

**STRATEGIES OF IMPROVING THE PERFORMANCE OF GIRLS IN
MATHEMATICS AT SECONDARY SCHOOL:**

A CASE STUDY OF SELECTED SCHOOLS IN LUSAKA DISTRICT.

BY

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**A Dissertation Submitted to the University of Zambia in
fulfillment of the requirements for the award of a Degree of
Master of Education in Management.**

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DECLARATION

I, Nicholas Mulenga, do hereby declare that this dissertation entitled; “Strategies of improving the performance of girls in Mathematics at Secondary school. A case study of selected schools in Lusaka District, Zambia is my original work, and has not been submitted to any institution before. All sources used have been thoroughly acknowledged.

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CERTIFICATE OF APPROVAL

This dissertation of Nicholas Mulenga has been approved as fulfilling the partial requirements for the award of the degree of Master of Education in Educational Management of the University of Zambia and Zimbabwe Open University.

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ABSTRACT

In Zambia it has generally accepted that good performance in mathematics has become a prerequisite for one entry into tertiary education regardless of one's sex. In a bid to find themselves places in colleges and universities, many more girls are victim of rejection because of poor grades in mathematics compared to boys. The study looks on strategies of improving the performance of girls in Mathematics at secondary school. The study adopts a Descriptive design Approach, which will employ research methods, questionnaires and interviews. The target population comprised learners, mathematics teachers, Head of Department and School managers at secondary level. Probability sampling techniques were used to select pupils and teachers from Secondary School A. The total study sample was 50. Two instruments were used for data collection in the study: the questionnaire and interviews. Qualitative data were collected and analyzed on an on-going process as themes and sub-themes that emerged through thematic analysis.

The findings showed that quality of instruction, teacher motivation, teacher qualification, learners' attitude, low parental involvement had bearing on girls' poor academic performance in mathematics. Based on the findings of the study, it was concluded that, the barriers to improving learning outcomes in Zambia are many and cut across both the demand and supply side, and interact across the school, district, provincial and national levels. The study recommended that parents should get involved in pupil's education in order to help monitor children's performance through homework as well as monitoring the time spent on social media and other vices. With regard to parental support to girls' mathematics education, the study established that many parents believe that girls were poor performers in mathematics hence they do not help them. With regard to girls' attitude towards Mathematics, the study established that most girls in selected secondary schools in Lusaka district had negative attitude towards mathematics. In order to improve teaching and learning practices secondary school, the study recommends that the school management sensitize mathematics teachers not to be gender biased in their lessons by involving both boys and girls equally in mathematics lessons. Secondary School mathematics teachers need to present to girls' scientific theories that suggest that mathematics performance is the result of experience and not genetics as well as guidance teachers 'need to work in collaboration with teachers of mathematics and the school head teacher in secondary schools must provide girls with many efficacy-building experiences in mathematics.

Key words: Performance, Strategies, Attitudes, Learning outcomes, Improved teaching

DEDICATION

This dissertation is dedicated to my wife, Francine, and our children Nicole, Tasheni, Catherine and Mwamba, for their unwavering support and encouragement during this academic journey. I also dedicate the work to my late parents, Catherine Njobvu and Dennis Mulenga who had always wanted me to excel in life.

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CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter provides an overview of a research proposal focused on improving girls' performance in Mathematics at the secondary school level. The first section discusses the background, while the subsequent section outlines the problem statement, purpose of the study, research objectives, research questions, and the significance of the study. Additionally, the chapter covers theoretical perspectives, delimitations and limitations, and operational definitions of terms.

1.1 Background

According to a report by the United States (U.S.) Department of Commerce, Economics and Statistics Administration in 2017, women held only 24 percent of STEM jobs in 2015, despite filling 47 percent of all U.S. jobs. Although there has been an increase in STEM degrees granted and STEM hiring, the shortage of female workers in STEM fields persists. One solution to address this issue is to find ways to recruit more women into STEM careers (Hyde & Gernsbacher, 2007). Recent studies on mathematics performance among school-age children indicate that the difference between boys' and girls' mathematics performance has decreased overall (Halpern Diane, 2007).

Research suggests that changes in education policies, such as the No Child Left Behind law and accountability movement, may have contributed to smaller gender gaps in mathematics (Miller, 2016). Another factor that could be responsible for the diminishing gender difference in math performance is the closing of gender gaps due to cultural shifts and social changes. Given the ever-changing nature of socio-cultural, gender, economic, and political gender parities, there is a need for more up-to-date cross-national analyses of gender differences in math achievement and mediators of these differences. Using large, valid, and respected international databases that are representative of the population could result in more generalizable findings. Furthermore, few research studies have assessed gender performance based on country classifications in terms of gender gap. Therefore, including the depth of economic and sociocultural gender disparity in a cross-national study of gender performance

can provide additional understanding of factors associated with gender performance differences (Reilly Mathew, 2012).

Children and young adolescents are typically obliged to go to school and must take part in schoolwork. Nonetheless, it is preferable that students are interested in their schoolwork, both because they are likely to experience more satisfaction in school and because they are likely to achieve better (Artelt et al, 2003). Mathematics affects all aspect of life at different levels and it is seen by society as the foundation of scientific and technological knowledge.

Gender differences in interest in schoolwork may be influenced by a societal factor, the achievement culture, which tends to drive interest in schoolwork down, in combination with a gender difference in conformity, with girls tending to conform more than boys. The outcome, would be a specific, complex pattern. In high-achievement cultures, it would be common for students to have a low level of interest in mathematic schoolwork and, due to conformity, a low level of interest would be especially common among girls. In low-achievement cultures, by contrast, it would be common for students to have a high level of interest in mathematics schoolwork and, again due to conformity, a high level of interest would be especially common among girls. Thus, high-achievement cultures would exhibit gender gaps in mathematics schoolwork interest that favor boys, while gender gaps would be reversed in low-achievement cultures.

It is a legal requirement for children and adolescents to attend school and participate in schoolwork. However, it is important that students are interested in their schoolwork to experience satisfaction and achieve better results. According to Artelt et al. (2003), mathematics is a crucial subject that affects all aspects of life and is considered as the foundation of scientific and technological knowledge. Societal factors such as the achievement culture and gender differences in conformity may influence the interest levels of students in schoolwork. In high-achievement cultures, students may have a low level of interest in mathematics schoolwork, especially among girls due to their tendency to conform more. In contrast, low-achievement cultures may have a high level of interest in mathematics schoolwork, and again, conforming girls may exhibit higher interest levels in such cultures. As a result, high-achievement cultures may have gender gaps in mathematics schoolwork interest that favor boys, while gender gaps may be reversed in low-achievement cultures.

Mathematics is an essential subject in school curriculums worldwide. It has a direct relationship with other subjects, especially sciences and technical subjects. Therefore, every student,

regardless of gender, should have equal opportunities to excel in it (Davies and Hersh 2012). Unfortunately, many girls tend to fall behind in mathematics due to their own silence and desire to please. As a result, they may not pick up on more efficient mental strategies, leading to a lowering of their confidence. In the long run, this can negatively impact a girl's future achievement, as mathematics preparation is at the core of college success. Research has shown that girls tend to perform poorly in mathematics compared to boys. This research proposal aims to investigate strategies that can help to improve girls' performance in mathematics in secondary schools.

Policy makers and educators have long been concerned with improving the teaching and learning of Mathematics. The United Nations Educational, Scientific and Cultural Organization (UNESCO) has highlighted the importance of focusing on this subject in their World Survey of Education. Despite efforts to improve the teaching of Mathematics, the performance in this subject remains poor in Lusaka province, with particular concern in the city of Lusaka where the Provincial Education Office is located. The poor performance of learners in Zambian Secondary Schools, especially in Mathematics, has been a major concern for teachers, parents, Mathematics specialists, and other stakeholders for a long time.

Table 1. 1 Examination results for the years in mathematics in the national examination

Year	2013	2014	2015	2016	2017	2018
Mean pass %	26.5	17.4	17.4	24.39	28.29	25.46

Source: Field Data, 2023

The low score of mathematics in secondary school is more likely to impact on a girl's future achievement than on a boy. On the basis of this background, this research proposal intends to investigate the strategies which can help to improve girl's performance in mathematics in secondary schools.

At grade twelve level in 2022 the percentages passing rates favors boys than girls. Those who got grading one to six, that distinctions, merits and credits in mathematics majority were boys with 48.53% and girls got 39.93%. Grading seven to eight which is satisfactory were dominated by girls with 14.52% and 12.77%. The failure percentage for girls at grade twelve in

Mathematics was 45.53% against boys who had 38.67%. The failure percentages are evidence enough that girls are not doing well in Mathematics. Hence, researching on strategies to improve girl's performance in Mathematics.

Table 1. 2. 2022 performance review report school certificate examination for grade 12

MATHEMATICS	GRADING 1 TO 6 (Distinction, Merit and Credit).		GRADING 7 TO 8 (Satisfactory)		FAIL (Unsatisfactory).	
	GIRLS	BOYS	GIRLS	BOYS	GIRLS	BOYS
	39.93%	48.53%	14.52%	12.77%	45.53%	38.67%

Source: Field Data, 2023

At grade 9 level, in 2022 males performed better than their female counterparts. The percentage of boys who got division one was 5.51% against 4.28% for girls. Boys dominated in division two category with 12.4% against girls with 10.2%. In division three category boys had 14.6% and girls had 12.7%. Girls only dominated in division four with 13.38% against boys with 13.28%. The number of failures in 2022 in terms of percentage was 45.79% for boys and 59.44% for girls. The data shows that girls have challenges in mathematics which needs to be attended to.

