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**CLOSING THE GENDER GAP: EXAMINING THE REASONS FOR PERFORMANCE  
DIFFERENCE IN MATHEMATICS BETWEEN STD 7 GIRLS AND BOYS IN  
THE QACHAS' NEK DISTRICT – LESOTHO.**

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**A research dissertation submitted in partial fulfillment of the requirements  
for the Master of Education.**

**UNIVERSITY OF NATA, DURBAN**

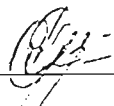
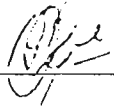
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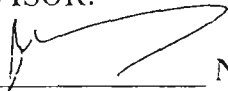
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**DECLARATION**

**I DECLARE THAT THIS RESEARCH PROJECT IS MY OWN WORK; IT HAS NOT BEEN SUBMITTED BEFORE FOR ANY DEGREE OR EXAMINATION IN ANY OTHER UNIVERSITY.**

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**LIST OF ABBREVIATIONS**

PSLE	Primary School Leaving Examinations
UN	United Nations
SAT	Scholastic Achievement Test

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**ABSTRACT**

There is a concern in Lesotho about inequalities in different sectors including inequalities that exist between females and males in schools. Closing the gender gap between males and females, girls and boys is the government's priority, hence the recent Gender and Development Policy, 2002. The project was conducted with the purpose of exploring the reasons that contribute to pupils' gendered performance in mathematics. In this regard, the focus was put on reasons behind girls' poor performance in mathematics.

This report presents and discusses the results of a research which was conducted in Qachas'nek - Lesotho. The project made some observations based on the questionnaire data gathered from four primary schools. The data provided some useful insights into girls' attitudes, behavior and perceptions towards mathematics, and it also provided insights into teachers' attitudes, expectations and perceptions about girls' and their learning of mathematics. The research also provided evidence that there are different social factors that contribute to girls' poor performance in mathematics. Some of those factors concern parents, teachers, classroom process, peers and girls themselves.

The analysis of the results and subsequent discussion suggests reasons that may be useful in terms of helping to explain pupils' gendered performance in mathematics and in the continued search for strategies that could improve girls' poor performance in this subject. Schools could be creative in the strategies that they can adopt to tackle gender differences. With this in mind, teachers and pupils were asked to suggest possible solutions that could be employed in trying to combat the problem of the gendered performance in mathematics hence noticeable improvement in girls' performance in this subject.

## **CHAPTER ONE**

### **INTRODUCTION**

#### 1.0 INTRODUCTION

This chapter is divided into three sections, the preamble, the section on definition of terms and the methodological aspects of the research. The preamble seeks to give a brief background of the recent policy developments in Lesotho in relation to gender.

#### 1.1 PREAMBLE

Gender became an issue in Lesotho in the 1990s and the National Gender Draft Policy that was produced in 1994 was used as a starting point for the present Gender and Development policy. The policy draws its mandate from Chapter II of the Constitution of Lesotho that entitles every citizen to fundamental human rights and freedoms. It challenges the current gender imbalances and as such providing the basis for creation of an environment for gender equity and equality. The policy recognizes the twelve critical areas of concern as defined in the 1995 Beijing Platform For Action. Among the critical areas highlighted in this forum, the stereotypes in subjects choices at various levels of education are considered. Such stereotypes influence classroom gendered practices in relation to some subjects (Gender and Development Policy 2002, 1).

The Gender and Development policy, 2002 is also guided by the UN conventions, one important convention is the Convention of the Rights of the child, which declares that every child should receive education which is free from gender biases. One question to be asked in relation to the situation in schools could be: 'Does every Mosotho child in Lesotho schools receive education that is free from gender biases?' In this study, I will try to provide an answer to this question with corroborative data and analytical discussions in the chapters that will follow. The gender policy observes that the socio-cultural status of girls and boys is greatly influenced by their socialization, peoples' perceptions and expectations. The result of this socialization and expectations can compel an individual to follow a career in which that individual is not competent and this has implications for development. For instance, in most

schools, sex-stereotyping influences the choice of subjects which boys and girls undertake and limits their capacity to venture into non-traditional careers like medicine for girls and catering and nursing for boys. To illustrate, if girls are socialized that some subjects are masculine and therefore are suitable for boys, it means that such girls will not take up those masculine subjects, even the most capable girls will decide to take the subjects that are regarded feminine by the society. In this way, such girls will be following different paths of careers that may not be compatible with their capabilities and this means that they will not be productive in their chosen fields, hence contribute little to the country's development.

In order to eliminate the prevalent gender biases in schools, the government will include gender-sensitive careers at all levels of education. This will be done by eliminating socio-cultural barriers with respect to girls' and boys' education to ensure that they have liberty to choose appropriate carriers without being restricted by socio-cultural stereotypes based on sex. This will also be done by engendering the curricula at all levels of education and training, by offering gender studies at tertiary educational level, by continuing to advance equal access to education, and by reviewing and reforming the curricula to eliminate stereotyped concepts of the roles of girls and boys.

As has been said, the aforementioned strategies will be placed to counteract the present gendered practices at all educational levels because at the moment the situation that prevails in schools is still characterized by gender inequalities. If girls and boys do not feel that they co-exist democratically both at a personal and professional level and given equal opportunities for personal development, then, they may become demotivated or leave school all together. By ensuring that girls and boys are treated as equals in both theory and practice within schools, chances are higher that motivation will improve and along with it individual performance" (Gender and Development 2002, 5).

Teachers need to strive for equal treatment of boys and girls in order to maintain the motivation that will lead to girls' good performance in mathematics. The fact that 98 % of schools in Lesotho are co-educational, teachers in such schools are faced with the biggest challenge of dealing with pupils of different sexes – girls and boys who have varying psycho-

social qualities, who come from different socio-economic backgrounds, and who may also have different educational backgrounds and foundations. Despite all these disparities, teachers have to create conducive environment that is free from gender biases and that allows girls and boys to learn without discrimination.

## 1.2 DEFINITION OF TERMS

This subsection serves to provide the meanings of the terms used in this study.

**Gender** – Gender is a psychological and cultural term referring to one’s subjective feelings of maleness or femaleness .

**Gender identity** – The sex one feels herself or himself to be, regardless of his or her physical sex which is not actively expressed.

**Gender role**- The society’s evaluation of behavior as masculine or feminine.

**Masculine** – Characteristics and qualities considered to be belonging to men.

**Masculinity** - Characteristics associated with the male sex. The historical study of masculinity documents manliness as a code of conduct, heroism, strength, emphasis upon the public nature of man as natural and monolithic, dimensions of masculinity relating to objectivity, reason and civilizing process.

**Femininity** – The characteristics associated with the female sex. The historical study of femininity documents feminine identity as linked to passivity, nurturing, co-operation, gentleness and relation to motherhood with an emphasis upon the relegation of woman to the private sphere, the sphere of domesticity.

**Gender stereotypes** – Stereotypes are strongly held overgeneralizations about people in some designated social category. Such beliefs tend to be universally shared within a given society and are learned as part of the process of growing up in that society.

**Socialization** – The process in which the culture of a society is transmitted into children, the modification from infancy of an individual’s behavior to conform with the demands of social life. Socialization undertaken in the family and elsewhere involves both integration into society (roles, institutions etc) and the differentiation of one individual from another.

**Gender aware** – Recognition of gender differentials with little or no translation of this into practice.

**Gender bias** – Differential treatment given to people on the basis of gender.

**Gender equality** - The state of women and men, girls and boys, of having equal rights, responsibilities and status. It denotes equal access and control over resources and opportunities, equal participation in decision- making.

**Gender equity** – Fairness and justice in the distribution of benefits and responsibilities between and among girls and boys (Gender and Development Policy, 2002, iv).

**Gender sensitivity** – The ability to recognize issues, and especially the ability to recognize girls’ and boys’ different perceptions and interests arising from their different social position and different roles and use such knowledge to identify problems and to act purposefully to address them.

**Gender gap** – The percentage difference between girls and boys in their performance in mathematics.

**Patriarchy** – Social system in which men have all the power.

**Gender differentiated performance-** Pupils’ performance that favors one sex.

**Learning styles** – Students’ habitual manner of problem solving or thinking or learning.

**Pedagogy-**The principles, methodologies and profession of teaching and instruction.

### 1.3. METHODOLOGICAL CONSIDERATIONS

#### 1.3.1. MOTIVATION FOR THE STUDY

My interest in conducting this study was kindled by the mathematics results of Std 7 pupils at the Primary School Leaving Examination (PSLE) and the results of the Local Mock Tests in the Qachas’nek district. These results proved the existence of a gendered performance in mathematics (See Appendixes A, B and C) and the performance difference that exists is in favor of boys. This means that more girls than boys fail Std 7 because of their poor

performance in mathematics. This subject has an important role to play in the educational development of girls because if they fail it, they have to repeat Std 7, they cannot proceed into post primary level. This results in high repetition rate in the primary level. The repeaters increase the number of Std 7 pupils beyond the manageable capacity, and this makes classroom management more difficult. Apart from repeating Std 7, most failures get discouraged, as a result, they drop out of school as has been indicated in the Gender and Development Policy, 2002.

Most of the girls who drop out of school without having graduated from primary school, end up in unsuccessful early marriages, teenage pregnancies and child labor. These social problems have negative implications on the development of the country. I was motivated to undertake this study so as to try and find if there could be ways of counteracting the problem of girls' failure of mathematics and their high drop out rate.

Research on gender-differentiated performance in mathematics is limited in Lesotho, nevertheless, the study was also motivated by one research conducted by Bam (1982) cited in Mwamwenda (1996, 134). Bam (ibid) indicated that there is no performance difference in mathematics between girls and boys in Lesotho. However, it is evident from the Local Mock Tests and PSLE results that there is a gender differentiated performance in mathematics between the primary school girls and boys. The results of these tests are opposed to what Bam (1982) found.

### 1.3.2 AIMS OF THE STUDY

The study was mainly a quantitative survey of which the purpose was not based on any hypothesis, instead, the research intended to develop a descriptive analysis of pupils' gendered performance in mathematics. Therefore, the study aimed to:

- find reasons currently given for the differences in girls' and boys' performance in mathematics.
- suggest strategies for addressing the gender-differentiated performance in schools.

### 1.3.3 THE SIGNIFICANCE OF THE STUDY

This study is significant because:

- it will assist teachers develop a sense of gender awareness and sensitivity thereby treat girls and boys as equals.
- it seeks to find social reasons behind pupils' gendered performance in mathematics thereby addressing gender inequalities in the classroom.
- it suggests strategies to counteract the classroom-gendered practices that contribute to disparities in performance in which girls are at the disadvantage. If effectively implemented, the strategies will help in improving girls' performance in mathematics.
- it will serve as the basis for researchers on school based gender inequalities. That is, the study will also lay a foundation for further research in this area that hopefully will help solve the nationwide gender imbalances that prevail in the classrooms.

### 1.3.4 KEY RESEARCH QUESTIONS

Researchers have tended to offer explanatory models for gender differences observed in pupils' performance in mathematics. For example, Reyes and Stannic (1986 cited in Murphy and Gipps, 1996, 138) stated five factors that are hoped to be responsible for pupils' gendered performance in mathematics. These factors include societal factors, school mathematics curricula, teacher attitudes, students' attitudes and achievement related behavior and classroom processes. Accordingly, the critical questions that guided this study were:

1.3.4.1 What are the possible reasons for pupils' gendered performance in mathematics?

1.3.4.2 What initiatives could be taken in order to solve the problem of the gendered performance in mathematics?

### 1.3.5 THEORETICAL CONSIDERATIONS

A constructivist theory of learning (Vygotsky, 1978) guides the theoretical orientation of this study in which I attempt to find reasons that contribute to the gendered performance in mathematics. From constructivist perspective, mathematical meanings are negotiated through a process of communication, which involves collaboration and argumentation. Learning from

this position is viewed as a social process in which children grow into the intellectual life of those around them, mathematical ideas and truths both in use and meaning are cooperatively established by the members of the group through participating in communicative discourse involving explanation, justification and negotiation of meaning. From this perspective, teaching is viewed as a process of encouraging children's individual construction of mathematical ideas through participation in communicative discourse. (Barnes and Tad, 1977, Cobb, 1990 cited in Marshall, 1994,191).

### 1.3.6 THE STRUCTURE OF THE REPORT

This report is divided into six chapters. Chapter one (this section) provides a general overview of recent policy developments in Lesotho's education in relation to gender. It also discusses the motivation of the study, the aims of the study, key research questions, the significance of the study and the theoretical considerations. Chapter two examines the related literature whereby the factors that influence poor performance in mathematics have been explored. Chapter three describes research methodology that was employed in the conduction of this study. Chapter 4 presents and analyzes the findings of the study as reported by participants. In chapter five the findings of the study are discussed in relation to views drawn from academic literature and other research. Chapter six concludes the report by highlighting an overview of the study, the main findings, limitations and strengths, implications, recommendations and the conclusion.

In this report, there are some responses that have not been discussed because of the limited scope of the research. Some of the responses that are not discussed include reasons for pupils' good performance in mathematics and the biographical data of the participants. The discussions were mainly put on reasons that contribute to girls' poor performance in mathematics.

