

## **Factors Influencing Low Participation of Rural Zimbabwean Female Students in Mathematics**

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### **Abstract**

*This study focussed on factors influencing low participation of rural Zimbabwean female students in mathematics. The research approach and paradigm used were qualitative and interpretive respectively. Participants were purposively selected from three high schools resulting in a sample of eighteen female students and six mathematics teachers. Observation and semi-structured interview guides were the data generating tools. Female students' participation in mathematics was highly influenced by their negative attitudes towards mathematics; teacher-centred methods, gender stereotypes and inadequate resources in the teaching of the subject. Other factors included lack of female role models and support from parents and family members. The findings suggest the need for gender sensitisation of female students, teachers and the community. Consequently, eradication of gender stereotypes is inferred hence creation of a gender-free teaching environment in the learning of mathematics. We additionally recommend female students' exposure to female role models, to encourage more participation in mathematics. Parents and teachers are to further enhance female students' confidence in the subject.*

**Key words:** Influence; factors; participation; mathematics

### **Introduction**

The study was motivated by the observation that there is low participation of female students in mathematics at ordinary level. Despite the fact that the Ministry of Education, Sport and Culture made the teaching of mathematics compulsory up to ordinary level, many female students withdraw their participation (Herzig, 2004). Hence, the main focus was to establish factors that influence rural Zimbabwean female students' low participation in mathematics.

### **Background and context**

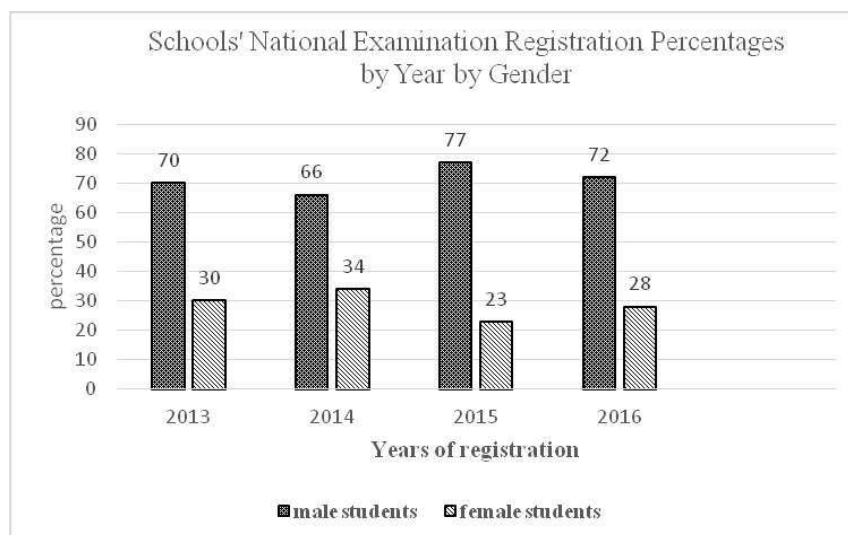
The majority of female students participate well in mathematics at Zimbabwe Junior Certificate (ZJC), but their number tends to decline tremendously as they enrol for ordinary level. Educational statistics in Sub-Saharan African countries show that women continue to lag behind men in education in general and specifically in science, mathematics and technology education (Masanja, 2010). Educational stereotyping continues, with women and girls tending to study programmes related to so-called women's occupations such as nursing, teaching and secretarial

jobs just to mention a few. In Zimbabwe, many researches in different provinces (Tshabalala, & Ncube, 2012; Chirume & Chikasha, 2014; Mapolisa & Tshabalala, 2014) were done in relation to poor performance in mathematics. The factors influencing the participation of rural female students in mathematics are not well researched. The only research close to this one is that carried out by Mandina, Mashingaidze, and Mafuta (2013) on ways to increase female participation in advanced level mathematics in Gweru District. Lack of research in such an important area has negative impact on strides made by the government towards mainstreaming gender issues in education.

Farooq and Shah (2008) argue that in Pakistan, female students are often discouraged from mathematics work during their primary school years. This idea of discouraging female students to take part in mathematics in the first level of education leads to a situation whereby female students drop mathematics in greater numbers than males at secondary level. As a result, very few women are employed in professions which require mathematical ability.