Table 1.3. 2022 grade nine performance of boys and girls in mathematics

Division 1		Division 2		Division 3		Division 4		Fail	
Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
5.51	4.28	12.4	10.2	14.6	12.7	13.28	13.38	45.79	59.44

Source: Field Data, 2023

1.2 Statement of the Problem

Mathematics is a key subject in the Zambian school curriculum, as it is intended to develop individuals who are able to live and integrate well in society. The subject is aimed at creating ideal citizens, promoting the development of social skills, beliefs, values, and traditions, and preparing boys and girls for the world of work. It is also seen as an important tool for gaining employment and entering into better universities and faculties.

However, despite the equal opportunity for boys and girls to gain knowledge, there are still social and cultural factors that affect their learning achievements. This has resulted in a wide gap between male and female students, with female students being underrepresented in fields such as engineering, polytechnic, and mathematics.

The Revised School Curriculum (2013) emphasizes the importance of Mathematics in promoting national unity and economic development, as well as in preparing learners for everyday problems that they may face as adults in society. However, there is a gap between the curriculum's goals and the actual pedagogical practices on the ground, which has resulted in poor performance outcomes for female learners.

Therefore, there is a need to explore strategies that can be used to improve the performance of girls in Mathematics. This can help level the playing field for both boys and girls in secondary schools, and ensure that the subject serves its intended purpose of developing holistic and mature individuals who can contribute positively to their communities.

1.3 Purpose of the Study.

The purpose of this study is to assess the strategies which can be used to improve performance of girls in Mathematics at secondary schools.

1.4 Research Objectives.

1. To explore the challenges faced by girls in learning of Mathematics in selected schools in Lusaka District of Zambia.
2. To investigate the causes to low performance of girls in Mathematics in selected schools in Lusaka District of Zambia.
3. To suggest strategies to improve girl's performance in Mathematics in selected schools in Lusaka District of Zambia.

1.5 Research Questions.

1. What are the challenges faced by girls learning of Mathematics in Selected schools in Lusaka District of Zambia?
2. What are the causes of low performance of girls in Mathematics?
3. What are the strategies to improve girl's performance in Mathematics.

1.6 Significance of the Study.

Mathematics is a vital subject for girls to pursue, as it offers them the opportunity to attain high levels of success and compete with boys in careers that were traditionally dominated by males. The hope is that this study's findings will shed light on effective strategies that can help learners excel in Mathematics and address the challenges that come with it, while also making Mathematics more relevant to the needs of schools, both for boys and girls and for society as a whole. Additionally, this study aims to contribute new knowledge to the academic world and the field of Mathematics. The outcomes are expected to provide valuable insights that the Ministry of Education can use to think about ways to enhance girls' performance in Mathematics. Furthermore, this research aims to establish a foundation for further exploration in this area.

1.7. Delimitation of the Study.

This study analyzes and propose strategies for enhancing the performance of female students in Mathematics at the secondary school level in Lusaka district. The study involves students and members of staff from 10 selected secondary schools within the district.

1.8 Limitations of the Study.

The study only focuses on public secondary schools in Lusaka district. Henceforth, the findings were only be generalized to other public schools with cautiousness. The other limitation is that some of the targeted respondents especially the members of staff were not fully disclosed or avail the required authentic information. The other probable limitation was related to the absence or rather the insufficiency of relevant literature pertaining to this study.

1.9 Theoretical Framework.

It is believed that theoretical and conceptual frame work contributes to the success of any research work. This study adopted the liberal feminist theoretical framework. Liberal feminism was thus born in Western countries from the contact of educated women with liberal ideas. Liberal feminists want to apply the philosophy of liberalism to gender equality, (Debra Satz, 2010). Liberal feminism is a form of feminist theory which focuses on women's ability to maintain their equality through their own actions and choices. Liberal feminists argue that society holds the false belief that women are by nature less intellectually and physically capable

than men: thus, it tends to discriminate against women in the academy, forum and market place, (Lorber 2010).

Liberal feminists believe that the gap between males and females in society is a consequence of the dominance of males. This dominance is reflected in the way customary and legal constraints block women's entrance to and success in the so-called "public World" (Tong, 2009). Liberal feminism is a particular approach to achieve equality both for men and women that emphasizes the power of an individual person to alter discriminatory practices against women. Liberal feminists believe that women led lives that were unfulfilling, if not stifling. Women could enjoy a family with children but needed to get involved in pursuits outside the domestic sphere as soon as possible by entering into public life. Mary Wollstone Craft (1759-1797), in her writings as "A vindication of the rights of women" commented on society's view of the women and encouraged women to use their voices in making decisions previously made for them. This can only be done by girls performing well in mathematics related subjects. Liberal feminists urge that girls be prepared to enter more advanced career fields. The National Women's Political Caucus (NWPC) founded in 1971 was dedicated to increasing women's participation in all areas of political, economic and public life. Liberal feminists advocate few reforms and interventions to reduce the gender gap. They thus call for interventions such as affirmative action or policies that can enable women to access areas they are not able to without these actions, (Hahatu Vielar, 2015)

Liberal feminism we be used because it explains the rationale educational interventions aimed at improving female learners in Mathematics. The theory we help to work as a catalyst to improve girls' performance in mathematics, because the theory is primarily concerned with equality between the sexes and believe equality is possible through hard work. Consequently, various stakeholders including the Government of Zambia through Ministry of Education have introduced Educational interventions to improve female performance in Mathematics in Secondary schools.

1.10 Conceptual Framework.

Based on the theoretical framework and literature review. The conceptual framework has been designed with the sole purpose of investigating the strategies of improving performance of girls in mathematics in secondary schools and the resultant variables are derived. With reference to the figure below, the study will endeavor to come up with strategies which can help girls to excel in mathematics the study also seeks to solutions to challenges girls. It has plausible to

academic performance without factoring the presence of various factors which influence poor performance such as negative attitude, fear of the study and inadequate teaching materials. The intervening variables is in form of academic based factor so as to assess its effects to improve girl’s performance in mathematics at secondary school level. The relationship between Independent and Dependent variables are shown in below.

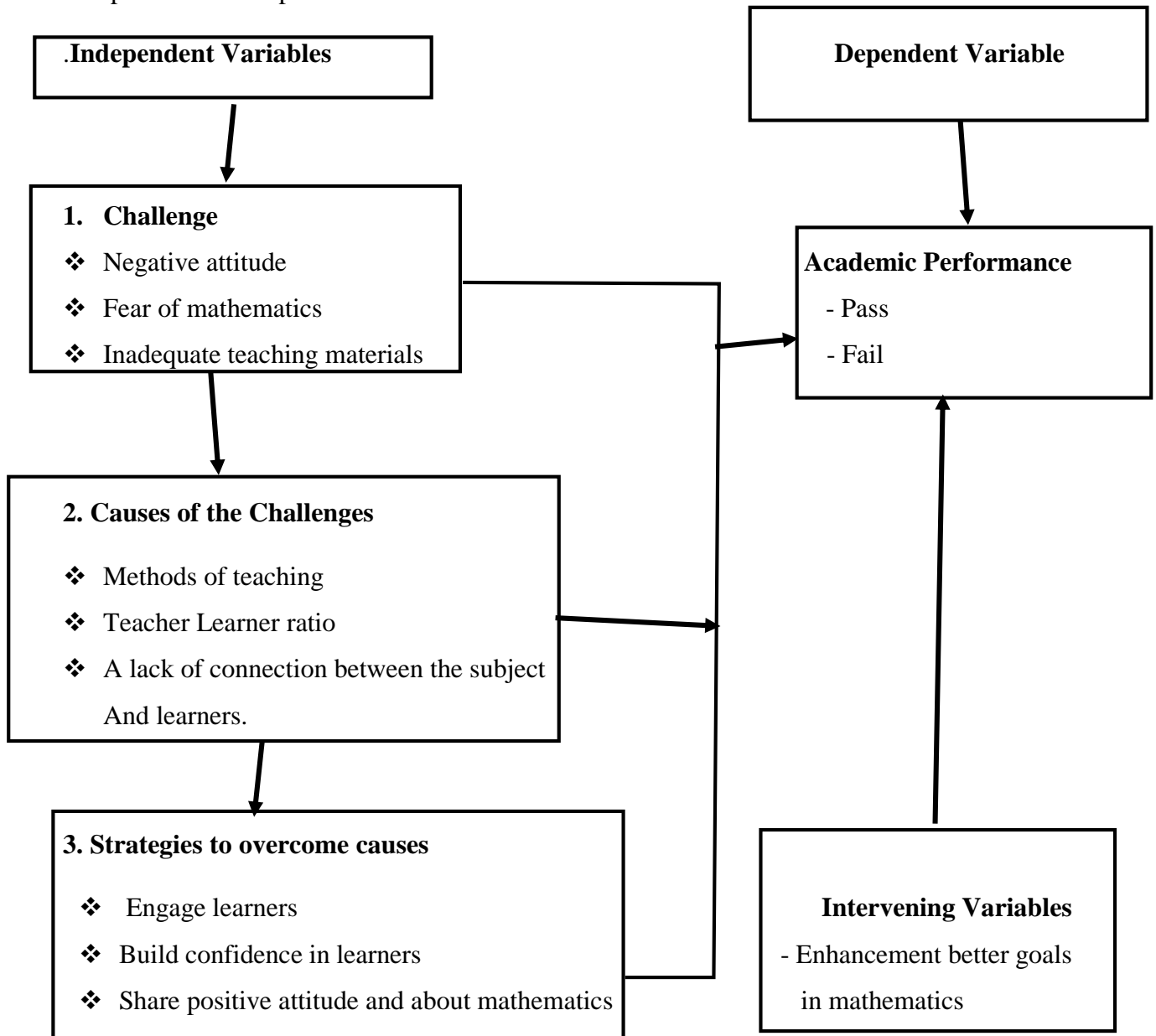


Figure 1.1: A Conceptual Framework of Strategies to improve girl’s performance in Mathematics

Source: Field Data, 2023

1.11 Operational definitions.

The terms the researcher will carry the meaning within a study, they need to be defined in a clear and agreed upon way. The process of defining concepts is essential because it allows for specific contexts to be described and explained in a manner that pertains to the study.