### 1.3.7 CLOSING REMARKS

In this chapter, the main concern of the government of Lesotho with regard to gender issues have been highlighted. It is the intention of the government to ensure equality between women and men, girls and boys so that development efforts have an equal impact on all gender. The chapter also presented some methodological aspects of the research such as, motivation for the

study; significance of the study, the aims of the study and the structure of the report, the purpose of this was to highlight the direction of the report. The following chapter aims to provide the literature reviewed on different factors that contribute to gender differentiated performance in mathematics.

## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURE**

#### 2.0 INTRODUCTION

This chapter reviews the literature related to factors that contribute to gendered performance in mathematics. The focus is mainly on reasons that influence girls' poor performance in mathematics. The reviewed literature will specifically concentrate on the following factors, socialization of girls and boys, parents' expectations and attitudes, teachers' perceptions, expectations and attitudes, teaching methodology, pupils' learning styles and attitudes and the reasons pertaining to the nature of different topics taught in mathematics. Each of these factors will be discussed below.

Much has been written about gender and mathematics, researchers have undertaken different studies in trying to find out different factors that influence the gendered performance in mathematics. Scholars have paid considerable attention to gender and mathematics, in the United Kingdom, researchers (Daniels, Creese, Hey, Leonard and Smith, 2001) found that there are different factors that influence pupils' gendered performance in mathematics and that the subject is perceived to be masculine. In the early 1980s two psychologists, Benbow and Stanley (1980 cited in Wrigley, 1992, 1993) published several studies on mathematics performance of American middle-school students. Benbow and Stanley (ibid) reported that among the middle school students who earned top scores in Scholastic Achievement Test (the SAT), males outnumbered females. These publications stirred debate around the inherent differences in mathematical ability between males and females, which tested for male testing advantage. Other researchers (Baker and Entwisle, 1987 cited in Wrigley, 1992,1993) challenged this findings and undertook an empirical research which resulted in standard set of conclusions, which went as follows:

gender differences in mathematics abilities were small, there was some evidence, none of it overwhelmingly, which indicated that males did better than females, and that differences were probably caused by social factors embedded within the family and school ( Baker and Entwisle, 1987 as cited in Wrigley, 1992, 1993).

The results of these two studies established two contradictory positions that, pupils' gendered performance is influenced by two kinds of factors, first, the social factors and secondly biological factors. According to Basow (1992, 41), a number of biological factors have been examined in the search for explanations of the gender differences in visual, spatial- genetic, hormonal and brain liberalization factors. Basow (ibid) argues that genetic influence on visual-spatial ability has been conducted but the results have been inconsistent. Because of this inconsistency, I will not base the discussion on the biological factors, but the discussion will be based on social and environmental factors. In the following section, different social factors (reasons) that contribute to pupils' gendered performance in mathematics will be discussed.

## Impact of the society ✓✓ 2.1 SOCIALIZATION OF GIRLS AND BOYS

From the very early age, children are socialized by the society about how to play certain roles according to their gender types. Kelly (1981 cited in Measor and Sikes, 1992, 9) suggests that children learn about appropriate attitudes and behavior from their parents, peers and teachers. From the socialization process, children develop clear ideas about different sex roles in general to include their gendered styles of learning as well as their preferred areas of study, this is to say, socialization is responsible for gender differences in pupils' ability and aptitudes (Measor and Sikes, 1992, 8). This socialization affects children's behavior at school.

Boys and girls are socialized to prefer different learning strategies, different subjects and different activities. Flessati and Jamieson, (1991) maintain that the gendered performance in mathematics is caused by differences in socialization whereby females are conditioned by the society to believe that mathematics is a subject for males. This socialization can lead to girls dropping mathematics. Fox (1981) confirms that mathematics anxiety is a learned response and that girls are not born hating mathematics. Socialization begins at home, females are socialized from the time they are very young to avoid risk taking as girls' learning of mathematics is seen as risk taking. A study by Lee (1980 cited in Measor, 1992, 62) found that within the home environment the treatment of girls and boys remain fairly stereotypic. For instance, toys such as 'construction blocks' and toy cars that are given to boys are different from girls' toys, normally dolls. This shows that girl infants are discouraged from exploring the mathematical world around them while boys are given toys that encourage small motor skills and spatial –

visualization necessary for success in mathematics later in life. Girls' toys like dolls often encourage relational or traditional nurturing activities. Lee (ibid) argues that at their earlier years, girls are not encouraged to play with toys that will facilitate their development in mathematics and spatial skills but they are given other toys or materials that will not enhance these skills.

## 2.2 PARENTS' EXPECTATIONS AND ATTITUDES

Parents' expectations for girls and boys differ significantly in terms of mathematics. Parents' lower expectations for girls than boys have negative consequences for girls. In Scotland, a study by Tinklin, Croxford, Ducklin and Frame (1999) found that parents and home background have very important influences on young people's views about education. It was further discovered that there is a link between children's educational attainment and home background. Thody and Kaabwe (2000, 95) confirm that parents who are educated influence their children's learning positively, girls whose parents had a higher level of education perform better in mathematics than those whose mothers had achieved a lower level of education. Thody and Kaabwe (ibid) further argue that parents may unconsciously fail to provide necessary support to cater for the interest of their daughters in mathematics, they may either direct their interest elsewhere or give all their support toward educating their sons.

Gaganakis (1999) in South Africa also found that parents influence their children's education; he contends that if parents do not approve of mathematics as female domain, there is no way in which children especially girls can view this subject as suitable for them. He further argues that school-based advisors do not influence girls' subject preference, but girls choose such subjects on the opinion of parents. The attitudes of teachers usually reinforce parents' messages (Schwartz and Hanson, 1992, 2) as will be explained below.

## 2.3 TEACHERS' PERCEPTIONS, EXPECTATIONS AND ATTITUDES

According to Jones and Jones (1989 cited in Jones and Smart 1995) teachers' perceptions and attitudes of gender differences and their consequent interaction with, and expectations of pupils have been shown to affect classroom interaction and pupil self-perception. Teachers often promote gender stereotypes and perpetuate the gender divide in more subtle ways. Many

teachers especially men view mathematics as a male domain and convey this attitude both directly and indirectly, for instance, by giving males and females different kinds of feedback. For instance, in a study conducted by Hallina and Sorensen (1987 cited in Basow 1992, 45) it was demonstrated that teachers were more likely to assign boys who scored high marks on a mathematics achievement test to a high-ability mathematics group than they were to assign high-ranking girls to such a group. Not only did girls receive less encouragement than boys but also seemed to have higher responsive rate to evaluative feedback than boys.

Investigations by Reyes (1981); Koehler (1985 cited in Fennema and Leder, 1990) have reported that teachers in mathematics classroom treat boys and girls differently and the treatment favors boys. Levine, (1995) have shown that teachers pay more attention to boys. Contrary to this findings, Randall (1987 in Epstein and Elwood, 1998, 173) found that girls received more attention from teachers than boys. However, girls' contacts are mainly on seeking help and encouragement. Randall (ibid) maintains that teachers' acceptance of girls' low confidence serves as reinforcement for feelings of helplessness. Stanworth (1983) backs up the idea that teachers' acceptance of girls' low confidence leads to girls' low expectations of their abilities and for boys to over-estimate theirs. In the mathematics classrooms, teachers mainly concentrate on boys' interests than to those of girls thereby assisting boys to gain superiority over girls. For instance, in a research observation conducted by Francis (2000) in the United Kingdom, one teacher used a challenging style that was full of sarcasm against girls, many boys relished this, in that class the majority of boys were vocal and enthusiastically shouted answers whereas girls were much less vocal and hardly volunteered giving answers. The teacher pretended to be willing to help them but he did not, this had a restrictive effect to girls thereafter refrained from class participation and hence performed poorly in mathematics.

Despite the fact that teachers favor boys than girls, in some cases, teachers who give boys more attention, do so unintentionally. For instance, in the classroom, teachers react to pupils' pressure all the time, so if boys are more active as we have indicated in the above example, and girls remain less active, obviously the teacher will automatically respond to boys' requirements than to girls' and the teacher may not even think of pupils' gender when responding to their concerns. Thus, teachers maybe unaware that they are concentrating on teaching males only

because the classroom interaction is unconscious, if boys talk most, they obviously receive much attention. For example, analysis of classroom discussions by Redpath and Claire (1989) involving children between the ages of 11 and 12 in different settings, revealed that boys took three times as many turns speaking than girls. It appears that boys' ability to talk is an advantage to their learning of mathematics as this helps them to articulate their views during classroom discussions. They are also able to ask questions and as such, are able to attract teacher's attention towards addressing their mathematics problems and this gives the teacher a chance to help them more than girls, hence their good performance in mathematics.

#### 2.4 TEACHING METHODOLOGY

Barnes and Coupland (1990 cited in Noble and Bradford 2000, 129) pointed out that teaching methods used in mathematics could also create barriers to girls' participation. These scholars indicate that women express much less preference than men for competitive or co-operative mode of learning. The traditional style of mathematics teaching is authoritarian and teacher-centered, and tends to encourage a competitive atmosphere. "Girls' poor performance seems to have its roots in teaching methods that are adopted by teachers. Girls' interest in mathematics depends on the manner in which classroom instruction in mathematics is being conducted" (Walberg and Horn cited in Bester and Budhal, 1995).

Noble and Bradford (2000, 130) further argue that a mathematical classroom in which girls might thrive is likely to be one in which learning takes place through interaction and co-operation, where group work and activities and ideas are shared, where individuals' contributions are welcome and where creative and imaginative thinking is valued. There is a need to give girls challenges both in groups and individually in order to encourage them to take risk in a situation where they feel safe and they can succeed. It was further indicated that teachers are aware of the teaching methods and learning styles that are most favored by pupils and are more effective. However, teachers tend to feel that the volume of work that has to be covered jeopardizes their ability to teach attractively (Noble and Bradford, *ibid*). There is the relationship between boys' and girls' learning style and teaching methods used, teachers need to consider pupils' learning style when they select teaching methods to be used, teaching methods need not be sex biased.

## 2.5 PUPILS' LEARNING STYLES AND ATTITUDES

Schwartz and Hanson (1992) in USA found that males and females tend to approach learning differently although the reasons for the differences continue to be debated. In the classroom, females prefer to use a conversational style that fosters group consensus and builds ideas on top of each other, the interrelationship of thoughts and actions is paramount. Males, conversely, learn through argument and individual activity or behaviors that they have developed. Schwartz and Hanson (ibid) emphasize that most classroom discourse is organized to accommodate male learning patterns hence their good performance in mathematics. Researchers (Marto and Saljo, 1976; and Svenson, 1977, cited in Richardson 1993, 69) indicate that most students are somewhat versatile in their choice of learning approach. Their choice depend on such factors as the nature of their academic motivation, the pressure others demand on their time and energy; the total amount of content in the course; the way in which a task is introduced and their perceptions of what will be demanded of them.

Epstein and Elwood (1998, 172) believe that girls' conformity has other consequences for their learning. Even when females do participate in the classroom talk, their approach may suggest to teachers that they have less command over the subject matter than males. Girls are more likely to ask questions, acknowledge the comments of previous speakers and refrain from interrupting exchanges in progress. In other words, their classroom conduct is consonant with accepted sex-role behavior that compromises women's assertiveness. In comparing the participation patterns of males and females, teachers are apt to treat females discourse contributions with less respect because girls exhibit less authority. By allowing classroom discourse to exit parallel to sex-role differences in society, teachers unconsciously pass on negative expectations for girls. Learners' learning style is very much related to their attitude since both learning style and attitude affect their performance (Hendrik and Strange, 1989 cited in Schwartz and Hanson, 1992).

Females are not likely to believe that mathematics has utility in their lives, they see mathematics as unconnected to a relationship model of thinking. Even if they persist in taking mathematics courses, girls are apt to find that they don't like them and as a result they fail because "liking a subject is key to succeeding at it" (Lockhead, Thorpe, Brooks-Gunn, Casserly, and McAloon, 1985). According to (Lockhead, Thrope, Brooks-Gum, Casserly, and McALoon, *ibid*) student's attitude towards a subject is important and affects their performance in that subject. Moreover, pupils' love of a particular class is based in part on his or her feeling of success within that class. These feelings are not only based on pupils' academic achievement but also on their felt experience in the class. Girls' confidence in themselves as mathematics learners, their perception of mathematics as a difficult subject, and their view that mathematics is a male activity, all impact on their attitude, achievement, and participation in advance courses in mathematics (Campbell, 1986). In a longitudinal study of sixth, eighth, tenth and twelfth grades, Tartre and Fennema (1991) found that girls' believe that mathematics is a male domain correlates with their mathematics achievement. For instance, in single-sex schools or in girls out-of-school mathematics projects, where girls do not see mathematics as an exclusively male domain, they tend to have higher mathematics success. When this dynamic is changed to make mathematics accessible to girls and boys, girls' interest and involvement rises.