The participation of female students in mathematics at secondary school level is low compared to males and it is worse in rural schools (Gudyanga, Mandizvidza, & Gudyanga, 2016). They further explain that fewer female students register to write mathematics examination at O-level, despite the fact that all of them would have been attending the compulsory mathematics lessons (See Fig 1). This is also in line with Herzig (2004) who says that many O-level female students withdraw their participation in mathematics. What is worrying is that even those female students who were doing well in mathematics at the junior level prefer to stop their participation at ordinary level.

**Fig 1: Registration of students in Gutu rural District by year by gender**



(Source: ZimSEC statistics at district level).

As indicated by Fig 1, fewer female students in Nyamanhindi Cluster in Gutu district are registering to write O-Level mathematics, despite it being a compulsory subject in Zimbabwe. Figure 1 clearly indicates that the participation of female students in mathematics was below fifty percent. Thus, it is on account of this information that this study set out to investigate factors contributing to low participation of rural female students in mathematics.

### **Rationale and Research Question**

The rationale for this study is based on the fact that the Ordinary Level examinations constitute a very significant component of Zimbabwe's education process as they determine the future employment prospects of the learners (Ndlala, 2012). Mathematics is seen by society as the foundation of scientific and technological knowledge that is vital in socio-economic development of the nation (Mbugua, Kibet, Muthaa, & Nkonke, 2012). Ethington (2006) argues that in Kenya, mathematics is used as a basic entry requirement into any of the prestigious courses such as medicine, architecture and engineering among other degree programmes. Mathematics plays an important role in buying and selling transactions. In addition, many activities like food preparation and sharing are done through the application of mathematical principles. In Zimbabwe, kitchen activities are dominated by females, hence if female students withdraw their participation in mathematics they lose important skills which help them to perform domestic duties such as food preparing and sharing effectively. Nations that aspire to develop scientifically and technologically should give great attention to the teaching of mathematics at all levels of education. Understanding factors influencing their low participation in maths is useful in developing policies and ways to encourage and support female students to participate, enjoy and achieve better grades in mathematics such that they are motivated to pursue mathematics-related careers.

Mathematics is generally recognized as a critical component of the school curriculum (Donnelly & Wiltshire, 2014). At international level, the Organisation for Economic Co-operation and Development [OECD], emphasized that "Being able to read, understand and respond appropriately to numerical and mathematical information are skills that are essential for full social and economic participation" (OECD, 2013, p. 98).

Despite the important role that mathematics plays in the society, there is low participation by female students at ordinary level internationally (Masanja, 2010). Hopefully, the research will give insight to school authorities, teachers, parents or guardians, female students and curriculum planners at large on what needs to be done in order to improve female students' participation in mathematics. In addition, the research findings are expected to contribute to the increase in numbers of female students who opt to participate in mathematics to levels beyond ordinary level.

The research question guiding this study is:

- *What are the factors that influence low participation of rural Zimbabwean female students in mathematics at ordinary level?*

While an attempt is made to address this question from the perspective of female students, a brief overview of the related literature is illuminated below.

The participation of female students in mathematics decreases as they progress to higher educational and professional levels, and hence at each successive educational level, female students are more likely than males to opt out of mathematics, science, technology, and engineering (Herzig, 2004).

Female students have fewer role models who encourage them to participate in mathematics (Costello, 2007). Role models are very critical in enhancing confidence and elevating aspirations of female learners. Costello (2007) further argues that shortage of well-trained mathematics teachers has a bearing on the number of students who participate in this subject. This means that in schools where mathematics is being taught by unqualified teachers, very few students may decide to take part in the subject. Teachers stand in at the interface of the transmission of knowledge, values and skills in the learning process. Thus, if the teacher is unqualified and ineffective, students under his or her tutelage lose interest. Costello (2007) is of the opinion that as mathematics teachers' advance in age they should have better mastery of content, better utilization of educational resources, motivational techniques and effective content delivery.