1. A Student is person who is actively enrolled in a Higher Educational Institution while the word pupil in Zambia is used for the learner who is either at primary or secondary school level. However, in this study, the words student and pupil are used interchangeably. This is because most of the literature from the European countries uses the word student to mean pupil.

- 1 **Attitude.** A settled way of thinking or feeling about something.
- 2 **Causes.** A person or things that gives rise to an action, phenomenon or condition.
- 3 **Effective.** The capability of producing a desired result or the ability to produce desired output. Explores. Consider an idea or topic broadly, searching out related and particularly relevant, interesting or debatable points.
- 4 **Explores.** Consider an idea or topic broadly, searching out related and particularly relevant, interesting or debatable points.
- 5 **Gender gap:** disparities across four thematic dimensions including economic participation and opportunity, educational attainment, health and survival, and political empowerment
- 6 **Identity terms:** Captures relevant math identity terms, including, identity, identities, perception, perceptions, perspective, perspectives, perceive, perceives, perceiving, attitude, attitudes, disposition, dispositions, belief, beliefs, and self-concept.
- 7 **Influence:** The capacity to have an effect on the character, development, or behavior of someone or something, or the effect itself.
10. **Mathematics:** Captures all forms of math (mathematics, Mathematical, etc.), including phrases like ‘science, technology, engineering and math’.

11. Secondary school: Grades providing the nationally prescribed complete curriculum subjects as organised for grades 8 to 12 in Zambia.

12. Stereotype. An often unfair and untrue belief that many people have about people or things with a particular characteristic.

13. Strategies. A plan for achieving something or reaching a goal, or the skill of making such plans.

14. ‘STEM’: Captures STEM intervention programmes that may not have directly indicated mathematics.

15. Outcome terms: Captures relevant achievement, engagement, participation, and persistence terms, such as, achieve, achieves, achieving, achievement, achievements, engage, engages, engaging, engagement, participate, participates, participating, participation, and persistence.

16. Performance: Level of competence in literacy, numeracy or other learning and teaching domains that indicate progress from lower to higher level. Performance is the accomplishment of a given task measured against present known standard of accuracy.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview.

In this chapter, literature related to the study will be reviewed under the following themes: Exploring challenges faced by girls in learning Mathematics in secondary schools, effective strategies for improving mathematical grades among girls, influence of teacher's attitudes on girl's performance in mathematics and solutions to the challenge's girl's face in Mathematics.

2.1 Challenges faced by girls in Learning Mathematics in Secondary schools

Gender stereotype is glaring problem. Widespread acceptance of stereotyping of mathematicians and engineers as predominantly male domain from elementary to university level is still the norm. This refers to the practices of attributing roles, behaviors, and aspirations to individuals or groups solely on the basis of gender. Discriminations based on gender stereotype surface in many ways in the school context. It may occur, for example, through teachers' samples of group placements and activity assignments, the content of compliments and criticism. Examples range from the treatment of females in textbooks and curriculum materials to differential treatment of males and females in the classroom, to mistaken beliefs about attitudes and cognitive abilities, (Saitoti, 2005).

This finding is aligned with the study conducted by Gomez-Chacon (2000) which found that the emergence of negative attitudes and behaviors towards mathematics are the factor that contribute to the failure in mathematics among girls. When learners have negative perception towards Mathematics such as perceiving mathematics as being too difficult and very confusing to learn, they will quickly lose their interests and motivation to learn the course. As a result, they cannot perform well in solving mathematics problems. Additionally, low self-regulation skills in dealing with the challenges mentioned by the students in this study is parallel with the findings of many researches which reported that many students faced difficulties in regulating their learning.

In addition, regulating learning is higher order thinking skills which is very important to be acquired during the transition from primary school to secondary school and high school life. Students form negative perceptions towards their ability in regulating their learning during the transition process, (Gilbert & Hayenga 2009).

In the aspect of teacher, the main actors indicated by learners as their challenges and Obstruction in learning mathematics are teacher behaviors, practices and characteristics. For example, students feel worried when their teachers teach too fast and have unpleasant characteristics.

As a consequence, students are afraid to ask for assistance when they are experiencing problems to understand certain lessons. The situation becomes worse when students cannot complete the homework given by the teachers. Marzita (2002) stated that strict and decisive teachers in the context of Mathematics education in Malaysia will eventually trigger the feeling of restless in mathematics among students. Pressure seems to be the common challenge faced by the students in their daily learning process for the Mathematics subject.

Specifically, the pressure may come from teacher, school or family members who place very high expectations for students to excel in Mathematics. Additionally, competitive pressure from peers and friends also contributes to students' anxiety in learning Mathematics. Therefore, all parties including students need to have a good mechanism to control and Minimize the pressure. Too much emphasis on the importance of getting excellent results in examination potentially makes the students to experience worry. However, it should be done to some extent by using the fear appeal elements. The use of fear appeal elements on student evaluation is believed can motivate the students to learn harder especially for less hardworking students. This can be done when teachers or parents executing it together with the explanation on the significance of evaluation for the students' future education and career prospect, (Putwain & Roberts, 2009).

With regard to delivery, mathematics teachers should consider alternative methods of delivery Which can boost girls' motivation to continue studying Mathematics. Teachers need to make sure that their students see the value of each Mathematical task or activity assigned to them. When the students appreciate the tasks, they will be more persistence and will be more willing to stay longer in completing the Mathematics activities (Martin, 2001), because they noticed the importance of mathematics in their life.

In addition, this is also an effective way in answering questions from students regarding the Purpose of learning particular topics in Mathematics which they feel are not useful for their future. Meanwhile, parents should put more emphasis on encouraging and motivating their children rather than setting very high expectations. Besides, teachers need to be aware of their students' individual ability in learning Mathematics. They must provide supportive learning environment to allow students to learn comfortably. Finally, the students must be trained to

develop a positive attitude and perception towards Mathematics. This is very important because their actions are influenced by their thinking. Maxwell & Evans, (2000) said that overcrowded schools are a serious problem in many school systems, where space for new construction and funding for such construction are limited. As a result, students find themselves trying to learn while jammed into spaces never intended as classrooms, such as laboratories etc.

Although research on the relationship between overcrowding and student learning has been limited, there is some evidence, particularly in high-poverty schools, that overcrowding can have an adverse impact on girls 'learning of Mathematics as chronic noise exposure hinders cognitive functioning, which is essential in the learning of mathematics (Maxwell & Evans, 2000). A study of overcrowded schools in New York City found that students, especially girls, in such schools scored significantly lower on both Mathematics and reading exams than did girls in underutilized schools. In addition, when asked, girls and teachers in overcrowded schools agreed that overcrowding negatively affected both classroom activities and instructional techniques. Jones, Howe, & Rua, (2000) found that overcrowding and heavy teacher workloads created stressful working conditions for teachers and led to higher teacher absenteeism. Crowded classroom conditions not only make it difficult for girls to concentrate in their Mathematics lessons, but inevitably limit the amount of time teachers can spend on innovative teaching methods such as cooperative learning and group work or, indeed on teaching anything beyond the barest minimum of required material. Therefore, teachers resort to concentration on the active participants who make teachers work easy.

2.2. Causes of the Challenges leading to poor performance by girls in Mathematics.

Poor performance by girls in Mathematics has been a comprehensive concern that has prompted developing countries to participate in initiatives to bring positive change in their communities (Sinyosi, 2015). Mathematics quality can bring positive change in developing countries to develop their education systems for shaping the future and prospects of young girls, to develop infrastructure, and to improve economic knowledge, culture and morality, as well as the living standards of their people (Roohi, 2012). However, Mathematics underperformance has become a perennial concern which can prevent Zambia from achieving its developmental goals and equality for all.

The factors that affect poor performance in the teaching and learning of Mathematics to girls vary from those that are teacher centered, learner centered, school centered, to family and environmental factors, among others. Studies conducted internationally have revealed that

learner-centered factors that cause poor performance in Mathematics among secondary schools include learners' misconceptions about mathematics as a difficult subject, and fear and anxiety (Olalekan 2010).

Hlalele (2012) have stated that "learners often develop Mathematical anxiety in schools, often as a result of learning from teachers who are themselves anxious about their Mathematical abilities in certain areas". In the South African context, research by Khatoon and Mahmoud (2010) indicated that learners' inferior performance in Mathematics is influenced by their negative attitudes towards the subject that emanate from societal views that it is a difficult subject. International studies by Olalekan (2010) found that, in Britain, the reasons for poor performance in Mathematics are a lack of learning support; principal teachers' dissatisfaction with the in-career training of teachers in Mathematics; and learners taught by teachers who have not participated in career professional development.