The findings of Tartre and Fennema (1991), that when girls are taught alone they are likely to perform better show that boys' dominance in the classroom or in-group discussions is a hindrance to girls' learning especially through discussions. Boys' tendency to oppress, demean and harass girls result in girls' feeling nervous and intimidated so much that they end up not feeling free to participate in class. Murphy and Gipps (1996, 28) confirms this by showing that in the United States of America and Australia girls of all ages are experiencing a degree of harassment and hostility in their in-school interactions with boys. Murphy and Gipps (*ibid*) point out that this has negative impact on girls' self esteem and academic achievement. In South Africa, Morrell (1998, 220) showed that harassment impact on girls' learning. He pointed out that in a study conducted in Durban, it was found that levels of girls' harassment were high in schools, and one principal reported that 30% of his female students were attacked.

Apart from damage to physical harm, the very core of teaching and learning was affected, thus, boys' intimidation and harassment of girls seems to be affecting girls' learning negatively.

## 2.6 THE NATURE OF THE TOPIC TAUGHT

Girl's performance in mathematics is also influenced by the nature of the topic being taught. In a study conducted in Lesotho by Bam (1982, as appears in Mwamwenda,1996, 134) it was found that pupils of different sexes have different understanding in different topics in mathematics. Mwamwenda contends that studies of Basotho children in Lesotho, showed that the performance of girls was significantly superior to that of boys on conservation of mass, and boys performed well on conservation of weight, liquid and number.

## 2.7 CLOSING REMARKS

I have devoted much of this chapter to unearthing factors that influence a gender-differentiated performance in mathematics. Researchers have found different factors that influence girls' poor performance in mathematics, it is evident that there are different social factors responsible for girls' poor performance in mathematics. The literature has shown that different factors in the learners' environment affect girls learning of mathematics negatively.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### 3.0 INTRODUCTION

In the previous chapter, the literature related to this study was reviewed, this was done with the purpose of exploring what previous researchers discovered in gender and mathematics studies, and also to find out what different scholars have said in relation to the reasons for girls' poor performance in mathematics. The data on different factors that contribute to girls' poor performance in mathematics was collected from the sample of population selected from four sample schools. This chapter intends to define the methodology that was employed in data collection. There were several activities involved in preparation for data collection and those activities are explained below.

#### 3.1 MOTIVATION FOR QUANTITATIVE METHOD

The research engaged the quantitative data analysis as it was found suitable for this study. This method allowed the researcher to interpret the collected data quantitatively in order to develop a rationale that explained how teachers and pupils view reasons behind pupils' gendered performance in mathematics.

#### 3.2 LOCATION AND POPULATION

Out of the four schools that were researched, two schools are situated in the Qachas'nek town and the other two are outside the town. The researcher selected schools located in different parameters so as to find out if the reasons behind pupils' gendered performance are similar in different areas.

#### 3.3 SUBJECTS UNDER STUDY

The population investigated comprised of thirty-two subjects, twenty-eight Std 7 pupils, and four Std 7 classroom teachers of the researched schools. This sample of participants represented a large population of Std 7 pupils in the four schools. The total number of Std 7 pupils in the four schools was 150. Out of this total number, the research sample of twenty-eight pupils was selected which was added to four teachers to make thirty-two. According to

Cohen (2000, 93) “ the sample size of thirty is held by many to be a minimum number of cases if the researcher plans to use some form of statistical data analysis.” It is with this notion that I decided the research sample of thirty-two subjects, thus, the data collected was analyzed using the statistical method, as we shall see in the following chapter.

### 3.4 POPULATION AND SAMPLING

#### 3.4.1 THE PROCEDURE FOR SELECTING THE FOUR SAMPLE SCHOOLS

The stratified random sampling was used to select the sample of schools and subjects. Through this method, 20 schools out of 101 schools were selected and from this sample (20 schools), the four schools under study were picked out. When they were being selected, the schools were categorized in relation to their pass rate in mathematics which was based on the Primary School Leaving Examination (PSLE) mathematics average percentage which is 50%. From the strata of those schools with the pass rate of 70% and above, two schools were selected and from the category of those with the pass rate below 50% the other two schools were selected through a simple random sampling. Thus, from the twenty schools the researcher ended up with four schools comprising of two schools with the pass rate of 70% and above and the other two with the pass rate of 50 % and below. Other schools with the pass rate of 70 % and above, and those with 50% and below were included in the first sample of twenty schools from which the four researched schools were selected.

#### 3.4.2 THE PROCEDURE FOR SELECTING THE POPULATION SAMPLE

The sample population of twenty-eight subjects (Std 7 pupils) was selected from the four schools by compiling a list of all Std 7 pupils in those four schools. The total population of one hundred and fifty comprised eighty girls and seventy boys. Their names were categorized into two groups based on sex. The percentages were worked out to find the exact number of boys and girls to be included in the research sample. Therefore, after calculating percentages based on the number of boys in the one hundred and fifty total, which was seventy, and that of girls, which was eighty, it was found that there were supposed to be sixteen girls and twelve boys to make the sample of twenty-eight subjects. This final sample was selected by using the simple random sampling whereby pupils' names were drawn randomly. This sampling procedure is useful in that it gives each member of the population under study a chance to be selected

without affecting the next population (Cohen, 2000, 100). The Std 7 class teachers were not sampled but they were incorporated in the research sample by the virtue of their status as teachers handling the Std 7 pupils, as such, they were also asked to respond to the questionnaires with the hope that being educators they will give the researcher the first hand information she required.

### 3.5 RESEARCH DESIGN

The study is a survey, the researcher decided to engage a survey because the nature of the study required a design that will allow a collection of information from a smaller group or subset of the population in such a way that the knowledge gained is representative of the total population. Some characteristics that make survey suitable for this study is that, it provides descriptive, inferential and explanatory information and it manipulates key factors to derive frequencies registering a particular opinion or test score (Cohen, 2000,170).

### 3.6 MOTIVATION FOR QUESTIONNAIRES

Questionnaires were used as the instrument for collecting data. Questionnaires were prepared for both pupils and teachers. One advantage of using questionnaires is that it is cheaper as it can be posted and also it can be administered without the presence of the researcher, and it is often easy and straightforward to analyze. (Cohen, 2000, 246).

Questionnaires are used to obtain facts about current conditions and practices and to make inquiries concerning attitudes and opinions. For those studies or certain phases of them presenting responses with carefully selected and ordered questions it is the only practical way to elicit the data required to confirm or disconfirm hypothesis or to collect information in the absence of a hypothesis (Lawson, 1970,33).

### 3.7 CONSTRUCTION OF THE QUESTIONNAIRE

Questionnaires are widely used in education to obtain information about current conditions and practices and to make inquiries concerning attitudes and opinions (Lawson, 1970, 85). In this study, the purpose of using the questionnaire was to explore the reasons for pupils' gendered performance in mathematics, that is, it was designed to collect information about teachers' and

pupils' opinions and attitudes. After deciding the purpose of the questionnaire, the questions were itemized or categorized into subsidiary topics that related to the purpose. Examples of such categories were; questions on teachers' expectations and attitudes, and questions concerning classroom processes. Categorizing the questions in this manner was useful for effective analysis of the responses and also in helping the researcher to collect information associated with the key questions.

Different types of questions were used so as to elicit appropriate information as possible. Using different forms of questions helped respondents to have broader scope of questions varied in construction and level of magnitude, this helped them to express their attitudes and opinions differently.

### 3.8 PRETESTING THE QUESTIONNAIRE

The questionnaires were pretested in order to check some possible mistakes such as, redundancy, misinterpretations and ambiguity. The pre-testing was also used to test the validity of the questions. One-draft questionnaire with the same content with that in the final questionnaire was pretested using a sample of twenty-eight Std 7 pupils and four Std 7 teachers from one school different from the researched schools. The pretested school is located in a different district. The participants were asked to show those questions that they did not understand very well, another way of pretesting the questions was by asking the respondents to give the meanings of each question to verify the clarity of the questions. From the results of the pretest, few alterations were made in the final questionnaires. The pretesting of the questionnaires helped in eliminating difficulties that could have been experienced in the interpretation of the results of the study if some questions were not made clearer.

### 3.9 ADMINISTERING THE QUESTIONNAIRE

The first important move towards the administration of the questionnaires was to send the covering letter from the supervisor to the principals of the researched schools. This was done with the purpose of establishing the legitimacy of the study and the integrity of the researcher. According to Tuckman (1988, 245) the covering letter constitutes an appeal from the researcher for the respondent's help. If there are special reasons why teachers should help, the

researcher should be sure to mention them. The researcher and the teacher were the main administrators of the questionnaires. The researcher delivered the questions to the schools and the principals and the Std 7 class teachers received them and provided their security. Since the questionnaires were to be answered after some time because of the final examinations that were taking place, the researcher asked the class teachers to distribute the questions to the respondents when the time arrived.

### 3.10 DATA ANALYSIS

According to Cohen (2000,147), data analysis involves organizing, accounting for and explaining the data. This is the process whereby the researcher is making sense of the data. The respondents' responses were organized and fitted in tables and charts under different headings, in doing this, the remaining patterns in responses were considered. The relationships between different themes of the data were observed, and this helped the researcher to put the responses in different categories according to their themes. The quantitative data analysis involved the use of percentages and these were presented in tables and charts.

### 4.0 CLOSING REMARKS

In this chapter, the methodology that was employed in gathering the data was described. The following components of the methodology were discussed; location and population, subjects under study, procedure for selecting the sample population and the sample schools, research design, construction of questionnaires, pretesting and administering the questionnaires and the strategy for data analysis. The following chapter will present the findings of the study.

## **CHAPTER FOUR**

### **RESULTS AND ANALYSIS**

#### 4.0 INTRODUCTION

This chapter intends to give and analyse the results of the study. By analyzing the data from thirty-two respondents I have shown different reasons that contribute to pupils' gendered performance in mathematics. The main purpose of administering the questionnaires was to capture teachers' as well as pupils' insights about reasons for pupils' gendered performance in mathematics. When analyzing the data, I looked at the similarities and differences in opinions and perceptions of the participants in relation to how they find reasons to be for pupils' gendered performance in mathematics.

The findings were quantified and some responses were not quoted directly but they were paraphrased, categorized and consolidated with the aim of putting them in short for the sake of clarity and also for minimizing the space. The reasons gathered are categorized according to different themes such as reasons related to pupils, teachers, classroom processes, teaching methodology, parents and teaching materials.

The schools were coded as Schools A, B, C, and D. The average percentages of pupils' scores in mathematics in their June test and September Mock Test and the pass rate of these schools at the Primary School Leaving Examination (PSLE) are given. Boys' and girls' percentage scores are based on 50 % which is the average percentage score for mathematics at the Primary School Leaving Examination (PSLE).

#### 4.1 ANALYSIS OF TEACHERS' RESPONSES

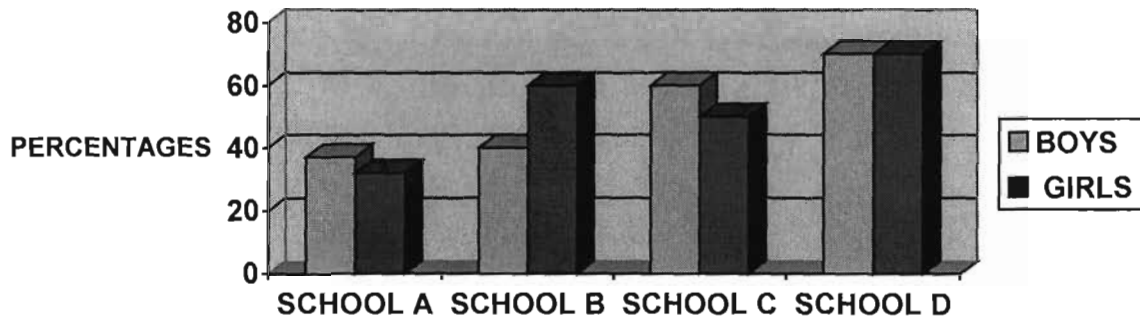
Each analysis of the responses is preceded by a question that has been quoted directly from the questionnaire.

#### 4.1.1 ASSESSMENT OF PUPILS' PERFORMANCE FOR JUNE TEST

**Question:** Tick the average percentage for boys and for girls for their June test.

**Chart 4.1**

**TEACHERS' RESPONSES ON PUPILS' AVERAGE PERCENTAGE SCORE IN MATHEMATICS FOR JUNE TEST**



The comparative examination results in chart 4.1 show that in School A boys with the average of 37% perform better than girls with the average of 32% in mathematics. However, it is observed that both boys' and girls' average percentage is far below the PSLE average percentage which is 50%. Although they both scored below 50%, boys' average exceeds that of girls. In School B, boys' average is 40% which is below the PSLE 50% average, and girls' average is 60%, which is above the PSLE 50% average, this shows that girls are doing better than boys in mathematics in this school. In School C, boys' 60% and girls' 50% indicate that boys perform better than girls in mathematics. In School D, boys and girls are far above the PSLE 50%. Their 70% average indicates that they are both doing well in mathematics. In two out of four schools, boys perform better than girls in mathematics and girls perform better than boys in one school. Both sexes perform equally in one school. Generally, boys are doing well.

**Question:** How often do boys outperform girls in quarterly tests in mathematics?

In response to the above question, two teachers (50%) indicated that boys outperform girls all the time, one teacher (25%), pointed out that boys outperform girls sometimes and one teacher (25%) also showed that boys never outperform girls. The impression we get here is that in some schools some girls perform better than boys, this means that it is not all girls who are

poor at mathematics, however, the majority of girls are not doing well in this subject. It is also observed that there are some boys who are not doing well in mathematics.