We (as researchers) have observed that the way teachers treat female students during lessons reveal their negative attitudes towards female students' participation. Some teachers particularly males, are not willing to attend to female students' problems that they confront in the subject (FAWE, 2004). There is no reason whatsoever one can participate in a subject in which the environmental factors are not in her favour in terms of mathematics learning (ibid.). This indicates that teachers have the capacity to influence female students' participation in mathematics. When female students observe that teachers are not supportive of their participation in mathematics, the end result is to stop their participation.

FAWE (2004) claims that teachers hold the view that female students are not as capable as males in mathematics and that teachers' expectations influenced by culture can lead to self-fulfilling prophecies as far as female learners' participation is concerned. FAWE (2004) is also of the view that attitudes and confidence are the major factors affecting female students' level of participation in mathematics. Even bright female students demonstrate lack of confidence in mathematical situations in far greater numbers than males (ibid.). Their confidence is eroded by some connotations attached to this subject which are in line with the traditional view of mathematics outlined by Buerk (1982) cited in FAWE (2004) who says that some people view mathematics as a discipline that is rigid, remote, aloof and without human ties and therefore culture-free and value-free.

What happens in the teaching and learning process in the classroom plays a big role in determining how well female students participate in education and whether they stay in school or not (Herzig, 2004). Due to the fact that teachers are central to the teaching and learning

process, their understanding and awareness of gender responsiveness is key to the effective participation of females in the learning processes. Lessons must be presented in a variety of ways since best practices become counter-productive if they are over used. Teachers tend to be authoritarian, hostile, unapproachable and distant (FAWE, 2004) making it difficult for female students to seek guidance and assistance from them.

Mathematics textbooks play a crucial role in the teaching and learning processes because they add flesh to the syllabus, determine sequence of teaching and provide exercises for mastery of concepts (Costello, 2007). Thus, schools without sufficient mathematics textbooks put students at a disadvantage. The section below explores the theoretical framework of this study in detail.

### **Theoretical Perspective**

The Feminist Standpoint Theory (FST) which is concerned with exploring the nature of social experiences of women with a view to explaining the mechanism through which power operates in order to bring about the emancipation of women, is the theoretical framework that was used in this study (Delanty, 2005). The premise of feminist standpoint theory is that the difference in the social experience of men and women gives them different ways of looking at life and interpreting events, and hence different standpoints (Smith, 1987). This basic premise was applied by Harding (1998) to critique science (mathematics is a science subject). Thus, the FST was used as a lens during sampling and purposively selecting female students with different standpoints that is, female students who had registered to write the O-Level examination and those who had not registered. FST further involves a commitment to the view that all attempts to know are socially situated.

### **Research Methodology**

We utilised a qualitative research approach, which situates us in the world of the participants in the study enabling the research process to take an insider perspective (Babbie 2005). A research design is the entire research process from conceptualising a problem to writing research questions, and on to data generation, analysis, interpretation, and report writing (Creswell, 2014). Henning, Van, and Smit (2004, p. 5) state that qualitative researchers want to “discover how human interactions take place, and why these interactions happen in the manner in which they do in certain situations.” Denzin and Lincoln (2011) state that qualitative researchers are guided by a set of principles that emphasise the socially constructed nature of reality, the personal relationship between the researcher and what is being inquired, and the situational constraints that shape the inquiry.

The qualitative research design is exploratory in that it emphasises words rather than quantification in generating and analysing data (Creswell, 2014). The researchers used the interpretivist paradigm because reality is socially constructed Denzin and Lincoln (2011).

Babbie (2005) is of the view that interpretivism focuses on social life interactions as perceived by individuals rather than objective reality. This means that there is no single observable reality or interpretations to a single event. Again, it emphasises the process and not the final results.

### **Population and Sample**

The population comprised teachers and female students of the three sampled secondary schools out of thirty schools in Gutu district. At each school, both those female students who had registered and those who did not register mathematics were selected. Thus, six female students per school were selected, of which fifty percent of them were participating in the subject (Labelled A1, A2, A3; B1, B2, B3; and C1, C2, C3) and the other fifty percent had not registered to write ZimSEC examinations (A4, A5, A6; B4, B5, B6; C4, C5, C6) from each of the three schools (A, B and C). The data were generated from six O-level mathematics teachers and eighteen female students (stated above) purposively selected from sampled schools. The goal of purposive sampling is to focus on particular characteristics of a population that are of interest, which can answer the research question (Creswell, 2014).