In the South African context, the research by Schanzenbach (2013.) found that educators play a significant role in learners' school performance; for example, if the educator lacks experience or passion about teaching, the learners might not be able to develop comprehensive understanding of the subject material. It is further assumed that, if the educator does not have effective classroom management skills and applies extreme authoritarianism, the classroom environment might hinder fruitful class discussions and collaborative learning from learners. It can also deter learners from applying themselves to the best of their abilities. It is therefore clear from the existing research that educators have an impact on the deficient performance in mathematics because if the teacher does not have a good subject knowledge and pedagogical content knowledge she or she might deliver incorrect content or even skip content, which could also lead to poor performance (Asikhia, 2010).

Another factor is the language of teaching and learning. Educators tend to use learners' home language during teaching and learning so that learners often fail to understand the language used in the official examination papers and consequently fail to answer correctly (Asikhia, 2010).

Forrest et al. 2019 argue the quality of teachers, influences learners in learning Mathematics. Strong evidence exists showing that teacher diligence, dedication, and adherence to basic educational policies and processes can lead to good teaching and learning. Chen, et al. (2017) further assert that issues around the maximization of contact time with learners in class, and the presence of both learners and teachers at school and in class, have a positive impact on performance.

In Zambia, the instructional time in the secondary for Mathematics is 6 hours (360 minutes) a week. Most teachers go to class later, others thirty minutes later. Some leave the class thirty minutes before time. Teachers miss one two hours a week. This means about an hour of mathematics teaching is lost per week. This is a significant amount of time lost per term and per year, which results in a chronic and systemic reduction of teaching and learning in class that affects performance in the subject.

Karue and Amukowa (2013) found that home environmental factors and family backgrounds as well as little participation of parents in the education of their children were the main causes of poor performance in mathematics in Kenya. Family-related factors also play a critical role in learners' performance. Parents who are too occupied to care about their children's performance contribute to children losing their academic focus. Poverty-stricken families were found to negatively affect their children's academic performance. Some parents were found to be abusive, which caused learners' school performance to decline dramatically. Learners who come from abusive families tend to perform badly at school (Cascio, 2013).

The literature also indicates that learners' positive attitude towards Mathematics is enhanced by teacher-related factors such as teachers' enthusiasm, teachers' resourcefulness, helpful behavior and teachers' thorough knowledge of the subject-matter and their making Mathematics interesting (Mensah et al., 2013). Lack of pedagogical knowledge in the subject has a great impact on girls' performance because the teacher who lacks knowledge is more likely not to teach the topic that he or she does not understand. Teacher-centered methods have a role in the low performance of the learners because the teachers teach learners by using a question-and-answer method without allowing learners to solve Mathematical problems with their peers and find solutions on their own.

2.3. Strategies for improving Mathematics grades among girls.

There have been many attempts to find the most effective strategies for developing a positive mathematical identity in girls. According to Anderson (2005), potentials Mathematical identity strategies promoting the retention or pursuit of STEM and math related fields. Weinberg et al, (2011). As empowered learners of Mathematics who perceived themselves as confident, capable, independent, and persistent, girls have an improved chance of participating and remaining in Mathematics Anderson (2005). However, they need to see the link between what they are learning in Mathematics and the careers they are planning Fredricks et al., (2018). Girls desired to learn how Mathematics can be applied to other fields and to everyday life

activities. Enjoyment of mathematics also played a role in women's persistence in the field, (Piatek-Jimenez, 2015). However, a survey of women majoring in math-related fields revealed that women who believed that status differences between the sexes are legitimate were more likely to endorse stereotypes about women's Mathematics abilities. This, in turn, predicted more negative self-perceptions of mathematics competence and less interest in continuing study in one's field, (Schmader et al. 2004).

A recurring theme in the development of girls' Mathematical identity should be a focus on constructivist learning techniques. Studies have examined the effects of constructivist learning programmes' Anderson (2005) where learning occurs as learners are actively involved in a process of meaning and knowledge construction as opposed to passively receiving information. Anderson (2005) discussed this in terms of agency and authorship based on girls' experiences in a feminist Mathematics class, which valued feminine voices and connected to girls' experiences. Agency is the process by which the learner acts on her own behalf to learn mathematics, and authorship refers to what and how mathematics learning is valued. Through this, girls in this study saw that they had a different relationship to Mathematics, one in which the classroom became a site of empowerment.

Anderson (2005) states that girls became more engaged in learner-centered classrooms with hands-on learning, group work, real-world applications and problem-solving activities. Collaborative environments, with cooperative group work and authentic instruction were particularly beneficial for girls' engagement, (Fredricks et al. 2018). Fun was also a factor. However, in studies involving both girls and boys, interesting differences emerged. Expectancy beliefs whether they thought they understood the content and could do well – were more strongly linked to boys' cognitive engagement in science but were a stronger predictor of girls' emotional engagement in Mathematics. In studies where self-efficacy for both improved, the gain was greater for males. In another, girls' confidences in their own skills and potential was significantly more positive than the boys' confidence in the girls (Redmond et al, 2011).

Girls relied more heavily than boys on conventional solution strategies to Mathematics problems. Combining performance accomplishment and belief-persistence had a greater effect on self-efficacy for boys than girls Cordero et al. (2010), indicating that ingrained messages for girls and women about Mathematics may need a lengthier intervention. Weinberg et al. (2011) studied the effectiveness of experiential learning at residential summer programmes and

found that interest gain, utility gain, cost value gain, attainment value gain and expectancy for success were equally successful for both sexes.

Learning environments should be created that promote active learning and teaching. Additionally, classroom discourse, small-groups and whole-group learning. Cooperative activities are useful for girls. It helps them to learn Mathematics, it may make them and girls because girls under participation and boys' over participation effect on math related careers (Watt, 2007). There might be relationship between Mathematics achievements, belief, and ability. Moreover, boys may have more confidence, and they estimate their abilities of mathematics too high. These attitudes of boys have benefits for advanced math preparation (ibid). Afghan females have more problems with Mathematics because there are lacks of professional math teachers in all schools even in capital of Afghanistan.

There is mixed evidence on the usefulness of single-sex versus mixed-sex classrooms. Whether classes are single-sex or mixed-sex have little influence on self-concept and self-efficacy found that after participating in a single-sex programme that integrated Mathematics and social science research, girls demonstrated greater confidence in their Mathematics ability. Single-sex classes were linked to negative effects for boys' and positive effects for girls' Mathematics confidence and achievement, with Brown and Ronau (2012) concluding that both girls and boys tend to fare better in the company of girls.

Study by Redmond et al (2011) showed that a mentoring relationship improved girls' Mathematics confidence Contact with same-sex experts enhanced women's self-concept and self-efficacy and boosted implicit positive attitudes toward STEM Dickens & Cornell (1993). Found that Mathematics anxiety in girls during testing was alleviated with positive modelling and verbal reinforcement.

The negative effect of stereotype threat on girls' Mathematical identity, in particular their self-perception, self-confidence, and career intentions Christy & Fox (2014). In a study of a virtual classroom with leader boards that had either female or male majority names, Christy and Fox found that a social comparison process had a stronger influence than stereotype threat. In another study, Gresky et al. (2005) found that the influence of stereotype threat can be lessened through exercises in self-concept that underscore women's many social roles and identities.

Christy and Fox (2014) found that women exposed to a female majority leader board actually performed more poorly on a subsequent Mathematics test. Another study found that highly

math-identified women scored significantly worse than highly math-identified men on a subsequent Graduate Record Examination-like Mathematics test, but when they participated in an exercise that reminded them of their many roles and identities, they scored as well as those men. Schmader et al. (2004) revealed that endorsing stereotypes can also have negative implications for women's performance on tests of their Mathematics ability by making them more susceptible to stereotype threat. More specifically, they found that making gender identity salient while taking a mathematics test led to lower test performance only among women who tended to endorse the stereotype and had no effect on women who firmly rejected the stereotype.

In her description of a feminist Mathematics class, Anderson (2005) highlights the importance of redefining power relations. Educators in the programme redefined their power and became guides in the process instead of instructors. Their role was not to impart knowledge, but to guide the girls as they took power to construct their own knowledge. Piatek-Jimenez (2015) reported that individual encouragement and recognition by parents and teachers continued to be instrumental in some girl's interest and persistence in Mathematics.

Parental support has direct motivation on learners' achievements. In US those students had better achievement that had parental support for Mathematic activities without any gender difference. Afghan parents who support their children at home the learners had better achievement than other. In particular fathers that had Islamic education their children were better in reading. Similarly, those who were shopkeeper, their children were better in arithmetic, May be those children learned Mathematics practically with their fathers in the shop. Those children whose fathers were educated had lower achievements than other because, their fathers were busy and had no time for their children, or may be those parents had no the skill of teaching the children.