As mentioned in chapter two, according to different researchers (Gaganakis, 1999; Kelly, 1981; Fox, 1981; Smart and Jones, 1995; Flessati and Jamieson, 1991) there are various social reasons behind pupils' gendered performance in mathematics. The following section explores the reasons behind pupils' gendered performance in mathematics.

#### 4.1.2 REASONS RELATED TO PUPILS

##### **4.1.2.1. Learning opportunities**

**Question:** Do girls have same opportunities for learning mathematics like boys?

All teachers (100%) indicated that boys and girls have same opportunities for learning mathematics like boys. Considering teacher's responses, it seems that both boys and girls have same advantages that enhance their mathematics learning.

##### **4.1.2.2 Pupils' attitudes**

**Question:** If you have girls who have negative attitude towards mathematics, how can this attitude affect their performance in this subject?

Out of four teachers, 25% of them showed that girls used to have negative attitude but they have improved, 50% of teachers have showed that the negative attitude contributes to girls' poor performance in mathematics. 25% of teachers indicated that one girl did not like mathematics before just because her parents used to say that mathematics 'beats' her but now she is the best in the class because teachers convinced her that mathematics is very simple and they encouraged her to work hard in this subject. With regard to the above responses, it appears that girls' negative attitude towards mathematics results in their poor performance in this subject.

### 4.1.3 REASONS RELATED TO CLASSROOM PROCESSES

#### **4.1.3.1 Pupils' participation in mixed groups**

**Question:** Is it true that when pupils work together in their learning of mathematics they understand it better than when they learn it individually?

Four teachers (100%) showed that when pupils learn mathematics together, for example, working in mixed groups, they understand it better than when they work individually.

### 4.1.4 REASONS RELATED TO TEACHERS

#### **4.1.4.1 Attention given to pupils**

**Question:** Give one reason why both girls and boys are not attended in the same way in the mathematics classroom.

Three teachers (75%) showed that boys and girls are the same, they need the same assistance from the teacher. One teacher (25%) showed that she puts more concentration on boys to ensure that they participate since they are regularly off task. It appears that most teachers do not discriminate pupils on the basis of their sex.

#### **4.1.4.2 Teacher's expectations**

**Question:** What expectations do you have for boys and for girls in relation to their learning of mathematics?

Two teachers (50%) have positive expectations for boys' performance in mathematics, they expect boys to improve better in mathematics as their work in life challenges their mental ability. One teacher (25%) indicated that he expects girls to perform fairly in mathematics because they have low attention span, however girls are expected to work harder and perform well like boys. One teacher (25%) showed that she expects girls to continue with mathematics and she expects girls to perform well in mathematics because they know English. According to Barham and Bishop (1991), the mastery of English language enables children to understand and communicate mathematical concepts. In this study, teachers believe that girls' knowledge of English language helps them to understand mathematical instructions and formulas. Considering teachers' responses in relation to their expectations for boys and girls' learning of mathematics, it seems that teachers believe that boys are doing better in mathematics than girls and they should keep this up because their future work requires mathematical knowledge.

Some teachers are not expecting girls to do well as they believe that girls are not fit for mathematics.

#### 4. 1. 5 REASONS RELATED TO TEACHING MATERIALS

##### **4.1.5.1 Books and teaching materials that are gender biased.**

**Question:** Most of the examples in mathematics books are gender biased.

Three teachers (75%) disagreed with the above statement, one teacher (25%) was not sure whether the textbooks are gender biased or not.

**Question:** Materials used during mathematics lesson are more attractive to boys than to girls.

Three teachers (75%) do not agree that teaching materials are attractive to boys only; one teacher (25%) indicated that materials used during mathematics lessons are more attractive to boys.

#### 4.1. 6 REASONS RELATED TO PARENTS

##### **4.1.6.1 Parents' high educational level**

**Question:** Do parents' educational level influences their children's performance in mathematics?

Three teachers (75%) showed that parents' educational level influences pupils positively in studying mathematics. One teacher (25%) showed that parents' education does not influence pupils learning of mathematics.

**Question:** How does parents' educational level influence their children's performance, particularly in mathematics?

Three teachers (75%) indicated that educated parents help their children with their school work, 25% of teachers indicated that some children take after their parents.

**Question:** Are parents consulted about any remedial action to improve girls' performance in mathematics?

All teachers 100% showed that parents are never consulted about remedial actions to improve girls' performance in mathematics.

Teachers' responses reveal that pupils' success in mathematics may be attributed to parents' educational level, despite this fact, parents are not informed nor invited by teachers to help in solving girls' problems in mathematics.

## 4.2 PUPILS' RESPONSES

### 4.2.1 Pupils' ratings of their performance in mathematics

Some of pupils' responses are presented in tabular form and each table is followed by the analysis of the results that appear in the table. In the first question pupils were asked to rate themselves, the purpose of this was to see their perceptions concerning their performance in mathematics.

**Question:** How would you rate your performance in mathematics?

**Table 4. 1 Girls and boys' own rating in mathematics**

<b>RESPONSE CATEGORIES</b>	<b>FREQUENCY Girls (n =16)</b>	<b>FREQUENCY Boys (n = 12)</b>
Very good	3 (19%)	5 (42 %)
Good	9 (56%)	6 (50 %)
Fairly	4 (25%)	1 (8 %)
<b>TOTAL</b>	<b>16 (100 %)</b>	<b>12 (100%)</b>

Girls' rating in table 4.1 indicates that out of 16 girls, 3 (19%) are very good in mathematics, 9 (56%) are good and 4 (25%) do fairly in mathematics. Out of 12 boys, 5 boys (42%) are very good in mathematics, 6 (50%) are good and 1 (8 %) does fairly in mathematics. In table 4.1 more boys (5 boys) than girls (3 girls) perceive themselves as performing very well in mathematics. It is only one boy who rated himself as performing fairly, while there are four girls who rated themselves as performing fairly. These ratings suggest that more boys than girls are doing well in mathematics. The responses also show that there are girls who are still doing well in mathematics and there are boys who are not good in this subject although those performing poorly are very few in this study. The following reasons explain the performance indicated in table 4.1.

#### 4.2.2 Pupils' reasons for their good performance in mathematics

**Table 4.2 Reasons given by boys and girls for their good and very good performance in mathematics.**

CONSOLIDATED REASONS	RESPONSE FREQUENCY	
	Girls (n=12)	Boys (n=11)
They understand mathematics and they are happy when they do it.	6 (50 %)	3 (27%)
They listen very carefully when the teachers teaches.	1 (8 %)	1 (8 %)
Mathematics is an easy subject.	- -	2 (18 %)
They are dedicated to their work.	2 (16%)	- -
They have interest in mathematics.	2 (16%)	3 (27 %)
Parents give them time to study at home.	- -	2 (18%)
They do mathematics with the purpose of knowing it.	1 (8 %)	- -
<b>TOTAL</b>	<b>12 (100%)</b>	<b>11 (100%)</b>

Boys and girls gave different reasons for their good performance in mathematics, 50% of girls and 27% of boys explained that they do well in mathematics because they understand it and they become happy when they do it. This implies that their success in mathematics is determined by their positive attitude and feelings towards this subject. 8% of girls and 8% of boys showed that listening very carefully when the teacher teaches helps them to perform well in mathematics. 18% of boys indicated that they rate good and others very good because mathematics is an easy subject, none of the girls gave this as a reason, perhaps girls did not give this as a reason because most of them know that mathematics is difficult for them, as a result they have to struggle for their success. 16 % of girls have given dedication to ones' work as one reason for their good or very good performance in mathematics. Some girls showed that they perform well in mathematics because they have interest in this subject, and it is 16% of girls and 27% of boys who showed that they have interest in mathematics hence their success. It is 18 % of boys who do well in mathematics because they are given time to do mathematics at home; none of the girls mentioned this as a reason, this may suggest that girls are not given chance at home to do mathematics, 8% of girls rather stated that they do well in

mathematics because they have purpose for studying mathematics, this implies that some girls may like to pursue some careers that may require mathematical background.

Amongst four girls who perform fairly in mathematics, 2 girls, that is, 50% of the girls indicated that they do not understand the way mathematics is being taught. This reason is related to teaching methodology, thus, the teaching methods used hinder girls from understanding mathematics. None of the boys indicated the use of inappropriate teaching methods as one reason that hinders them from performing well in mathematics. One boy who does fairly in mathematics indicated that he does not have time to practice mathematics at home, 25% of girls indicated that they do not do well in mathematics because they do not understand English. 25% of girls said mathematics is difficult, that is why they do not pass it.

#### 4.3 REASONS FOR GIRLS' POOR PERFORMANCE IN MATHEMATICS AS GIVEN BY TEACHERS AND PUPILS

**Table 4.3 Reasons related to pupils as given by teachers and pupils:**

<b>CONSOLIDATED REASONS</b>	<b>Teachers (4) Frequencies</b>	<b>Girls (16) Frequencies</b>	<b>Boys (12) Frequencies</b>
Lack of effort	1 (25%)	2 (13%)	2 (17%)
Negative Attitude	1 (25%)	7 (44%)	4 (33%)
Girls are not free to participate	-	6 (38%)	-
Boys participate fully in class	-	-	100%
Girls are shy to ask questions	2 (50%)	4 (25%)	-
Boys laugh at girls when they get answers wrong	-	3 (19%)	-
Boys make noise in mixed discussion groups	-	2 (13%)	-
Girls think about boyfriends during mathematics lessons.	-	3 (19%)	3 (25%)
Girls' perception that boys know mathematics, leads them to giving up from working hard.	-	2 (13%)	2 (17%)
Girls cannot 'endure' mathematics difficulty and they have weak reasoning power.	1 (25%)	-	-

In relation to hard work and effort, 25% of teachers, 13% of girls and 17% of boys agreed that girls do not put effort in their work. It was also stated by 25% of teachers, 44% of girls and 33% of boys that girls have negative attitude towards mathematics. Teachers did not give any response in relation to girls' participation and 38% of girls showed that they are not free to participate in class, whereas 100% of boys participate freely during mathematics lessons, this shows that mathematics classroom environment is not a threat to them. Both teachers (50%) and girls (25%) mentioned that girls' shyness is one of the contributing reasons to their poor performance in mathematics, 19% of girls indicated that they are scorned by boys when they get answers wrong, this could be a reason for their shyness. Noise made by boys during discussion groups was mentioned as one reason for girls' failure to take part in some classroom activities, this was indicated by (13%) of girls.

Love affairs appeared to be another reason that prohibits girls from performing well in mathematics, boys (25%) and girls (19%) agreed that girls are disturbed by love affairs from doing well in mathematics. Girls' perception that boys know mathematics is one of the reasons that prevent girls from doing well in mathematics, 13% of boys indicated this, and 17% of girls also confirmed this claim. Teachers have no confidence in girls concerning mathematics, 25% of teachers stated that girls cannot 'endure' mathematics' difficulties and they also have weak reasoning power. Teachers do not have to show girls that they are helpless in mathematics; they should rather help girls develop a high self-esteem that will help improve their performance in mathematics. The above responses tell us that girls also contribute to their poor performance by putting less effort in their work and by having negative attitude towards mathematics.

#### 4.4 REASONS RELATED TO CLASSROOM PROCESSES

**Table 4.4 Reasons pertaining to teachers and classroom processes**

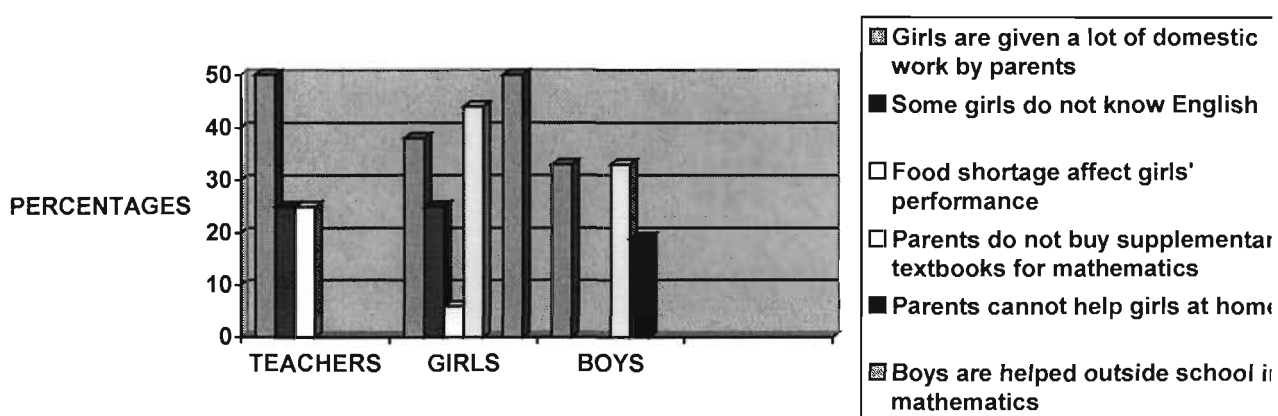
<b>CONSOLIDATED REASONS</b>	<b>Teachers (4)</b>	<b>Girls (16)</b>	<b>Boys (12)</b>
Teaching approaches that are not gender sensitive	3 (75%)	-	-
Teachers do not teach mathematics well, as a result, girls do not understand it.	-	6 (37%)	5 (42%)
Girls do not interact frequently with the teacher	2 (50%)	-	-
Boys interact frequently with the teacher	2 (50%)	-	-
Girls are not given attention but boys do	1 (25%)	3 (19%)	-
Both girls and boys are given attention	3 (75%)	13 (81%)	12(100%)
Boys are given positive feedback more than girls.	1 (25%)	-	-
Boys are helped more than girls	1 (25%)	1 (6%)	3 (25%)
Both boys and girls are given positive feedback.	3(75%)	-	-
Neither boys nor girls receive positive feedback.	2 (50%)	-	-
Boys are given more time to practice mathematics in the classroom, and to workout sums on the board than girls.	-	1 (6%)	-
Girls are never praised for good work.	-	6 (37%)	4 (33%)

Regarding classroom process and teachers' behavior, most of the answers were given by teachers, for instance 75% of teachers showed that they do not consider pupils' gender when making lesson preparations. In relation to teaching methods, 37% of girls and 42% of boys reported that they do not understand the way mathematics is taught. With regard to teacher - pupil interaction, teachers (50%) agreed that boys interact frequently with the teacher whereas girls do not. 75% of teachers indicated that girls and boys are given equal attention by the teachers, 81% of girls and 100% of boys confirmed this claim. 25% of teachers, 6% of girls

and 25% of boys agreed that only boys get help from the teacher. In relation to positive feedback, 25% of teachers admitted that only boys receive positive feedback, this confirms the idea that boys get more help from the teacher. Again, with regard to feedback, 75% of teachers affirm that girls and boys receive positive feedback and 6% of girls reported that boys are given more time to workout mathematics sums on the board. On the issue of praise for good work, it was indicated by 37% of girls and 33% of boys that girls are never praised for good work.