### **Research Instruments and data analysis**

Two data generation tools, an interview guide and an observation checklist were used. An interview is a planned and guided conversation in which the interviewer draws out from the respondents, but never divulges his views by direct or indirect statement (Creswell, 2014). This type of interview gives the researchers opportunities to probe for views and opinions of the interviewees. Probing is a way for the interviewer to explore new paths which were not initially considered and affords the interviewer a chance to interpret meanings and attach subjective conclusions (Creswell, 2014). The researchers interviewed mathematics teachers and female students who were participating and those who were not participating in mathematics. Teachers were interviewed individually and focus group interviews were conducted for students. Each interview session was 30 minutes to one-hour long.

Observation is a way of generating data by watching behaviour of the participants and noting physical characteristics in their natural setting (Denzin & Lincoln, 2003). Observation allowed us to watch people's behaviours and interactions directly. Observational data is very useful in overcoming discrepancies between what people say and what they actually do and it helps researchers to uncover behaviour of which the participants themselves may not be aware of (Creswell, 2014). We used the observation method to capture the actual behaviour of the participants, not allowing them to write or tell what they think they do which may be totally different from what they practice. Thus, data generated through observation tends to be more real and true. Furthermore, seeing the environment where something takes place helped us to increase understanding of the events or situations. Again, observation requires little

from the individuals from whom the researcher needs data since it does not rely on participants' willingness or ability to provide information. The major problem with overt observation is that it is susceptible to the 'hawthorn effect' that is, people usually modify their behaviour when they are aware that they are being observed (Denzin & Lincoln, 2003). To reduce the negative effects of this method, the researchers carried out three lesson observations per class from each of the sampled schools without recording.

We obtained ethical clearance from our institution (Midlands State University) and from the Ministry of Primary and Secondary Education to allow us to carry out the study. The heads of schools also gave us clearance to interview their teachers and students who consented in writing. Anonymity and confidentiality were granted to all participants and they were told that they could freely withdraw from the study at any time if they so wished. We fully explained the purpose of the study honestly and made explicit how the data were going to be used.

Data were analysed using thematic approach which looks across all the generated information to identify the common issues that recur and the main themes that summarize all the views (Denzin & Lincoln, 2003). Thematic analysis requires the researchers to read and annotate transcripts, identify themes, develop a coding scheme and code the data.

### **Analysis of Results and Discussion**

Among the six teachers used in this study, five (83 %) were males and only one (17%) was a female. This clearly indicated gender imbalance in the teaching of mathematics. Their age range was twenty-four years to thirty-six years. The age range for the female students was sixteen years to eighteen years.

#### **Teachers' qualifications and experience.**

**The table 1 shows information on teachers' qualifications and experience.**

Table 1: Teachers' qualifications and experience

Teacher code	Qualification	Experience in years
1	Dip Ed	2
2	Bcom in Banking and Finance	2
3	Dip Ed	3
4	Dip Ed	1
5	Dip Ed	6
6	Dip Ed	2

Five out of six teachers (83%) were professionals (Table 1) that is, diploma in education holders while one of the teachers (17%) was a holder of a degree in banking and finance but employed as a mathematics teacher. Five teachers were qualified to teach mathematics while one was not. Only two teachers (33%) were experienced and the other four (67%) were in their probation periods that is, two years and below. This may mean that the inexperienced teachers (1; 2; 4 and 6) were not in a position to handle female students' problems. This is supported by Masanja (2010) who revealed that there was a positive linear relationship between female students' participation in science, mathematics and technology and qualification and experience of teachers who teach them.

