The nature of attitudes is mainly positive as there was little occurrence of negative attitudes. These negative attitudes are related to qualifications of teachers where diploma holders are the highest in having negative attitudes followed by 1st degree holders and the last are the 2nd degree holders. Similarly, the negative attitudes seem to be related to learners' age where the different age groups can be ranked as follows: learners less than 15 years old are first, learners greater than 20 years old second and learners between 15 and 20 years old last.

With regard to the relationship between these findings and those of previous research studies, there was a difference, meaning that the findings were not in line with the literature. For Becker *et al* (2010) mathematics is dominated by male in terms of teaching thereby making it less competitive and more sensitive to girls. Similarly, Walls, (2010) indicated that female teachers of mathematics have no confidence and ability to teach the subject for they lose interest very fast in mathematics. This means that they lack self confidence in the subject which is one of the strongest predicator of their success in mathematics (Walls, 2010). Catsambis, (2005) also wrote that females are less confident of their mathematics ability than males; thus they become uninterested, unmotivated, and are more likely to abandon academic tasks (including advanced mathematical tasks) than males (Sanders and Nelson, 2004). Mathur (2010) argued that stereotypes that girls and women lack mathematical ability persist and are still widely held by the society. UKRC (2010) also noted that there continues to be some negative attitudes prevalent to women working in the areas of where mathematics is core.

However, there was also some agreement between the findings of this study and those of previous research studies. For example, Gilbert and Calvert (2003)'s recommendation that mathematics should not be given a masculine image, but should be regarded as a neutral, objective and genderless knowledge which can be acquired by both genders at equal levels, was in line with this

study's finding that both male and female or men and women teachers can teach mathematics at secondary school level.

The theoretical implications of the findings on the nature of attitudes towards female teachers of mathematics showed that the framework resulted in mostly accepting incoming positive attitudes and rejecting the negative ones**.** Since the findings suggest that there is no pronounced nature of negative attitudes among most of the administrators, secondary school teachers, learners and parents, it means that the nature of attitudes that exist could be inferred as positive. In this case, the female teachers of mathematics internal processes of individual judgment positions depended directly on the preferred position on an issue.

## Conclusion and Recommendations

In line with the objectives of the study, the following conclusions were drawn: With regard to the nature of attitudes by administrators, secondary school teachers, learners and parents, it is clear that nature of attitudes exhibited was positive which encourage female teachers of mathematics to teach mathematics in secondary schools.

The following recommendations are made to guide policy makers, school administrators, teachers, parents and researchers:

1. First, female teachers need to be encouraged to teach mathematics in secondary schools by counseling and support supervision, particularly in order allay their fears.

2. Second, inform female that there is no nature of attitudes exhibited towards them. As such more female teachers of mathematics should be recruited in secondary schools. This will encourage more females to opt to take mathematics at higher level in order to reduce anxiety. And allow more time to female teachers of mathematics to prove their competency.

3. Third, school administrators should be sensitised on the need to provide support and encouragement to female teachers of mathematics so as to foster their interest and good performance in the subject.

4. Fourth and last, the PTA through individual parents should be enlightened on the need to provide a positive and enabling environment at homes for female learners to do and study mathematics and mathematics related subjects.

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