#### 4.5 REASONS RELATED TO PARENTS AND HOME CIRCUMSTANCES

**Chart 4.2 Reasons pertaining to parents and home circumstances**

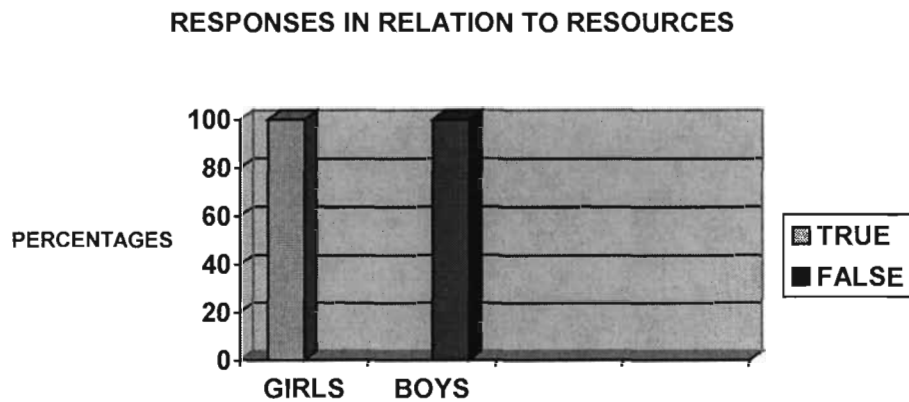


Concerning parents as contributing factors to the gendered performance in mathematics, 50% of teachers, 38% of girls and 33% of boys reported that girls are not given time for study at home, they are given more domestic work by parents. One reason given for girls' poor performance in mathematics was that some girls do not understand English, 25% of teachers and 25% of girls stated this as a reason for girls' failure in this subject. This reason contradicts the previous one where it was stated that some girls' knowledge of English language helps them to understand mathematics. Another reason given was based on shortage of food in girls' homes, 25% of teachers and 6% of girls indicated that some girls cannot learn well since they go to school without breakfast, this reason is confusing because there are some boys who may still not have little food at home but who still do well in mathematics. Nevertheless, it is observed that pupils' family socio-economic status can also affect their academic achievement.

Resources are important for learning, 44% of girls 33% of boys admitted that parents fail to buy supplementary textbooks for mathematics. In accordance with the help pupils get from home, 50% of teachers pointed out that boys are helped at home whereas girls are not. This reason is consistent with the other reason that boys have time to study at home and girls are always busy with domestic activities.

#### 4.6 REASONS RELATED TO RESOURCES

**Chart 4.3**



In chart 4.3 100% of girls and 100% of boys showed that there is no discrimination against any of the sexes in relation to the use of resources like mathematics textbooks.

#### 4.7 SOLUTIONS TO THE PROBLEMS

##### 4.7.1 Introduction

Every problem that exists needs a solution, at times when the solutions are given by people concerned with the problem, such people become more effective in putting the solutions into practice. Thus, involving all the concerned parties in decision making about the measures to be taken in order to solve the problem helps in making all of them feel the ownership of the decisions made. As a result of this, they will ensure effective implementation of strategies to counteract the problem. It was with this in mind that I asked the respondents to make suggestions towards the solutions for gendered performance in mathematics. The following section presents the suggestions as were given by pupils and teachers.

#### **4.7.2 Solutions as suggested by boys and girls**

Most of the suggestions pupils gave correspond to most of the reasons that were stated earlier. These reasons are believed to be contributing towards pupils' gendered performance in mathematics. Pupils' suggestions were as follows; 7% of pupils suggested that parents should give girls time for study at home. 4% of pupils suggested that teachers should be 'strict' and they should give girls regular tests in mathematics. 4% of pupils suggested that girls should be given extra mathematics classes, perhaps the normal periods are not enough for girls. 4% of pupils suggested that pupils should make their self- testing in mathematics as this will give them enough practice.

Most of the pupils, 46% suggested that group work should be encouraged, it was observed in the findings that pupils believe that group work is useful. 4% of pupils think that if girls could gain confidence in mathematics, they could improve their performance in mathematics. 21% of pupils feel that teachers should encourage and help girls more in mathematics. 14% of pupils suggested that love affairs should be 'stopped' as this seem to be confusing girls during the learning time. 4% of pupils suggested that girls should be praised for good work in mathematics. 7% of pupils suggested that parents should be encouraged to help their children with school work, this I believe will only work for educated parents, however uneducated parents may look for other means to help their children. 4% of pupils suggested that there should be separate classes for boys and for girls. 4% of pupils suggested that, girls should learn to seek help; they should stop being shy. It was 7% of pupils who suggested that girls should change their negative attitude towards mathematics.

#### **4.7.3 Solutions suggested by teachers**

With regard to teachers' suggestions 50% of teachers have suggested that group work should be encouraged, and 25% suggested that pupils, especially girls should work hard. 25% of teachers said parents should be encouraged to give girls time to do mathematics at home.

#### 4. 8 CLOSING REMARKS

The findings were categorized and consolidated according to different issues. The results have revealed that most of teachers' and pupils' responses contradict. This gives us the impression that between these two groups of respondents there is one group, which did not reveal the real and truthful information. However, the discussions and conclusions will be drawn on the given and available data. The following chapter intends to discuss the findings of the study.

## **CHAPTER FIVE**

### **DISCUSSION OF FINDINGS**

#### 5.0 INTRODUCTION

The findings of this study highlight the social factors associated with pupils' gendered performance in mathematics in which girls' are disadvantaged. That is, the argument that emerges from the data is that there are social and environmental factors that are responsible for girls' poor performance in mathematics. In the following section I will discuss the social reasons behind girls' poor performance in mathematics in the light of evidence drawn from literature and other research. The reasons have been categorized into different themes, these are; reasons relating to, parents, teachers, pupils and classroom processes.

#### 5.1 REASONS RELATED TO PARENTS

Although parents were not active participants in this study, teachers and pupils indicated that they also contribute to pupils' gendered performance in mathematics as we shall see in this section. Parents have great influence on the education of their children. This influence could either be positive or negative. Parents' activities at home, which have positive influence on their children, involve the provision of necessary learning materials, helping children with their schoolwork and giving them time to study at home. The outcomes of this study do not support these views because the study has shown that in most cases parents do not give girls time to study at home. According to the results of the study, parents give girls a lot of domestic work after school. This deprivation of study time puts girls at the disadvantage against their male counterparts. There is a consensus among boys that studying at home contributes to their good performance in mathematics. The study confirmed what Kelly (1981) stated when explaining that experiences such as the environment at home play the vital role in shaping children's interest in learning. Kelly (ibid) argue that early socialization called the 'cultural theory' may lead girls way from mathematics by virtue of the household chores they are asked to help with.

Apart from depriving girls of the study time at home, this investigation has found that there are parents who discourage their daughters from studying mathematics because they think that

mathematics is not suitable for females. From the study outcomes one teacher reported that one girl was told by her parents that mathematics 'beats' her and therefore she must drop it, the girl agreed with her parents. Later teachers encouraged her to carry on with mathematics. Teachers convinced her that mathematics is an easy subject and she could be good at it, she followed teachers' advice and she eventually became one of the best performers in mathematics. This incidence whereby parents discouraged their daughter to abandon mathematics, shows that socialization played an important part in the girls' behavior and attitude as Measor and Sikes (1992, 8) maintain that socialization from home environment has influence on children's behavior at school. From this socialization, they develop clear ideas about different sex roles in general to include their preferred areas of study, that is, socialization for gender differences have influence on pupils' ability and aptitudes. This means that family-learning environment makes large contributions to pupils' cognitive and affective characteristics. Families are very powerful institutions and their influence over their young members registers in every part of their lives including schooling, children who are motivated by their parents recall the parental urges and they are conditioned by their parents (Marjoribanks, 1986).

The survey established that in the researched schools parents are excluded from most of the school activities. All the teachers agreed that they never involve or consult parents for any remedial actions that could be employed so as to help girls improve their performance in mathematics. Teachers' tendency to exclude parents from school activities becomes a disadvantage because if parents are not well informed about their children's individual problems and they are not fully involved in school matters, it means that they will not know the kind of problems their daughters have. When involved, parents can provide some solutions to the problem, in particular, educated parents could be supportive and helpful to their children, as Thody and Kaabwe (2000, 95) have argued :

Parents who are educated influence their children's learning positively, girls whose parents have high level of education perform better in mathematics than those whose mothers have achieved a low level of education.

This simply proves that there is a link between pupils' educational attainment and home or parental background. Even those parents who have attained a low level of education need to be fully engaged in their daughters' educational matters. The data shows that parents do not give their daughters time to do mathematics at home since girls are expected to do different home chores as it was stated earlier. If parents are fully informed and are shown the importance of home study, even the uneducated ones could understand that it is important to give girls time to do school work at home. When the uneducated parents are approached and are well oriented towards understanding the importance of home study, they can eliminate time for home chores and provide girls with time for study. Alternatively, parents who are uneducated can make arrangements for extra classes or find private teachers for their daughters, but if they are not involved or informed it means that they will lose the opportunity to get help for their daughters. The research has corroborated the literature that maintains that parents and teachers do not meet to discuss learners' problems. There are different reasons behind lack of cooperation between parents and teachers, for instance, this might result from teachers' attitudes regarding the families of children or another reason could be characteristics related to reporting practices of the school whereby teachers lack understanding on how to involve parents in school matters (Epstein, 1986 cited in Booth and Dunn, 1996,4).

Girls have also explained that their parents do not buy them mathematics supplementary books, this means that one reason for girls' poor performance is related to the shortage of resources (mathematics textbooks). This reason is not very convincing since there are boys as well who reported that their parents do not buy them books but these boys still perform well in mathematics. This suggests that perhaps the issue of shortage of mathematics supplementary books is not one of the most influential reasons for girls' poor performance in mathematics. It is evident from the data collected that parents also contribute to girls' poor performance in mathematics. However, parents should not be taken as the main contributors toward girls' poor performance in mathematics since they are always at home or at work and they are also excluded by teachers from school matters as has been indicated above. It is important to distinguish between the competence of teachers and parents in the school. The professional didactic aspects of the school, which have immediate bearing on pupils' performance fall within the competence of the teachers, and they also fall within pupils' involvement with their

own learning. I will at this juncture illustrate how teachers contribute towards the gendered performance in mathematics.

## 5.2 REASONS RELATED TO TEACHERS AND CLASSROOM PROCESSES

Teachers are people who interact with children daily, one would therefore guess that most of the reasons behind the gendered performance in mathematics could rightly be attributed to teachers' differential treatment of boys and girls which is usually done in favor of boys as will be indicated in the following section.

### **5.2.1 Teacher- pupil interaction**

Teaching and learning are the activity that involves much interaction between teachers and pupils. Thus, interaction is the core of classroom 'business'. The interaction in the classroom requires teachers to be sensitive and avoid discriminating pupils on the basis of gender. In this study 25% of boys and 12% of girls and 25% of teachers acknowledged that teachers interact more with boys than with girls, and it was also indicated that boys receive more help from teachers than girls. It is evident that high teacher interaction with boys leads to boys' good performance in mathematics and girls' poor performance in this subject. The responses from other teachers (75%) indicated that teachers treat girls and boys equally, which means that, pupils are given equal attention and they interact equally with teachers. This is contradicting with the opinion of other respondents that, girls interact less frequently with teachers. I agree with the view that girls are not given adequate attention and they also interact less with teachers. Girls' poor performance in mathematics proves that teachers treat them differently from boys in the mathematics classroom, it appears that teachers' treatment favors boys. When girls are not given attention and help, they are less privileged to certain kinds of learning experiences that are useful in their learning of mathematics. In this way, chances are that they will remain less involved and less active during mathematics lessons and this will eventually lead to their poor performance in this subject. This is consistent with Murphy and Gipps's assertion that, "teachers' behavior and perceptions when combined with classroom organization and instruction makes a pattern of organization that favors males and that have negative influence on girls' learning" (Murphy and Gipps 1996, 74).