During interviews, teachers disclosed that in rural day schools, mathematics was mostly taught by inexperienced teachers because experienced teachers were lured by boarding schools with facilities like electricity and taped water. For example, teacher 6 said: *There is a shortage of mathematics teachers in many schools even in some of the good schools. I have already submitted my transfer letter to the District Offices, of which I am waiting for the response. I am not enjoying teaching in day rural schools.* Teacher transfer resulted in those transferred being replaced by college graduates with no experience. Student A1 said that mathematics teachers did not spend many years teaching at one school and this leads to situations whereby students were taught by newly qualified teachers almost every year. Female students outlined that they failed to catch up with the different approaches used by those different teachers. The end result was to withdraw their participation in the subject.

Teacher 5 who was the most experienced teacher (see Table 1) told us that: *This school is in my home area. I have no interest of transferring because I don't want to incur high transport cost to and from home.* This indicated that for experienced mathematics teachers to be retained in rural schools, they need to be exposed to some direct or indirect benefits. His experience seemed to pay dividends as noted by the researchers during lesson observations. The way he treated particularly female students was totally different from what the other four inexperienced male teachers were doing. He granted female students equal chances of participation with male students. This confirmed the meaning of an old adage which says experience is the best teacher.

### **Teacher attitudes**

During interviews, all teachers said that female students found mathematics tough, e.g. teacher 2 said: *Mathematics is a tough subject which is a no go area to lazy students particularly girls.* This concurred with what teacher 3 said: *For my three years as a teacher, I have noticed that girls are lazy, they don't want to work. They want us to solve every problem for them.* One of the students at school B who was not participating in mathematics said that her maths teacher told her not to register for maths exams because she would be wasting her time. *Use the maths time to study other subjects which you can pass,* the teacher said. This indicated that teachers had negative attitudes towards female students' participation.



More so, the labelling of female students as lazy confirmed their negative attitudes towards them.

One of the female students at school C blamed teachers for causing her to lose interest in the subject. The other nine students who were part of the focus group discussions registered their agreement with the raised point by nodding their heads. Student C5 indicated that teachers only concentrated on those pupils whom they believed to be intelligent, especially the boys. Lesson observations also indicated that male teachers had negative attitudes towards female students, for example teacher 4 shouted: *You are wasting our time*, to a female student who was struggling to solve a mathematical problem at the chalkboard. Thereafter, he called upon a male student to solve the problem.

However, teacher 6 said that: *I do not have negative attitude towards female students. I give equal attention to all my students*. Surprisingly enough, during lesson observation, the same teacher was biased towards male students. He granted permission to seven males and only twice to female students to answer questions. Costello (2007) observed that it is interesting to note that teachers generally see themselves as blame free and seem unwilling to find any fault with their own teaching approaches. From the lesson observations in four of the six classes observed, teachers were mainly concentrating on the boys who seemed to be quite aware of the topics that were being learnt. The teachers had negative attitudes towards female students' participation and they treated them differently from their male counterparts.

During lesson observations it was revealed that teachers were giving encouraging comments to boys who were missing some points in the process of solving maths questions such as *'well tried'* and *'you were in the right direction.'* The teachers took time to clearly examine step by step the correct procedures which were supposed to be followed to clear the misconception. However, when a female student volunteered to solve some problems at the chalkboard the situation was totally different when she displayed some misconceptions. The teachers tended to give a sharp *'no'* and gave the chance to boy students who were quick on raising their hands whenever they noticed some errors. Furthermore, a common comment in the female students' exercise books was *'You are very lazy.'* In student B1's tests exercise book the researchers noticed this comment: *'totally hopeless.'* The comment had been passed to a student who had a test score of 17%. According to the labelling theory, students tend to accept the labels placed on them by their teachers. Those labelled as hard workers tend to work hard in accordance with the label in order to please their teachers and those labelled as lazy behave like wise (FAWE, 2004). Thus, the belief that female students are lazy caused teachers to have negative attitude towards girls' participation in mathematics.

It also came to the attention of the researchers that due to strong criticism from teachers after failing to solve correctly given problems, the number of girls who volunteered to solve mathematics problem at the chalkboard reduced. Female students resorted to chorus answers. This showed that the teachers' comments eroded female students' confidence. Thus, the

attitudes and approaches of teachers proved to play a major part in influencing low participation of female students in mathematics.