2.3.1 Influence of teachers attitudes on girl's performance in Mathematics

In Albania teachers claimed that boys are more intelligent in Mathematics than girls UNESCO, (2004). There are lots of factors that affect girl's Mathematics achievement in different societies like Afghanistan. These factors can be parents' background, and parental support, cultural issues, learners' socioeconomic condition, and learners' self-confidence that may affect their future achievements in Mathematics. As well as, these factors influence on their future occupations too. Sometime school location and grades have influence on learners'

achievements too. A survey which has taken place on upper grade student in Afghanistan girls' mathematics achievements was higher than boys in some home school, (Mansory, 2000). It might be different in other formal schools. Differences in Mathematics score might have relation to differences in some school variables. Some teachers believed that girls' classrooms had different characteristic or ethos as compared to boys' classrooms. The difference might be in the role that students play in the classrooms. Mostly the teachers might prefer good relationship with learners (Halai, 2010). Educators must promote greater participation for both boys and girls. Some Pakistani teachers believe that girls have less achievement in Mathematics than boys. Teachers have ideas that boys being more active, deeply asking questions and being encouraged to learn through motivation while girls being hard working, paying attention, trying to learn not asking. These habits of girls (not asking) prevent them from improvements. If students don't ask questions it may be unclear, (Forster, 2000). Moreover, there are some efforts to be done by many didactic educators. They must know the relationship between learners and their belief about mathematics. Otherwise there is no physical or intellectual difficulty to the participation of female students in Mathematic.

In the USA, 1980 when studying of Mathematics become optional for learners, less females selected Mathematics to study than males because young women believed that math is not useful and they had not self confidence in learning Mathematics. By the way researchers started an intervention program and explained the effectiveness of math to students it impacted on female confidence. As a result, the number of girl's learners increased in Mathematics classes but the female learners had anxiety about Mathematics. In Pakistan some teachers had an idea that Allah creates male superior then women, because of that boys are better in Mathematics. They think deeply and try to find better solutions than girls (Halai, 2010).

A research which conducted in US, when teachers evaluated student's success in Mathematics, teachers had an idea that boys' success related to their ability but girls' success more related to efforts. Researchers have different findings about girls' Mathematics achievements. According to Ganley and Lubienski (2016), females are essentially excluded from the upper end of Mathematic achievement curve. It is natural from the begin if you explain something to girls they accept. So, then boys from the childhood usually ask lots of questions like what, why, how Halai, (2010). The idea is different about girls and boys because in my class girls are more active and ask more questions than boys. In society where culture associate's professions strictly with men and there is gender based stereotypical division of professions and roles

particularly those in male dominated societies, this will affect girls' and women's future career choices. Girls lowered interest in math impact on their math participation and significant impact on their workforce. These ideas stunt girls' development and progression (Watt 2007).

Women are more interested to develop capacities to be occupants of house because of that they need financial support. Learners' self-confidence Mathematics is a subject which is based on questioning when students ask questions, the problem which they have may be clear otherwise all part of the subject might be like a puzzle which makes the environment with less interest of math. Boys are naughty usually they are interested in lots of activities and lots of energy. As well as girls are self-conscious and obedient (Halai 2010). Accordingly, when girls are bashful and shy away of asking questions they think they have no ability of learning mathematics. They lose their self-confidence. Students' confidence is the way students can ask and be able to explain the issue in the classroom Forster (2000). Girls have less confidence in math ability than boys even when no gender differences are measured in mathematic (Watt, 2007). Self-confidence usually brings changes in learning achievements. There is difference in confidence level between male and female students. These differences emerge in high school and it determines the outcome of females. Sometimes self-confidence may become problematic for learners. Those students who have confidence in their ability may bring them to a situation which doesn't help them when they meet with difficulties (Dweck, 2000). Teachers' responsibility toward girls' Mathematics achievements. In some case it is teachers' responsibility to find the ways to have positive impact on female learners. At the same time, competitive activities encourage boys, but it has a negative influence on girls' Mathematics achievements.

A study of working conditions in urban schools concluded that "physical conditions have direct positive and negative effects on teacher morale, sense of personal safety, feelings of effectiveness in the classroom, and on the general learning environment." Building renovations in one district led teachers to feel "a renewed sense of hope, of commitment, a belief that the district cared about what went on that building." In dilapidated buildings in another district, the atmosphere was punctuated more by despair and frustration, with teachers reporting that leaking roofs and burned out lights, were the typical backdrop for teaching and learning. Schneider, (2002) also found that where the problems with working conditions are serious enough to impinge on the work of teachers, they result in higher absenteeism, reduced levels of effort, lower effectiveness in the classroom, low morale, and 0reduced job satisfaction and

teachers when in class, tend to concentrate on active participants who in most cases are boys. Where working conditions are good, they result in enthusiasm, high morale, cooperation, and acceptance of responsibility and help the slow learners in classes. This suggests that if teachers of mathematics are not motivated, their focus tends to be on the higher achievers or active participants who in most cases boys are hence leaving the girls which in turn bring about low morale and poor participation leading to poor performance.

There is a strong belief among some teachers that Mathematics and science subjects are a male preserve. Many teachers, including women teachers, despite much lip service to the equality of girls and boys, just do not believe that girls have the ability to study mathematics (O'Connor, 2000). Female Education in Mathematics and Science in Africa (FEMSA) studies in eight African countries namely, Burkina Faso, Kenya, Mali, Malawi, Mozambique, Senegal, Swaziland, and Zambia, O'Connor, (2000) found teachers' attitudes and approaches to factor greatly in this state of affairs across all the countries. Again, teachers generally tended to accept the situation as being out of their control and inevitable and therefore, saw nothing wrong in terms of their attitudes and instructional styles (O'Connor, 2000).

Furthermore, Female Education in Mathematics and Science in Africa (FEMSA)'s eight countries research project O'Connor, (2000) further revealed that poor expectations of girls' performance on the part of teachers leads to the kind of science and mathematics classroom dynamics, where girls are treated very differently from boys. Their studies revealed that teachers do not encourage girls during mathematics lessons, and in fact, at times, actively discourage them. Furthermore, one of the best documented findings of the past years is that teachers interact more often and in more detail with boys than with girls. This has been observed in students from preschool to college. Teachers 'expectations caused changes in girls' academic achievement in general even when accounting for the girls 'past achievement and motivation. Teachers view girls as performing more highly than boys, and as trying harder than boys. One way they do this is by directing more challenging, high order thinking questions to males, while only simple recall type of questions to females. This kind of treatment can only reinforce and confirm in the minds of both boys and girls what society and literature peddles around 'that mathematics is for boys only.' Boys therefore, over time, develop at this subject which they consider a male domain. Thus, teachers' classroom instructional and management practices are not always conducive to learning especially for girls in mathematics classes (FAWE, 2010). However, teachers view boys as having more Mathematics talent than girls (Garrahy, 2001). According to this view, girls who succeed in mathematics do so because they

compensate for their lack of Mathematics talent by working hard. Such biased views can unintentionally influence the way teachers treat pupils. Teachers may treat pupils differently based on the pupil's sex, even when they believe they are acting in a gender-blind manner towards their pupils (Garrahy, 2001; Turner, 2010); however, this is not always the case. A number of studies also have shown that boys' more interaction with teachers in class than girls tend to influence better development of mathematics concepts among male students (Clarke 2011). Also, the pattern of interaction in class tended to make boys appear more competent in Mathematics than girls. Boys greater use of verbal and non-verbal language to dominate more of the teacher's time in terms of attention and classroom control is one of the influencing factors favoring boys in class (Dweck, 2007). For example, boy's attraction to the teacher's time could be attained by boys being more mobile than girls in the classroom. Teachers ask males more questions and give them more feedback (e.g. praise, criticism, correction), and give them more valuable and specific comments (Graham, 2001).

2.3.2 Approaches to the challenge's girls face in Mathematics

The quality input related to teachers' educational level leads to differences. Mathematics courses of secondary school is advanced algebra and for this reason all high schools need at least teachers with university degree level of education. That is to say most of math subject taught by those teachers whose educational level was diploma doesn't provide the skills needed to assist students learn Mathematics. In regards to students' exam scores in relation to teachers' education level, a relationship is found between teachers' education level and students' achievements. The average score of students that taught by teachers with degrees and diploma has a big difference.

The achievement culture of a society may be an important factor behind how interested students are in Mathematics schoolwork. When comparing across countries, it is well-known that a high average level of student achievement in Mathematics and science is related to a range of negative outcomes, including more negative attitudes to mathematics and science Artelt et al (2003), For instance, on a global scale, math achievement is very low in Egypt and very high in Japan; nonetheless, a high positive affect toward mathematics was found to be very common among grade 8 students in Egypt but very uncommon in the same grade in Japan.

At the individual level, positive attitudes, good student-teacher relations, and a positive academic self-concept are generally regarded as conducive to learning. Yet, a national culture that focuses on high achievement may bring about more negative attitudes, worse student-

teacher relations, and a more negative academic self-concept. To explain this phenomenon, researchers have pointed to particularly high educational norms and standards in high-achievement countries. Many students may struggle to fully meet these high standards, even though their achievement is high on a global scale, and this could account for the surprisingly low academic self-concept in high-achievement countries. The level of interest in schoolwork could similarly be driven down by high educational norms and standards. Students who are struggling to keep up with a progressively difficult curriculum in math could lose interest in doing the schoolwork to progress to even more advanced Mathematics, instead preferring to consolidate their knowledge.