The outcomes of the study show that teacher's high interaction with boys imposes disadvantages on girls. Boys' domination of the mixed classroom is a well – established feature of classroom life. Boys initiate more contact with teachers and are more successful in gaining teacher's time and attention. The proponents of constructivist theory (Cobb, Wood and Yackel, 1991 cited in Marshall, 1994, 185) believe that, "children grow into the intellectual life of those around them, mathematical ideas and truths, both in use and meaning are cooperatively established through participating in communicative discourse". When teachers fail give girls attention and when they interact less frequently with girls, they deprive girls of the opportunity to participate in the communicative discourse which is effective for the learning of mathematics.

### **5.2.2 Teacher's perceptions and expectations**

Teachers' assumptions and activations about pupils on the basis of gender affect pupils' performance. Teachers themselves have different expectations for girls' behavior and achievement and these are highly influential, not only girls think that they do not have aptitude in mathematics but teachers do too. The results of the study indicated that 25% of teachers have the perception that girls are not performing well in mathematics because they have poor reasoning power and little attention span. Another 25% of teachers expect boys and not girls to perform well in mathematics because they believe that boys' work in life challenges their mental ability. This kind of perception about girls can discourage them from working harder as they may already have the feeling that they are not part of the challenging work in life that requires them to have acquired skills and knowledge in mathematics. This suggests that many girls perceive tension surrounding their academic achievement early in their school careers, perhaps enabling some of them to establishing strategies for not being obvious achievers. This idea is consisted with the observation made by Jones and Jones (1989 cited in Jones and Smart, 1995) that "teacher's perceptions and attitudes of differences and their consequent interaction with, and expectations of pupils have been shown to affect classroom interaction and pupil's self-perception. Teachers often promote gender stereotypes and perpetuate the gender divide in more subtle ways".

Teachers' perception that girls will not do any challenging work in the future like boys, may influence them not to take initiative in ensuring that girls too perform well in mathematics. This leads to girls' failure in mathematics which will in turn lead them to less challenging work in future that could possibly be of lower standard. Thus, teachers perceptions of boys' and girls' learning of mathematics plays significant role in deciding girls' and boys' different roles within the society. Boys and girls should be given equal treatment in the classroom so that they could have equal achievement and similar outcomes. At the end of schooling, there should be no differences in what girls and boys have learned in mathematics nor should there be any differences in how girls and boys feel about themselves as learners of mathematics. This suggests that there should be equity between girls' and boys' learning of mathematics. Fennema (1990 as cited in Murphy and Gipps, 1996, 139) defines three different kinds of equity in learning mathematics: equity as equal educational opportunities; equity as equal educational treatment and equity as educational outcomes. Fennema (ibid) suggests that girls' lack of mathematical learning opportunities and negative beliefs about themselves and teachers' differential treatment hampers them from achieving equity with boys.

In this study 25% of teachers have the perception that girls cannot 'endure' the difficulty in mathematics because this subject is very difficult for them. The implication here is that only boys can 'endure' mathematics' difficulty. This result strengthens the other finding in which 25% of teachers stressed that girls cannot do well in mathematics because they have a very low attention span and weak reasoning power. By declaring that boys can do well in mathematics and girls cannot, teachers show that boys have superior knowledge and ability in mathematics than girls. This validates Bourdieu's (2001) observation that teachers always discourage girls from choosing science subjects like mathematics because they perceive girls to have less stamina, by being told constantly that science (mathematics) is for boys, girls end up believing that they are weak in science subjects. With this in mind, girls may not feel obliged to put any effort in science subjects including mathematics, and in this way they cannot be expected to perform well in these subjects since they are discouraged by the masculine image which teachers attached to science subjects.

### **5.2.3. Differential praise and feedback**

With regard to feedback, Dweck, Davidson, Nelson and Enna (1978 cited in Murphy and Gipps 1996, 63) argue that the importance of feedback from teachers affect pupils' feelings of learned helplessness. They carry the argument further that, teachers tend to give a wider range of feedback to boys ranging from generous praise to sharp criticism while most of the time girls are not praised.

Feedback and praise are classroom practices that are vital for pupils' motivation towards their work. These practices should be equally distributed among boys and girls. In the schools under study, teachers were reported not to be giving boys and girls equal praise and feedback. For instance, it was declared by 25% of teachers, 33% of boys and 44% of girls that girls are not given positive verbal praise for any achievement in mathematics. Praise serves as a positive reinforcement, without it girls get discouraged from trying harder. The number of participants who indicated that girls are not given positive feedback proves that feedback is very important for encouraging pupils to do their work. When praise and other forms of positive feedback are given and removed later, people continue to show intrinsic interest in their work. If teachers could give girls verbal praise and positive feedback this could work as a motivation for them to try their level best in mathematics and hopefully improve their performance. Other teachers (75%) stated that both girls and boys are given equal positive feedback. The possible implication is that, these teachers have identical expectations for boys and girls. However, the fact that girls in their schools perform poorly in mathematics invalidates these teachers' claim that they provide girls with positive feedback like boys.

### **5.3.4 Teaching methodology and pupils' learning styles**

Literature in chapter two, suggests that the goal of achieving equivalent outcomes in mathematics education for males and females may require teachers to approach boys and girls somewhat differently because most of the effective teaching methods for boys are different from effective methods for girls (Secada, 1989,155). Teaching approaches and pupils' learning styles are at the heart of teaching- learning process because they are regarded as the vehicle through which the subject matter is transmitted from the teacher to the learner. Consequently, if pupils have grasped some points from the lesson, then it becomes obvious that learning has

taken place. Therefore, it is fundamental for teachers to select carefully the teaching approaches that will suit pupils of different sexes since boys and girls' learning styles differ. Teachers' negligence of considering appropriate teaching methods for pupils' different learning styles would mean that teaching in some cases is done perfunctorily. The research outcomes illustrate that teachers do not consider pupils' gender when making lesson preparations and when selecting teaching methods to be used. For example, 75% of teachers have shown that it is not necessary to use different teaching approaches when teaching pupils of different sexes. This means that such teachers use the same teaching methods when they teach boys and girls who have different learning styles. The whole class teaching approach eventually leads to one sex compromising its learning style and this will result in their failure to understand or follow what is happening in the class as 44% of girls stated that they fail mathematics because they do not understand the way this subject is taught. This means that because of inappropriate teaching methods that are used girls do not understand mathematics.

Noble and Bradford (2000, 130) contend that there is the relationship between boys' and girls' learning styles and teaching methods used, they further suggest that teachers need to consider pupils' learning style when they select teaching methods to be used, teaching methods need to be sex biased. Good teaching has always been about using different approaches to assist in children's learning. A good classroom in which girls might thrive is likely to be one in which learning takes place through interaction and cooperation, where activities and ideas are shared, where individuals' contributions are welcome and where creative and imaginative thinking is valued. This situation is impossible in the schools in which a study made. In these schools, 19% of girls have shown that in mixed discussion groups boys make noise and boys scorn some girls when they get sums wrong. However, not only boys are uncooperative and are noise makers who disturb others during mathematics group work because 25% of teachers, 17% of girls and 13% of boys have indicated that girls too are uncooperative, playful and are not serious about school work. This shows that girls are also responsible for disrupting learning in the mathematics classroom. This means that they also contribute to their poor performance in mathematics. Consequently, girls' disruptive behavior may be attributed to teachers' use of inappropriate teaching methods, that is, girls may play in the classroom when they do not understand the way mathematics is taught, as has been mentioned in the previous chapter.

When they fail to follow what the teacher is doing, pupils normally resort to disruptive behavior.

It should be emphasized that teachers should consider teaching approaches to be used as well as pupils' learning styles. Teachers need to remember that there are no two pupils who receive the same learning experience in the same way. For many females, mathematics language, its discourse mode, and the dynamics of the classroom are oppositional to the way females are socialized to interact and communicate. On the other hand, males are socialized towards an individualistic perspective and are more comfortable with interaction based on individual expertise and presentation and elaboration of abstract concepts (Kramarae and Treicher, 1990). Teachers need to treat pupils differently, they should systematically vary their teaching approaches to adapt the way boys and girls learn mathematics best.

Not only parents and teachers contribute to pupils' gendered performance in mathematics, but pupils are also regarded as contributing factors towards this kind of performance as shall be explained below.

### 5.3 PUPIL RELATED REASONS

#### **5.3.1 Girls' perceptions and attitudes towards mathematics**

The development of positive attitude is an important goal in any mathematical program. Unless girls develop positive attitude towards mathematics, there will be no way in which they could be successful in this subject. The results of this study showed that 25 % of teachers, 33 % of boys and 44 % of girls support the argument that girls have negative attitude towards mathematics and this is one of the main reasons that contributes to their poor performance in this subject. This outcome supports the argument raised by Campbell (1986) that girls' confidence in themselves as mathematics learners, their perception of mathematics as a difficult subject, and their view that mathematics is a male subject, all impact on their attitude, achievement and participation in mathematics classes and in advance courses.

As has been stated previously, girls themselves contribute to their poor performance in mathematics. For instance, in this study 13% of girls believe that boys are 'strong' (as they put

it) in mathematics. With this in mind, they end up losing hope that they themselves can perform well in mathematics, as a result, they give up and they end up not putting any effort in improving their performance in mathematics. This means that their confidence and self-esteem in relation to mathematics are negatively affected. What can be deduced from girls' negative attitudes and perceptions towards mathematics is that there are some social messages that they have received that mathematics is a male preserve hence their lack of motivation to excel in learning it. In this study 13% of boys and 17% of girls have reported that some girls have decided not to work hard any more in mathematics because they believe that boys know mathematics, similarly, other girls are reported not to be participating in mixed groups because they have developed hatred for boys who know mathematics. It appears that girls do not have confidence in their learning of mathematics.

### ✓ 5.3.2 Girls' limited participation and involvement with boys

The study revealed that boys hamper girls' learning of mathematics by hindering their participation in mixed discussion groups. In relation to participation during mathematics lesson, 38% of girls reported that they do not feel free to participate in the mathematics classroom because boys laugh at them, but all the boys (100%) have shown that they participate freely in the mathematics classroom. Failure to participate is one of the situations that have compelled some girls (25%) to suggest that they want to be taught in separate classes from that of boys. This generally suggests that boys' dominance becomes a hindrance to girls learning. It was mentioned in the literature review that boys tendency to oppress, demean and harass girls result in girls feeling nervous and intimidated so much that they end up not feeling free to participate in class. It was indicated that girls of all ages experience hostility in their interactions with boys and this impact on girls' self-esteem and academic achievement (Murphy and Gipps, 1996).

The study also found that girls' learning of mathematics is affected by their involvement with boys, 25% of boys and 19% of girls claimed that girls' poor performance in mathematics is enhanced by their involvement in love affairs. The question to ask here is whether boys themselves are not involved in the same love affairs, it is obvious that they are also involved but none of the respondents mentioned that boys are also involved in love affairs. Perhaps this

is because boys seem not to be affected by love affairs since they still perform well in mathematics. The literature suggests that at adolescent, boys' performance in mathematics begin to increase enormously whereas girls' performance lapses at the advent of adolescence stage. Girls' lack of interest in mathematics is the result of a number of factors, among them, a decline of self-esteem and copulation to forces of socialization that encourage them to focus on their bodies at the expense of a whole person or achievement orientation (Schwartz and Hanson, 1992).

Having discussed the reasons that contribute to the gendered performance in mathematics I will now discuss the phenomenon of 'closing the gender gap' and the suggestions that were forwarded by teachers and pupils. The suggestions could serve as initiatives for closing the gender gap between boys' and girls' performance in mathematics.

#### 5.4 CLOSING THE GENDER GAP



In this study, the main concern was to explore the reasons behind the gendered performance in mathematics as has been indicated. The purpose of this was to try to find an explanation for girls' poor performance in mathematics, in short, the researcher was trying to account for the existing gender gap in mathematics that was evident in the Qachas'nek Local Mock Tests (see appendices B and C). The gender gap is not very significant in the national Primary School Leaving Examinations (PSLE) as shown in the Syllabus Grade Analysis Report for 1999 and 2000(see Appendix A). For researchers to find the significance and insignificance of the gender gap in mathematics, they need to trace pupils' performance over several years. This will help them capture the trend and patterns of the gender gap in the primary school mathematics. It is important to establish the evidence on the changing patterns of gender performance as, the factors involved are both complex and interactive (Arnot, David and Weiner, 1999, 151).