### **Attitudes of female students towards mathematics**

During interviews all the six teachers indicated that in most cases female students did not do their corrections. When carrying out lesson observations, the researchers observed that the rate at which female students went out of the classroom during mathematics lessons was high. At school A five female students against zero males left the classroom during the lesson. At school B and C it was seven females against one male and four females against zero males respectively. On several occasions, teacher 4 told female students B2, B5 and B6 to pay attention during the lesson. Furthermore, among the thirty female students who were participating in mathematics, twenty-three had not completed assigned work.

Female students' negative attitudes towards mathematics were observed by the researchers when they were reluctant to solve mathematics problems at the chalkboard despite the fact that they were aware of the procedures. This was in line with the view of one of the teachers interviewed who pointed out that girls are shy to demonstrate their knowledge in front of the class. Teacher 5 said: *Even my best female students are uncomfortable to volunteer to work out problems at the chalkboard despite the fact that they know the solutions.* Student C4 told the researchers that female students' shyness was an inborn character and student C6 indicated that comments passed by male students were always a threat to their self-esteem when they failed to correctly solve problems which the boys perceive as easy problems.

*Most female students have negative attitude towards mathematics. The state of their exercise books can tell you the whole story,* said teacher 2. At school B, six out of the ten female students who were participating in mathematics had uncovered exercise books. Despite a comment 'cover your exercise book' on the outside of those books and the date on which it was written was 15 January 2015, no positive action had been taken by those students by October 2015. When the researchers asked those female students why they had not covered their exercise books they cited lack of money as the reason. However, the researchers observed that all the six students had covered their exercise books for other subjects they were participating in.

Furthermore, when the researchers analysed students' work presented in their exercise books, they noticed a sense of negligence on part of many female students. Some female students' work was haphazardly arranged and they were not doing their corrections as demanded by the teachers' comments. Four students at school A were not doing their corrections on regular basis despite the fact that the teacher's comments were demanding them to do corrections. At school B seven students were leaving gaps with the heading 'corrections' in their exercise books. The researchers observed a different situation at school C where some female students

were repeating solving those problems which they had answered correctly instead of correcting the wrongly answered questions. This indicated an element of negative attitude on the part of female students towards mathematics.

### **Teaching methods and resources**

Teacher 3 told the researchers that teaching methods were determined by the content to be covered within a lesson. He added that he used teacher-centred methods such as lecture and teacher demonstrations when he wanted to cover a lot of content. During interviews, all the six teachers (100%) clearly indicated that the mathematics syllabus is very long, so for them to cover much ground they resorted to lecture method. Teacher 2 said: *I use lecture method in most cases so that I can cover much ground.* During lesson observations we noted that teachers spent much of the lesson time explaining and demonstrating concepts. Students were busy writing down steps and procedures displayed by their teachers. Lecture method is ineffective in that it turns the learners into passive participants in the learning process (Costello, 2007).

During focus group discussions, all the female students revealed that teachers tended to be fast in explaining concepts and dominated the lessons. For example, student A3 said: *We are not given enough time to demonstrate our concept mastery during lessons,* there was a 'yes' chorus from the other students. This indicated that teacher-centred methods were not favourable to female students. FAWE (2004) alludes that girls favour participatory learning environment. Teachers should select teaching methodologies that ensure equal participation by both boys and girls. Some teaching methods like group discussion, role play and practical experiments can be very effective in encouraging student participation and therefore give the girls opportunity to participate more actively (ibid).

Furthermore, interviewed students also indicated that teachers used methods that learners did not easily follow when teaching mathematics. Student B1 told the researchers that teachers at times used mathematical technical words without first explaining their meanings. The researchers observed the same situation when teacher 6 used the terms supplementary and complementary angles regularly without clearly explaining their meanings to the class. This is supported by Costello (2007) who states that teachers need not complicate their lesson delivery in mathematics by using language that is beyond the scope of their learners. This frustrates learners rather than making them enjoy learning the subject.