Beilock et al. (2010) conducted a study to investigate the effect of female mathematics teachers' anxiety on the mathematics achievement of first and second grade students in the United States. They found that unlike the beginning of the school year when there was no relation between the two variables, at the end of the school year, more mathematics anxious teachers were more likely to have female students (not male students) who held the stereotype that "boys are good at math and girls are good at reading." The girls in the mathematics anxious teachers' classes who endorsed this stereotype also had lower mathematics achievements than girls who did not endorse this stereotype and lower than boys overall. This set of studies targeted very young students with limited mathematics training and knowledge. Moreover, the occupational tendencies and decisions are normally made as students get closer to the end of compulsory education.

Watt (2006) found that girls' 10th grade mathematical identity (measured by expectancy beliefs, intrinsic value, and importance) directly influenced 11th and 12th grade Mathematics course participation. In 10th and 11th grade girls intending to continue taking mathematics course work had higher mathematical identity measures (confidence, attitudes, usefulness, and reflectance motivation) than girls not intending to continue.

Meanwhile, Fredricks et al. (2018) reported that girls' lower perceived enjoyment, importance, usefulness, and cost of participating in Mathematics resulted in them reporting less interest in mathematics careers or a desire to participate in Mathematics outside of school. Indeed, perceived usefulness or importance of mathematics was specifically highlighted as one of the most influential predictors for girls' persistence in Mathematics. Additionally, Whigham (1988) reported that women in introductory engineering college courses were more likely than men to have stronger attitudes towards success in Mathematics, more positive perceptions of their

teacher attitudes towards them as learners of Mathematics, and were less likely to see mathematics as a male domain.

Moreover, studies have also shown that implementing practices that support a positive Mathematical identity can lead to improved outcomes, participation, and persistence in Mathematics, (Redmond 2011). These studies suggested that numerous intervention programmers' have been developed to encourage women to pursue the field of Mathematics. Potential strategies that have succeeded to some extent in making many women feel welcome in the discipline include constructivist learning techniques that encourage hands-on, real world applications and problem solving; the use of positive same-sex mentors and role models, and reminding women of their many roles and identities to combat the negative influence of stereotype threat.

Despite these findings, the systematic review of Mathematical identity indicated several gaps in the current body of literature. First, researchers did not find a uniform measure of Mathematical identity that could help to support the fields as it seeks to improve young girl's and women's Mathematics achievement and performance. Second, researchers found no studies that examined the role of Mathematical identity in early education and very few that that looked at elementary grade. Lastly, most of the current studies reviewed employed cross-sectional or longitudinal designs which limit casual attributions and validity. Moving forward, researchers suggest that research and practitioners develop and validate a uniform measure of mathematical identity and related tools, that can recognize students at-risk for low of negative Mathematical identities, determine the root causes of said risk, and identify appropriate and effective strategies or interventions. Additionally, future studies should rigorously examine which factors of Mathematical identity (e.g. academics, motivation, societal influences, gender or racial stereotypes) are most important and which strategies and practices are most effective in promoting positive Mathematical identity in young girls and women.

In conclusion Azevedo and Cornley (2004). Failure of doing so will affect learners' motivation to learn and eventually might diminish their interest to learn. Motivation is a very important element in the learning process as it is an inducer and propeller for one to do a task successfully.

Therefore, motivation is essential for an individual to successfully face challenges in academic setting. Moreover, motivation will be used by learners as the attribution or determinant to their behavior in learning and performance. Behaviors that are related to academic motivation such

as the desire to do difficult tasks and stay longer in difficult situations will be the determinant for learners' ability in facing daily school life challenges.

2.4 Summary

According to review of literature there are many reasons for girl's poor performance in Mathematics, among them, lack of learning support, principal teachers' dissatisfaction with the in-career training of teachers in Mathematics, and learners taught by teachers who have not participated in career professional development.

Girls achievement in Mathematics can be improved when teachers of Mathematics create classrooms that include, substantial emphasis on mathematics instruction and girls 'engagement in Mathematics tasks, whole-class instruction, effective question-answer and individual practices, minimal disruptive behavior, high teacher expectations and substantial positive feedback to both boys and girls. Furthermore, girls need to learn in classes that are not overcrowded as overcrowded classes tend to make teachers concentrate on higher achievers leaving the rest unattended to.

To improve girl's performance in Mathematics motivation is the key. Motivation should be used by learners as the attribution or determinant to their behavior in learning and performance. Behaviors that are related to academic motivation such as the desire to do difficult tasks and stay longer in difficult situations will be the determinant for learners' ability in facing daily school life challenges.

From the literature a number of studies have been conducted on challenges faced by girls in mathematics at secondary level but they have not determined strategies of improving the performance of girls in mathematics at secondary school. Hence the study on the strategies of improving the performance of girls in Mathematics at Secondary school.

CHAPTER THREE.

METHODOLOGY

3.0 Overview.

The previous chapter presented literature related to this study. This chapter presents the methodology employed for this study. Methodology refers to the approaches of a thesis or proposal which describes the broad philosophical underpinning to your chosen research methods, including whether you are using qualitative or quantitative methods, or a mixture of both, and why (White, 2008). This chapter discusses the methodology of the study under the following sub-themes: research design, population, sampling procedures, instruments of data collection, data analysis and ethical considerations.

3.1 Research Design.

A descriptive design will be used because the research aimed at getting people's experiences and perceptions under the natural setting. Kombo and Tromp (2006) define descriptive design as one used when collecting information about people's attitudes, opinions, habits or any of the variety of social issues. The design will help to understand, in detail, the methods used by the teachers and learners in the teaching and learning of Mathematics as well as the benefits of Mathematics to the girls. This study will use a descriptive survey design. The design will be descriptive by nature because it will be concerned with describing, analyzing and interpreting conditions that existed. Both qualitative and quantitative approaches will be used to survey, interpret and collect information on the academic performance of girls in Mathematics. The reason the research will use both approaches is because they complement each other and qualitative approaches gives a deeper understanding to the problem.

3.2 Population.

A population is a universe of units from which a sample is selected or chosen, Babbie (2007). A population consists of individuals, elements or objects of specific group with common characteristics to which the researcher plans to generalize the results (Kombo and Tromp, 2006). The population of this study comprise of learners, Mathematics teachers, Head of Departments (HODs) and School Managers of selected secondary schools in Lusaka District.

Kombo and Tromp (2006) stated that the selection of a research site is essential. It

Influences the usefulness of the information produced. This study will be conducted in Lusaka district. Lusaka is one of the largest and populated towns in Zambia

3.3 Sample

A Sample is defined as a set of respondents selected from a larger population. Information was gathered from 10 schools in the district. The participants were both male and female pupils, Mathematics teachers and administrators. A sample is a group of subjects selected from a larger population (White, 2008). The sample for this study comprises of 50 respondents, namely 30 pupils, 15 mathematics teachers' staff and 5 Head of Departments and School Managers. The 50 participants were picked using the random number method. Using the random number method, the researcher assigned every respondent a number.

3.4 Sampling Procedures.

Sampling procedure is defined by Kasonde (2013) as a process of selecting a number of individuals or objects from a population such that the selected group contains elements representative of the characteristics found in the entire group. This study employs purposive sampling to select academic staff and key informants. In line with this, Gray (1996) states that purposive sampling allows the researcher to pick a sample which is representative of the requirement with regards to characteristics of representative samples. The researcher used convenient sampling to sample the students. Convenience sampling (also known as availability sampling) is a specific type of non-probability sampling method that relies on data collection from population members who are conveniently available to participate in study Saunders, (2012). Convenience sampling is a type of sampling where the first available primary data source was used for the research without additional requirements. In other words, this sampling method involves getting participants wherever you can find them and typically wherever is convenient. In convenience sampling no inclusion criteria identified prior to the selection of subjects. All subjects are invited to participate.

The actual data collection for this study were done during the third term of the school calendar between October and December 2023. Before subjecting respondents to the data collection procedures, informed consent was considered by explaining the aim of the research and seeking permission from all the relevant officer.

3.5 Instruments of data collection.

Research instruments refer to the tools that the researcher uses in collecting necessary data Kasonde (2013). Interview guides were used in this study to collect data from all the respondents, that is, learners, Mathematics teachers, Head of Departments and School Managers in the selected secondary schools and the key informants from the Managers of secondary schools. However, the researcher did not use the same interview guide to collect data from the aforementioned groups. The researcher used different interview guides that was administered to the respective groups (Learners, teachers, HODs and school managers). Interview guide provides questions within which the researcher is free to explore, probe, and ask questions that will to come-up strategies to improve girl's performance. This study used semi-structured interview guides because it enables the researcher to ask follow up questions to seek clarification from the respondents.

3.6 Data Analysis.

Kaonde (2013) defines qualitative data analysis as the manipulation of the collected data for the purpose of drawing conclusions that reflect on the interest and theories about ideas that initiated the study. Thematic data analysis was used to analyze data for this particular study. This was achieved by generating themes that emanate from the data collected. Braun and Clarke (2006) define thematic analysis as “a method for identifying, analyzing and reporting patterns within data.” Thematic analysis is a widely used method of analysis in qualitative research. Thematic analysis is simple to use which lends itself to use for novice researchers who are unfamiliar with more complex types of qualitative analysis. It allows for flexibility in the researchers' choice of theoretical framework. Some other methods of analysis are closely tied to specific theories, but thematic analysis can be used with any theory the researcher chooses. Through this flexibility, thematic analysis allows for rich, detailed and complex description of your data. The researcher was familiarized with the data. This phase involves reading and re-reading the data, to become immersed and intimately familiar with its content. Then, the researcher proceeds into coding. This phase involves generating succinct labels (codes) that identify important features of the data that might be relevant to answering the research question. It will involve coding the entire dataset, and after that, collating all the codes and all relevant data extracts, together for later stages of analysis. Thereafter, generating initial themes will be done. This phase involves examining the codes and collated data to identify significant broader patterns of meaning (potential themes). It then involves collating data

relevant to each candidate theme, so that the researcher can work with the data and review the viability of each candidate theme. The themes will subsequently be reviewed. This phase will involve checking the candidate themes against the dataset, to determine that they tell a convincing story of the data, and one that answers the research question. In this phase, themes will typically be refined, which sometimes will involve them being split, combined, or discarded. Defining and naming themes will then be done. This phase will involve developing a detailed analysis of each theme, working out the scope and focus of each theme, determining the 'story' of each. It will also involve deciding on an informative name for each theme. The final phase will involve weaving together the analytic narrative and data extracts and contextualizing the analysis in relation to existing literature. The data analysis will guide by and emanated from the research questions, consequently analyzed according to the concepts and themes.