There are various factors that influence pupils' in such a way that they change or improve their work hence contributing to the minimization of the gender gap. The phenomenon of closing the gender gap is twofold; firstly, it refers predominantly to the reduction in male advantage in mathematics and a reduction in sex-segregated classroom setting. Greater gender equality has also been achieved through a parallel reduction in differences between male and female

achievements in most subjects including mathematics. Secondly, gender gap refers to a decreased feminization of the art subjects through increased male participation in them, for example males participating in English (Arnot, et al 1999, 23). In the following section the discussed interventions will be related to the first meaning of closing the gender gap phenomenon, that is, I will state some suggestions through which teachers can help reduce the male advantages in mathematics and enhance the improvement of girls' performance in this subject.

### 5.5 SOLUTIONS AS SUGGESTED BY RESPONDENTS

The respondents were asked to contribute towards the interventions or solutions for the gendered performance in mathematics. Among the solutions they suggested, the following featured very strongly as interventions towards girls' poor performance in mathematics. Most of the respondents, 46% of pupils and 50% of teachers suggested that group work should be used as the main solution to this problem. There is an extensive literature on group work, such literature advocate the use of cooperative groups in the teaching and learning of mathematics. However, teachers need to be careful when engaging boys and girls in group work since they both come to the group work offering and expecting different things. Boys have a preference for individual work as opposed to sharing. Teaching boys to share, listen to instruction and to each other, is a prerequisite of enabling effective group membership and learning. Boys need lessons in cooperation. The study outcomes showed that boys are not corporative during mixed discussion groups, this hinders girls from learning from them and other group members. The constructivism theorists, Cobb, Wood and Yackel, (1991 cited in Marshal, 1994,185) believe that "learning is a social process and that learners must construct knowledge through their own experiences, explorations and social interactions, this suggests that opportunities for learning occur during social interaction". Marshall (1994) affirms that as "they work together, pupils engage in discourse about their mathematical activity and when they exchange ideas with one another, opportunities arose for them to explain and justify their mathematical thinking, to resolve conflicting points of view and negotiate meaning".

Collaboration and cooperation have to be embedded at the very heart of the school's philosophy and practices. They have to be located in the way that difference is addressed. By

taking a collaborative learning approach boys are placed in learning structures that demand that they share, listen and negotiate. These practices appear to produce a masculine learning identity that appears to be more relational, less boundaried, more collegial and that is able to seek and offer help. These are behaviors associated with more effective learning strategies (Daniels, Greese, Hey, Leonard and Smith, 2001, 115).

Some pupils (6%) have shown their concern about their failure to understand mathematics; they have suggested the use of different ways of teaching that they think will help them to understand mathematics. It is important for teachers to use various teaching methods that will suit all pupils. In relation to asking help from the teacher, a number of girls (19%) said they find it difficult because they are too shy to talk in class. This affects their performance in mathematics immensely. In order to assist girls, teachers should try to give adequate attention to individual students as much as possible during the mathematics lesson. This would allow girls who find it difficult to ask for help to obtain that help without discussing their difficulty in front of the class. Again, this could be achieved by professional development for teachers to emphasize the importance of giving each student as much individual attention as possible.

For professional development to be successful, school principals need to show leadership by encouraging teachers to undertake professional development on the education of gender issues. Principals would need to ensure that changes occur at classroom level.

With regard to current training of teachers, it is important to educate new teachers on gender issues while they are still at the college or university.

One of the strategies that could be useful in helping girls to perform better in mathematics is an attitude change. If parents believe that their daughters can succeed in mathematics, they will provide them with toys, for example, construction blocks and jigsaw puzzles and toy cars that promote mathematics learning readiness and will encourage them to sustain their perseverance in mathematics. If teachers understand and respect girls' learning styles, they will alter classroom discourse to accommodate girls' participation and provide a message to boys and girls that no single learning behavior is superior to another.

## 5.6 CLOSING REMARKS

The discussion of the results presented in this chapter arose from the data analysis that has suggested some areas for further investigations. The reasons that seemed responsible for pupils' gendered performance in mathematics were discussed. It has been observed that there are different social factors that are responsible for girls' poor performance in mathematics. This means that the issue of finding the reasons behind the gendered performance is more complex in the sense that not any single reason could be responsible for the gendered performance in mathematics. This therefore calls for more comprehensive interventions. Some solutions for the gendered performance in mathematics were suggested with the hope that they will help in improving girls' performance in mathematics.

## **CHAPTER SIX**

### **CONCLUSION**

#### 6.0 OVERVIEW OF THE STUDY

In Lesotho's schools, matters related to gender and schooling are still not yet being given adequate attention. This situation is therefore responsible for gender biases that prevail in the classrooms. It was with this in mind that I decided to undertake this study. The research focused mainly on poor performance of girls in mathematics and as a result, made the reasons behind this kind of performance important to this study. Again, the aim of this study was to find solutions that will help in redressing the current gender imbalance in primary schools classrooms. It is hoped that this will result in the improvement of girls' performance in mathematics.

The method for data collection mainly consisted of questionnaires. Other information related to the required statistics on national achievement grades was captured from the Syllabus Grade Analysis Report (1999, 2000) provided by the Examination Council of Lesotho. The other useful statistical information concerning pupils' average percentages in mathematics were derived from the Local Mock Tests and the other information was provided by teachers through their assessment of boys' and girls' mathematics for June Examination. The questionnaires for both teachers and pupils were categorized into different themes that were aimed at eliciting the contributing reasons related to teachers, parents, classroom processes, pupils and teaching materials.

The survey showed that in the Primary School Leaving Examinations for the years 1999 and 2000, there were more boys than girls who passed mathematics in first class (obtained 79% and above). In these two years, there were more girls than boys who failed mathematics (obtained 49% and below), however, according to the PSLE given statistics, there is not huge gender gap between boys and girls' performance in mathematics, but the fact remains that, the difference exists. In the June Test (2002) in two (50%) of the schools under study, the difference in the gendered performance was in favor of boys, and in one school; boys and girls performed equally and in the last school girls out performed boys. Pupils' performance in these schools

indicates that although girls are trying their level best, generally boys are performing better in mathematics. The analysis of the 2002 September Mock Test results have indicated that there is a gendered performance in mathematics and in this case too, boys have proved to be doing well in this subject.

The analysis of the September Mock Test, the June Test and the PSLE, invalidates the ratings that girls gave themselves because according to the results of these tests, more boys than girls passed the mathematics.

### 6.1. MAIN FINDINGS

6.1.1. From the findings it was discovered that girls do not have time to study at home and there are no remedial facilities or actions at school to help improve their poor performance in mathematics.

6.1.2. Another area of concern that was discovered through teachers responses was that, teachers believe that boys are ‘men’ and as such their work in life is full of challenges and as a result, they have to do mathematics and understand it better than girls. Some teachers have also showed that girls cannot endure the difficulty and challenges in mathematics. This shows that teachers introduce the notion of masculinity and femininity in mathematics as a subject and consequently establishing mathematics as a means of inscribing notions of patriarchy in the academic life of the pupils as early as Std 7.

6.1.3. It was discovered that parents are not consulted by teachers in matters concerning the problems girls have in the learning of mathematics. Excluding parents deprive them of the opportunity to help their children where necessary.

6.1.4. Teachers themselves admitted that they are not conscious of gender as a learning factor when they prepare mathematics lessons. As a result, girls’ learning is hampered by teachers’ lack of gender awareness, sensitivity and use of inappropriate teaching methods.

6.1.5. It was found that boys dominate the classroom situation, for instance, they make noise in mixed discussion groups, and they ridicule girls if they get sums wrong. In addition, most of the classroom practices are in favor of boys, for example, they are given positive feedback more than girls, they get more attention from teachers than girls and they also interact with teachers more frequently than girls. However, girls also contribute to their poor performance in mathematics, for instance, they do not put effort to their work.

6.1.6 One other point that worth mentioning is that, the study found that there are girls who are good at mathematics and there are boys who are also poor in this subject. This suggests that there could be other reasons that are responsible for both boys' and girls' poor performance in mathematics. Further research in this area should identify the strengths and weaknesses of each student in mathematics. Boys' and girls' performance differences in mathematics should not be evaluated along different social factors that affect individual sex, but researchers need to consider reasons or factors that affect individual pupils. That is, there is a need to differentiate between advantaged and disadvantaged pupils when undertaking research on underachievement in mathematics. This will help in providing explanations as to which boys and which girls perform well or poorly in this subject. Such explanations will counter the usual sweeping statement that 'girls are poor at mathematics and boys are good at mathematics' and it will also help teachers to focus remedy to relevant underachieving pupils. Thus, the future research should be based on the conclusion drawn by Collin (2000 cited in Tinklin, Croxford, Ducklin and Frame 2001,2) that " it is more helpful to consider the 'gender jigsaw' than the 'gender gap' because males and females are not homogeneous groups".

## 6. 2. IMPLICATIONS OF THE STUDY

Generally speaking, when looking at PSLE average percentages in mathematics, it is observed that pupils perform poorly in mathematics compared to other subjects at PSLE (See Appendix A). This implies that actually, it is not only girls who are at the disadvantage in relation to poor performance in mathematics, even boys are, although they can still do better than girls. Therefore, mathematics proves to be a nationwide problem that requires far reaching and intensive interventions.

In relation to parents, the findings of the study imply that parents are still held up by traditional beliefs that girls have to know female roles thereby engaging them in too much domestic work in preparations for womanhood hence their inability to see themselves providing conducive learning environment for girls at home.

### 6.3. LIMITATIONS AND STRENGTHS

The main limitation to this study was the use of one instrument, the questionnaires, for collecting data. The nature of questionnaires, of not permitting the researcher to probe the respondents, has led to some information left uncovered. Normally such information arises from the verbal responses that can be elicited through probing. The information is important for clarifying some issues that may not be clear when given as written responses.

The study attempted to offer some insights and awareness relating to the ways in which different classroom processes and parents as outside factors contribute to pupils' gendered performance in mathematics. This will serve as a basis for any attempted intervention for gendered performance in mathematics.

### 6.4 RECOMMENDATIONS

The following recommendations can help create an equitable environment that will encourage mathematics development of girls.

- Teachers should eliminate the gender typing of tasks and activities of allocating opportunities, resources and their attention without regard to pupils' gender.
- Teachers should formulate school-based policies on gender and schooling that will work as a guide in relation to how gender issues in schools should be dealt with.
- All stakeholders in schools should be sensitized towards gender issues and educationists should be encouraged to engage in vigorous research pertaining to gender and schooling.

- Teachers should improve their understanding on the nature of adolescent girls and how this affects their performance at school. This will help in addressing the ‘love affair’ problem that was stated as one of the reasons that lead to girls ‘ poor performance in mathematics.
- Parents should assign school and household chores to children equitably.
- Teachers should engage girls in high-level interactions, they should provide praise and positive feedback for girls’ effort and appropriate strategies in mathematics.
- Teachers should provide female role models who are articulate, successful, and happy with their work as mathematicians to encourage girls in undertaking mathematics seriously.
- Teachers should make mathematics enjoyable for girls. They should listen carefully to girls and examine existing educational materials to find opportunities to let girls have fun with mathematics. The concept of decreasing stress to increase the transmission of knowledge is vital to any shift in paradigm.
- Girls should change their negative attitude towards mathematics and towards boys who know mathematics as these further hampers their performance in mathematics.
- It has been observed that parental education, the degree of awareness of the family of the importance of girls learning of mathematics, and girls’ attitude towards mathematics can affect their learning of this subject. This calls for counseling for parents and girl pupils. Counselling will help parents understand the importance of supporting their daughters’ learning of mathematics and girls too will be encouraged and they will see mathematics as a subject suitable for them. Teachers too need to be shown the importance of treating girls as boys’ equals who deserve to be treated well so that they can improve their performance in mathematics.

- Alongside the counseling program, there should be workshops held for girls whereby they will be given extra help in mathematics, that is, there should be out of school programs that will help enhance girls performance in mathematics.

## 6. 5. CONCLUSION

This study was occasioned by poor performance of girls in mathematics. Mathematics is an important subject as it greatly affects the career options open to learners. If the Lesotho's economy is to be improved, and if Lesotho wishes to advance in terms of scientific and technological developments, the mathematics education of its learners, of both girls and boys, needs to be improved.

The search for factors or reasons that can account for sex differences in mathematics performance has covered many areas of research. In the end, few definite conclusions can be drawn. It is not possible to single out one factor as the prime cause for such differences. Instead, there seems to be a constellation of factors or reasons that influence girls' performance in mathematics in varying degrees. However, among the reasons, pedagogy and classroom interaction that are gender biased have been found to be the main factors affecting girls learning of mathematics. Pedagogy and classroom management present a hidden curriculum, which covertly affects teachers' and pupils' behaviors. These are processes and factors that are very important to girls' performance in mathematics.

Although most teachers reported no sex-bias, a great part of the outcomes of this study reported constantly more teacher contacts with boys. The survey indicated that relatively, girls' poor performance in mathematics is also linked to broader social attitudes that are powerful at adolescence. Apart from teachers and the adolescence stage, parents and pupils themselves also seem to be contributory factors to girls' poor performance in mathematics.