Female students at school C unanimously agreed that they wanted to be afforded enough time to personally approach their teachers with problems which they face individually in the subject. However, all the male teachers were unwilling to address female students on a one on one basis. The teachers highlighted that they encouraged girls to visit them in groups with the accompaniment of at least one boy. These findings clearly indicated that the doors are shut for girls' individual needs to be attended to by male teachers. However, those students

taught by female teachers disclosed that their individual needs were attended to by their female teacher. They also indicated that they were heavily criticised and allegations were levelled against them that they had hidden agenda of luring the attention of the male teachers in the staffroom.

Girls seemed to be unwilling to raise up their hands in order to respond to teacher-posed questions or solving mathematics problems at the chalkboard. Teachers relied on calling upon boys who were quick in raising up their hands. These findings are supported by Mwetulundila (2011) when he says that more attention is given to male students than to female students because teachers call upon them more than female students, and to the delight of most teachers, male students are usually vocal enough to volunteer answering and ask more questions than female students. Male students subsequently received more reinforcing feedback than female students.

For all the classes where observations were made, the researchers noted that seating arrangements were mixed grouping in terms of gender and ability. However, the front seats were dominated by male students in the sense that on a three seater-desk the ratio was one female student to two male students. Although those seating arrangements have their advantages, the researchers observed that it led to a situation whereby female students over relied on male students to an extent that whenever female students wanted to respond to teacher-posed questions they consulted male students first. We noted in group work activities that male students were in charge of writing and giving class feedback.

All the schools had one type of textbook that is, the New General Mathematics. The textbook-student ratio was one to one in two schools and one to two in the other school. These favourable ratios were as a result of donations from UNICEF in 2012. The interviewed teachers outlined that their schools were facing challenges in raising enough money to purchase a variety of mathematics textbooks since the students were facing challenges in paying their tuition fees. The teachers indicated that the only extra source of information they were using were past examination question papers. However, interviewed teachers indicated that the textbook they were using did not cover in depth all the syllabus content, hence they advocated for the importance of a variety of textbooks. This finding concurs with observations by Costello (2007) who says that a variety of textbooks help both teachers and students in content coverage since they complement each other.

All interviewed teachers and students indicated that most parents had problems in providing adequate resources like mathematical sets and calculators. Shortage of resources implies that pupils had to rely on sharing. When resources are scarce, female students have no courage to scramble for them (FAWE, 2004). This was clearly observed by the researchers at the school where textbooks were shared. Those males who were sharing with female students were in possession of the textbook. Information generated during interviews indicated that female students rarely possessed those textbooks particularly over the weekends. Such a situation meant that female students had limited individual private practice.

We also noted that shortage of resources like graph papers and mathematical sets hindered progress in the topics like quadratic equations, locus, functions and others. In addition, during focussed group interviews, the participants indicated that the bulk of them had no calculators. Half of the female students told the researchers that their parents were not providing them with all the necessary resources not because they could not afford but were unwilling. They said that if male students from the same families requested for resources such as the calculators, they were given. In this regard, the researchers noted that chronic shortage of resources is therefore a clear handicap in the participation of female students in mathematics. Failure to get the required resources was noted to be a contributing factor in dropping of mathematics by many students.

### **Conclusion**

The results indicated that teacher qualification and experience are significant factors which influence female students' low participation in mathematics. Furthermore, there was gender stereotype in the teaching-learning of mathematics which was mostly taught by inexperienced teachers. Male teachers were biased towards male students. They were giving encouraging comments to male students while female students were either scolded or labelled as lazy. Lack of female role models proved to be another factor because the class which was taught by a female teacher had the higher number of female students participating in mathematics than the classes taught by male teachers. This means that if the numbers of female mathematics teachers in rural schools' increase, chances are high that female students' participation in the subject may also increase.

The data suggested that female students preferred participatory teaching methods such as group work and problem solving as compared to teacher-centred lecture method. Adequate mathematics textbooks are needed to enable both the teachers and students to be able to refer to both previous and current concepts being taught. We therefore recommend that rural schools should upgrade the infrastructure and facilities like electricity and water in order to retain the services of experienced teachers. Male teachers should have positive attitude towards the participation of female students in mathematics.

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