Quantitative data analysis helps to make sense of information by identifying patterns, trends, and relationships between variables through mathematical calculations. With quantitative data analysis the researcher reduces risks of making the wrong decision but relying more on facts.

Quantitative data analysis ensures questions the researcher asked are close-ended questions, providing respondents selected choices to choose from instead of open-ended questions that all for free responses.

3.7 Validity and Reliability of the instruments.

Validity is defined as the extent to which a concept is accurately measured in a quantitative study. Validity explains how well the collected data covers the actual area of investigation Ghauri and Gronhaug (2005). Validity basically means "measure what is intended to be measured".

To achieve content Validity, the questionnaire and interview guide were used as the vital instruments for data collection on strategies to improve girl's performance at secondary school level in Lusaka District. The researcher ensure that these instruments have questions necessary to answer the three research questions of the study.

Furthermore, to make sure reliability of in the study which is qualitative and quantitative. The researcher makes sure that the process of sampling, data collection and analysis are done accurately. For example, a random sampling technique was used carefully to select 50 respondents. The researcher ensures that only those who are more knowledgeable about

strategies to improve girl's performance secondary school level are selected as key informants to the study.

3.8 Trustworthiness

According to Stake (2003) a good case study research follows disciplined practices of analysis and triangulation to tease out what deserves to be called experiential knowledge from what is opinion and preference. The researcher collected data questionnaires and interviews in time. Both questionnaires and interviews enable the researcher to collect data that is detailed and trustworthy enough to provide a full and revealing picture of what is going on (Maxwell, 2005). After collecting data, the researcher assures the learners, teachers and Head of Departments (HODs) and school Managers, that data collected will be used only for educational purpose to improve girl's performance in Mathematics.

3.9 Ethical and considerations.

Ethics are simply moral principles that guide our behavior and based on shared values and beliefs about what is good or bad Yin (2003). The researcher strictly observes the acceptable norms of the environment throughout the study. Respondents were not be coerced to participate in the research and were assured that the data collected will be kept confidential. On the other hand, respondents were assured that findings of the study will only be used for academic purposes. Before the actualization of data collection, the researcher seeks for approval and clearance from the University of Zambia.

3.10 Summary.

The Chapter presented the methodology was used in the study. The study uses a case study design. The population will consist of pupils, Mathematics teachers and officers and guidance teachers. A total number of 50 respondents were purposively sampled for this study. The study used interview guides that are semi-structured to collect data from respondents. Data was analyzed qualitatively by using thematic analysis.

CHAPTER FOUR

RESEARCH FINDINGS

4.0 Introduction

The previous chapter explained the methodology used for data collection and analysis in the study of improving the performance of girls in mathematics at secondary school. This chapter presents the results in accordance with the three objectives outlined at the beginning of the dissertation. The first objective was to identify the challenges faced by girls in learning mathematics. The second objective was to investigate the causes of low performance by girls in mathematics, and the third objective was to suggest strategies to improve the performance of girls in mathematics. Demographic characteristics of the participants are presented first, followed by qualitative and quantitative results presented under each theme derived from the three objectives. The qualitative results include key quotes from interviews with respondents, while the quantitative results are presented using statistical tables, frequency counts, and charts. The results are presented without any discussion.

4.1 Challenges faced by girls in learning Mathematics.

In the first phase of the study, the researcher aimed to investigate the difficulties encountered by girls in grasping Mathematics. The primary research question was centered around identifying the various challenges faced by female students in comprehending Mathematics. The collected data revealed that factors like a high Teacher-Pupil Ratio and limited parental involvement were some of the key barriers to effective learning outcomes for girls.

4.1.1 Lack of Parental Involvement.

Learners were asked if parents check their books and help them with homework. The table below shows the learners responses.

Table 4.1: Parental Involvement

	Frequency	Percentage
YES	09	30%
SOMETIMES	06	20%
NO	15	50%
TOTAL	30	100%

Source: Field Data, 2023

According to the table above, it can be seen that a majority of learners (50%) responded that their parents do not check or help them with their Mathematics work. On the other hand, 30% of the respondents reported that their parents do help them, while 20% of the learners stated that their parents neither help nor check their books. These findings suggest that the lack of parental engagement in school-related matters has a negative impact on the academic performance of girls. Without proper guidance and encouragement from their parents, learners may struggle to perform well. One school manager even commented that:

“Learners become more serious about their studies when their parents keep an eye on their academic progress. When parents are involved in their children's education, learners tend to feel more motivated and encouraged to do well. This is because parents provide the necessary guidance, materials, and support that are recommended by the teacher. They give academic guidance and support to pupils, which greatly improves their performance”.

4.1.2 Teacher-Pupil Ratio.

The study investigated the effect of teacher-pupil ratio on the workload of teachers and how it relates to the poor performance of girls in mathematics. Teachers were asked to provide information on the teacher-pupil ratio because it was observed that most girls are less likely to participate in overcrowded classes. The study found that the average teacher-pupil ratio was 1:95, which suggests that teachers are unable to manage the large number of students in their classes. As a result, most girls do not participate in class discussions, leading to poor grades in Mathematics. In response to questions about teacher-pupil ratio, one Head of Department explained that:

“Having many students in a class makes it difficult for teachers to concentrate, leading to noise and poor performance. Similarly, limited contact time between teachers and students makes it difficult to manage a large group of students. It is much easier to manage a small group of students, and student participation depends on the population”.

4.2 Causes of low performance of girls in Mathematics

4.2.1. Quality of instruction (Teaching method).

The second objective that is, to investigate the causes to low performance of girls in Mathematics. This objective was guided by the research question, what are the causes of low performance of girls in Mathematics. The bar chart below shows the responses, whether learners understand Mathematics with the teaching methods used by teachers.

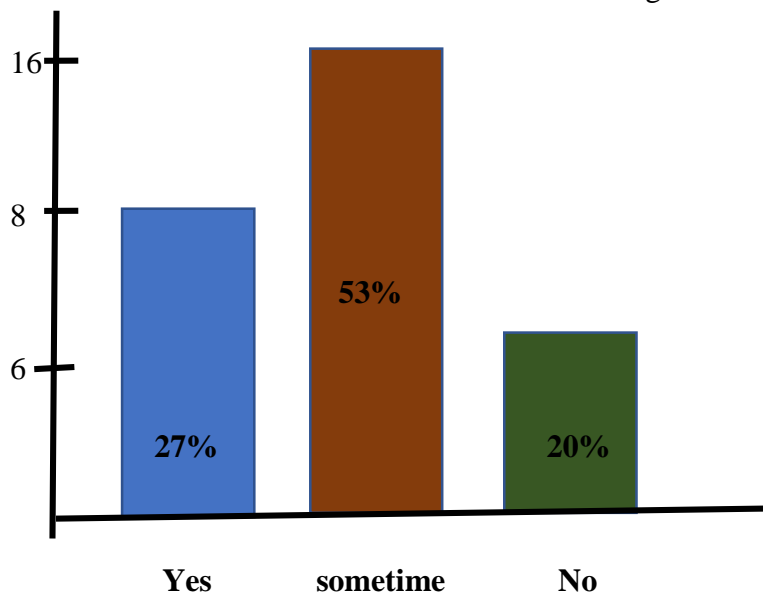


Figure 4.1: Understanding of Mathematics by Girls

Source: Field Data, 2023

The bar chart presents some interesting findings. According to the data, only 27% of learners fully understand their teachers' teaching methods, while 53% of them sometimes understand the methods being used. On the other hand, 20% of learners indicated that they do not understand their teachers' teaching methods at all. The study also found that the quality of instruction has a direct impact on the academic performance of learners in mathematics. The three key informants who were interviewed for the study emphasized that good teaching methods lead to good academic performance, while poor teaching methods result in poor

academic performance. They believe that teachers have an important role to play in ensuring that learners receive quality instructions that can help them perform well in challenging subjects such as mathematics. One administrator suggested that:

“The quality of instruction could influence learners' thinking and academic performance in a significant way. Poor instructions can lead to poor academic performance, while good instructions can result in better academic results”.

4.2.2. Girls attitude towards Mathematics.

Another factor that was prominent among the teacher respondents regarding low performance of girls in Mathematics is the attitude of the towards the subject.