This study confirmed the findings of many researches that girls are performing poorly in mathematics, however it is not consistent with Bam's (1982) conclusions that there is no difference between Basotho boys and girls in mathematics. The study sought to contribute to

the improvement of mathematics education by identifying reasons that contribute towards girls' poor performance in mathematics. Depending on the nature of reasons found, I have contemplated ways of improving the current situation. However, mathematics performance is too complex to be judged on these few reasons, this suggests that other studies are required that will unearth more reasons that will be obtained from a larger population sample that will help researchers to come up with more consolidated conclusions that could be generalized

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Syllabus Grade Analysis Report- FEMALE

Current Exam: XPSL9911 PRIMARY SCHOOL LEAVING EXAM 1999

Selection Criteria:- From Syllabus  
To Syllabus ZZZZZZ

Syllabus	Absentees	Missing Grades	Grades To Follow	No. (Grade, Number, Perc. , Cum Perc) Achieving Grade	No. Of Grades	No. Passed	Mean	Std Dev.
001011 ENGLISH	769	0	0	1 2 3 F 3195 4869 6778 6740 15% 23% 31% 31% 15% 38% 69% 100%	21,582	14,842	3+	1.04
002011 SESOTHO	752	0	0	1 2 3 F 19608 1579 209 191 91% 7% 1% 1% 91% 98% 99% 100%	21,587	21,396	1-	0.42
003011 MATHEMATICS	833	0	0	1 2 3 F 2920 4909 6878 6811 14% 23% 32% 32% 14% 37% 69% 100%	21,518	14,707	3+	1.03
004011 SCIENCE	828	0	0	1 2 3 F 3456 5274 6778 6015 16% 25% 31% 28% 16% 41% 72% 100%	21,523	15,508	3+	1.04
005011 SOCIAL STUDIES	840	0	0	1 2 3 F 1641 3796 7313 8761 8% 18% 34% 41% 8% 26% 60% 100%	21,511	12,750	3-	0.94
Total Grades for all Syllabuses	4,022	0	0	1 2 3 F 30820204272795628518 29% 19% 26% 26% 29% 48% 74% 100%	107,721	79,203	3+	1.16

Syllabus Grade Analysis Report  
Current Exam: XPSL9911 PRIMARY SCHOOL LEAVING EXAM 1999

Selection Criteria:- From Syllabus  
To Syllabus ZZZZZZ

Absentees	Missing Grades	Grades To Follow	No. (Grade, Number, Perc., Cum Perc) Achieving Grade	No. Of Grades	No Passed	Mean	Std Dev.
590	0	0	1 2 3 F 2058 3345 4812 5815 13% 21% 30% 36% 13% 34% 64% 100%	16,030	10,215	3+	1.04
584	0	0	1 2 3 F 14326 1322 205 171 89% 8% 1% 1% 89% 97% 98% 99%	16,024	15,853	1-	0.46
639	0	0	1 2 3 F 2627 3685 4886 4783 16% 23% 31% 30% 16% 39% 70% 100%	15,981	11,198	3+	1.06
625	0	0	1 2 3 F 3143 4091 4766 3995 20% 26% 30% 25% 20% 46% 76% 100%	15,995	12,000	3+	1.06
636	0	0	1 2 3 F 1789 3461 5244 5490 11% 22% 33% 34% 11% 33% 66% 100%	15,984	10,494	3+	1.00
3,074	0	0	1 2 3 F 23943159041991320254 30% 20% 25% 25% 30% 50% 75% 100%	80,014	59,760	2-	1.16

Syllabus Grade Analysis Report- FEMALE  
Current Exam: XPSL0011 PRIMARY SCHOOL LEAVING EXAM 2000

Selection Criteria:- From Syllabus  
To Syllabus ZZZZZZ

Syllabus	Absentees	Missing Grades	Grades To Follow	No. (Grade, Number, Perc., Cum Perc) Achieving Grade	No. Of Grades	No Passed	Mean	Std Dev.
001011 ENGLISH	661	0	0	1 2 3 F 6464 6474 5510 2001 32% 32% 26% 10% 32% 64% 90% 100%	20,249	18,248	2-	0.98
02011 SESOTHO	668	0	0	1 2 3 F 12713 6186 1176 157 63% 31% 6% 63% 94% 100%	20,232	20,075	1-	0.64
003011 MATHEMATICS	704	0	0	1 2 3 F 2950 4096 6205 6955 15% 20% 31% 34% 15% 35% 66% 100%	20,206	13,251	3+	1.05
004011 SCIENCE	700	0	0	1 2 3 F 4078 5179 5808 5145 20% 26% 29% 25% 20% 46% 75% 100%	20,210	15,065	3+	1.07
005011 SOCIAL STUDIES	714	0	0	1 2 3 F 6203 5960 5115 2918 31% 30% 25% 14% 31% 61% 86% 100%	20,196	17,278	2-	1.04
Total Grade for all Syllabuses	3,447	0	0	1 2 3 F 32408278952361417176 32% 28% 23% 17% 32% 60% 83% 100%	101,093	83,917	2-	1.08

Syllabus Grade Analysis Report  
Current Exam: XPSL0011 PRIMARY SCHOOL LEAVING EXAM 2000

Selection Criteria:- From Syllabus  
To Syllabus ZZZZZZ

Absentees	Missing Grades	Grade To Follow	No. (Grade, Number, Perc., Cum Perc) Achieving Grade	No. Of Grades	No Passed	Mean	Std Dev.
529	0	0	1 2 3 F 4190 4322 4092 2140 28% 29% 28% 15% 28% 57% 85% 100%	14,774	12,604	2-	1.03
522	0	0	1 2 3 F 8732 4819 1001 193 59% 33% 7% 1% 59% 92% 99% 100%	14,745	14,552	2+	0.68
555	0	0	1 2 3 F 2472 2903 4444 4899 17% 20% 30% 33% 17% 37% 67% 100%	14,718	9,819	3+	1.08
555	0	0	1 2 3 F 3382 3727 4045 3564 23% 25% 27% 24% 23% 48% 75% 99%	14,718	11,154	3+	1.09
562	0	0	1 2 3 F 5633 3961 3157 1960 38% 27% 23% 13% 38% 65% 86% 99%	14,711	12,751	2-	1.06
2,723	0	0	1 2 3 F 24409197321673912756 33% 27% 23% 17% 33% 60% 83% 100%	73,636	60,880	2-	1.09

## APPENDIX B

### PUPILS' AVERAGE PERCENTAGES FOR JUNE TEST

<b>SCHOOL</b>	<b>BOYS</b>	<b>GIRLS</b>
SCHOOL A	37 %	32 %
SCHOOL B	40 %	60 %
SCHOOL C	60 %	50 %
SCHOOL D	70 %	70 %

## APPENDIX C

### STD 7 PUPILS' RESULTS FOR SEPTEMBER MOCK TEST 2002

<b>SCHOOL</b>		<b>No of Candidates</b>	<b>No of girls who failed maths</b>	<b>No of boys who failed maths</b>
SCHOOL	A	45	4	1
SCHOOL	B	25	2	6
SCHOOL	C	50	8	4
SCHOOL	D	30	5	2



The following items refer to your pupils' gendered performance in relation to mathematics.

**1. Students' related questions:**

(a) Tick the average percentage score for boys and girls in mathematics for their June Test.

**Boys 'average percentage in Mathematics**

**Girls' average percentage in Mathematics**

30 %

30%

40 %

40 %

50 %

50 %

60 %

60 %

70 % and above

70 % and above

(b) How often do boys outperform girls in quarterly tests?

All the time	Almost all the time	Some times	Not at all	They score equally

(c) Do girls have same opportunities for learning mathematics like boys?

Yes

No

( d ) If your answer is Yes, why do they perform differently in mathematics? If your answer is move to the next question.

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(e) What is the general attitude of girls in mathematics?

Positive [    ]

Negative [    ]

( f ) What is responsible for the attitude you indicated above ?

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(g) If you have girls who have negative attitude towards mathematics, how can this attitude influence their performance in mathematics?

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(h) Is it necessary to use different approaches when teaching boys and girls mathematics?

Yes [    ]

No [    ]

(i) How can teaching approaches be gendered?

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(j) When pupils (boys and girls) work together in the learning of mathematics, they learn understand it better than when they learn or work individually.

True [   ]

False [   ]

(k) Boys understand mathematics more than girls because they interact frequently with the teacher they are not shy to ask when they do not understand something whereas girls are shy to ask.

True [   ]

False [   ]

**2. Teacher related questions:**

(a) Between boys and girls which group is attended (by you as a teacher) most during mathematics lesson ?

(i) Boys [   ]

(ii) Girls [   ]

(iii) Both groups [   ]

( b ) Give one reason for your answer in (c) above. Why both girls and boys are not attended in same in the mathematics classroom.

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(c) What kind of expectations do you have for girls and for boys in mathematics?

**Expectations for boys:**

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**Expectations for girls:**

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**3. Questions related to classroom processes**

(a) When planning your lessons do you consider pupils' gender?

Yes [    ]

No [    ]

( b ) If your answer is **YES** , explain how you consider pupils gender when planning your lessons.  
If your answer is **NO** move to the next question.

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(c) Probably, which group (boys or girls) receives more positive feedback from the teacher?

Boys [    ]

Girls [    ]

**4. Reasons related to teaching materials and resources.**

( a ) Most of the examples in Mathematics books text books are gender biased .

<b>Strongly Agree</b>	<b>Agree</b>	<b>Not Sure</b>	<b>Disagree</b>	<b>Strongly Disagree</b>

(b) Materials used during mathematics lessons are more attractive to boys whereas girls don't.

Yes [    ]

No [    ]

(c) Boys have other relevant supplementary mathematics books than girls.

Yes [    ]

No [    ]

**5. Parent related questions**

(a) Does parents' education level have influence on their children's performance in mathematics?

Yes [   ]

No [   ]

(b) If your answer is **YES** show how parents' education level influence their children's learning mathematics. If your answer is **NO**, move to the next question.

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(c) Parents are consulted by teachers about any remedial action to improve girls' performance mathematics.

Yes [   ]

No [   ]

(d) (i) Parents are asked to indicate home circumstances that might affect girls negatively on their learning of mathematics.

Yes [   ]

No [   ]

(ii) State one home circumstance that you think can affect girls negatively in mathematics

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(e) Parents like their boys to study mathematics, that is, they influence boys' love for mathematics.

True [   ]

False [   ]

(f) What do you think could be done to improve girls' performance in mathematics

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**THANK YOU FOR RESPONDING TO THIS QUESTIONNAIRE.**

## APPENDIX E

### STD 7 PUPILS' QUESTIONNAIRE

**HIGHLY CONFIDENTIAL**

#### INTRODUCTION

There is a saying that boys know mathematics more than girls. In this research I attempt to find reasons or factors that contribute to this situation so that a solution to this problem could be found.

#### INSTRUCTIONS:

**-ANSWER ALL QUESTIONS BY TICKING THE CORRECT ANSWER WHERE APPROPRIATE AND WRITE SOME ANSWERS IN THE SPACES PROVIDED.**

#### Biographical Data:

(a) Are you a girl or a boy?

Girl [    ]

Boy [    ]

(b) How old are you ?

**Girls:** 11 [    ]  
12 [    ]  
13 [    ]  
14 [    ]  
15 [    ]  
16 [    ]  
17 [    ]  
Other specify [    ]

**Boys :** 11 [    ]  
12 [    ]  
13 [    ]  
14 [    ]  
15 [    ]  
16 [    ]  
17 [    ]  
Other specify [    ]

The following questions are related to your performance in mathematics.

1. (a) How would you rate your performance?

Very Good	Good	Fairly	Poorly	Very Poorly

(b) Why do you think your performance is like this? Give one reason for your performance that have shown in (a) above.

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**2. Attitude related questions:**

(a) Do you like mathematics?

Yes [   ]

No [   ]

(b) Give a reason for your answer in (a) above.

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**3. Classroom participation**

(a) Are you free to participate in mixed discussion groups of girls and boys during mathematics lesson?

Yes[   ]

No [   ]

(b) If your answer is **NO** give one reason for that answer in the spaces provided below. If your answer is **YES** move to the following question.

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**TICK ONE CORRECT ANSWER**

**4. Teacher related questions:**

(a) I don't perform well in mathematics because:

- (i) The teacher gives boys more time to work mathematics sums than girls
- (ii) The teacher helps boys in mathematics more than girls.
- (iii) The teacher does not teach mathematics well
- (iv) Girls are never praised for good work in mathematics.

(b) The teacher gives boys attention more than girls, that is, she or he listens and talks to boys more than to girls.

Yes [   ]

No [   ]

**5. Parents' related questions**

(a) I do poorly in mathematics because:

- (i) My parents do not buy me necessary mathematics books.
- (ii) My parents cannot help me in my mathematics homework
- (iii) My parents do not give me time to do mathematics at home.
- (iv) My parents are not interested in me studying mathematics.

**6. Resource related questions**

(a) Few available mathematics books are mainly used by boys and not by girls.

True [   ]

False [   ]

**7. Behavior related question**

(a) Give one reason why you think girls' behavior influence their poor performance in mathemat

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**8. Questions related to peer influence**

(a) How do your friends influence your performance in mathematics?

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(b) What do you think could be done in order to help improve girls' performance in mathematics?

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**THANK YOU FOR RESPONDING TO THIS QUESTIONNAIRE.**