Table 4.2: Girls’ attitudes towards Mathematics

	Frequency	Percentage
Challenges in mathematics	12	40%
Sometimes difficult	09	30%
Mathematics is not difficult	9	30%
TOTAL	30	100%

Source: Field Data, 2023

Several teachers have pointed out that girls' attitudes towards mathematics greatly affect their academic performance in the subject. One teacher mentioned that most girls lack the enthusiasm to learn mathematics, which negatively impacts their performance. One teacher shared a similar view, stating that:

“Learners who have a negative attitude towards mathematics tend to perform poorly, which is often due to a lack of interest in the subject”.

A school manager also expressed the same concern, stating that:

“Poor attitude by girls towards mathematics could lead to failure in the subject, which could be a result of their unwillingness to attend and participate in class lessons”.

However, the sentiments of the school above were in line with one HOD who pointed that:

“Learners could learn mathematics, and it is a subject suitable for all learners. Although dealing with numbers may come naturally to some, it is the negative attitude towards the subject that prevents some girls from performing well”.

From the questionnaire, twelve girls indicated that they found mathematics to be a difficult subject for them, while nine girls felt that it was difficult only sometimes, and nine others did not find it difficult at all.

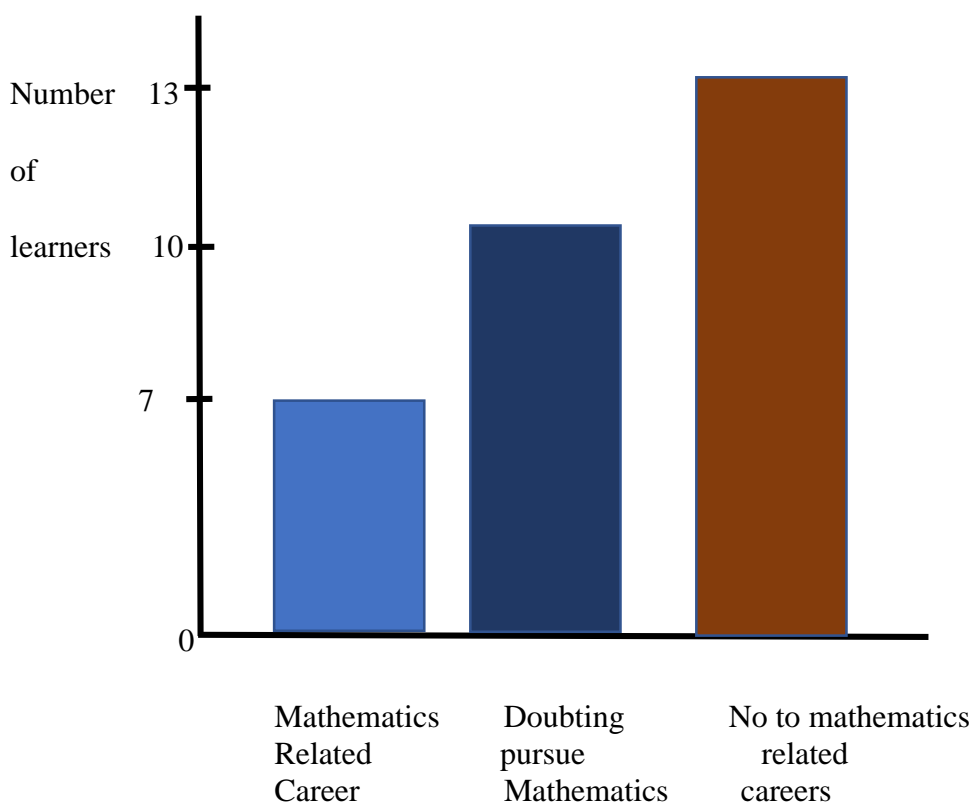


Figure 4.2: Interest of Girls in Mathematics

Source: Field Data, 2023

Seven girls had interest of pursuing mathematics career. Ten girls said that they maybe to, pursue Mathematics related careers and the 13 said no, to pursue Mathematics related careers.

4.2.3 Low teacher qualification.

The researcher sought to investigative teachers’ qualification, as one of the factors which has been stated to influence girl’s performance in Mathematics.

According to the research results, 40% of the teacher respondents reported having degrees, while 60% had diplomas. It was also observed that the knowledge base of teachers increased with higher academic qualifications. A well-qualified teacher plays a crucial role in the education system, as face-to-face interactions with humans cannot be replaced by technology. One HOD stated that:

“Well-qualified teachers are important as they can offer a variety of different techniques and methods for learners to learn. They may use hands-on teaching, allowing learners to interact with what they are learning, or have them explain it back in their own words”.

The manager from one of the schools noted that:

“Well-qualified teachers make learning fun and exciting for students as they have been trained to use effective teaching methods. These teachers also can connect with their students on a personal level, which helps to develop self-esteem and personal confidence in learning and solving mathematical problems”.

4.3. Strategies to improve girl’s performance

4.3.1 Teacher Motivation

The research question guiding the third objective was "What are the strategies to improve girl's performance in Mathematics?", which aimed to suggest ways to enhance girls' performance in the subject. The respondents, including the Head of Departments, emphasized the need for teacher motivation to achieve this goal. The findings showed that teacher motivation plays a crucial role in girls' performance in Mathematics. During the interview, one of the respondents stated that:

“Good management relationship and a healthy work culture among teachers can enhance learner performance. Conversely, de-motivated teachers may not deliver as expected in the classroom”.

This view was echoed by the HOD who believed that:

“Schools should motivate teachers improve girl’s good learner performance. Providing an enabling environment, administering support, and

commitment to providing learning materials are also vital in enhancing learner performance”.

One comment in response to the issue of girls' poor performance in mathematics for HOD suggests that:

“The only obstacle preventing them from excelling in the subject is their mindset. According to this viewpoint, girls tend to think of mathematics as a difficult subject that is only for boys. However, if they were to change their perspective and approach mathematics as a game, they would find it enjoyable and even come to love the subject. To achieve this, girls need to be motivated and encouraged to view mathematics as a subject for both genders. Teachers can also help by creating a classroom environment that enables both boys and girls to compete fairly. Overall, this position emphasizes the importance of changing attitudes towards mathematics to help girls succeed in the subject”.

The aspect was also covered by the study and according to the research findings different views as per key informants were revealed regarding relationship between motivation and performance of mathematics teachers.

Table 4.3: Relationship between motivation and performance of Mathematics teachers.

Responses	Frequency	Valid Percentage	Cumulative percent
YES	19	95%	95%
NO	1	5%	5%
TOTAL	20	100%	

Source: Field Data, 2023

Based on the information you provided, the researcher performs a chi-square test to determine whether there is a significant relationship between the two categorical variables: “teacher’s opinion on whether motivation contributes to learners’ performance” and “number of teachers who hold that opinion”.

Table 4.5: Chi – Square of motivation against performance

OPINION	NUMBER OF TEACHERS	EXPECTED FREQUENCY
YES	19	18.95
NO	1	1.05

Source: Field Data, 2023

The chi-square statistic can be calculated using the formula:

$$\text{Chi-square} = \sum ((\text{observed frequency} - \text{expected frequency})^2 / \text{expected frequency})$$

Using this formula, the researcher gets a chi-square value of 0.95. The degrees of freedom for this test is 1.

Using a chi-square distribution table with a significance level of 0.05 and 1 degree of freedom, the researcher found that the critical value is 3.84. Since the calculated chi-square value of 0.95 is less than the critical value of 3.84, the researcher fails to reject the null hypothesis. Therefore, the researcher concludes that there is no significant relationship between the two categorical variables at a significance level of 0.05. Basing on the findings from most of the key informants, this led to the conclusion that there is a relationship between motivation and performance of mathematics teachers.

4.3.2 Parental support to girls' Mathematics education

The study found that only 30% of learners receive parental support with mathematics homework and projects. This lack of support for girls in particular highlights the need for holistic parental support, which can be difficult for girls who already have a lot of work to do. Although many girls are capable of doing well in mathematics, they often lack motivation and support from their parents. The study showed that parents are not encouraging their daughters to take mathematics seriously by not helping them or providing guidance. Additionally, the questionnaire responses from girls revealed that they do more household chores than boys who are day-scholars.

4.3.3. Individual attention given to Learners

Most teachers suggest that individual attention is important in the classroom because it helps learners grow and achieve their fullest potential, but the time and number learners does not all. Another key informant suggested individual attention, enables educators to spot talent among the girls and give them their due credit. Suitable encouragement and attention from teachers can go a long way in allowing the learners to shine.

One key informant suggested that:

“Individual attention in teaching girl’s mathematics helps foster a healthy classroom environment by making the learners feel seen and heard. Teachers should per attention to girls when teaching mathematics because it keeps learning learner-paced and enhances focus among learners by teachers”.

The suggestions by the aforementioned HOD were also agreed the school manager, who said:

“individual attention is crucial in teaching mathematics as it helps teachers identify gaps in learners’ understanding and provide them with the necessary guidance to nurture their skills. By paying individual attention, teachers can create a good bond between girls and themselves, which can lead to improved academic performance, increased motivation and engagement, enhanced self-esteem, and improved social and emotional well-being”.

4.3.4. Teachers views on Strategies to improve girls’ grades.

According to some teachers, one of the most effective strategies to improve girls' grades is to provide them with a supportive and inclusive learning environment. This includes creating a classroom culture where girls feel comfortable and confident to participate, ask questions, and share their opinions. Additionally, teachers can focus on building girls' self-esteem and promoting a growth mindset, which can help girls approach challenges with a positive attitude and persevere through difficult tasks. One HOD suggested:

“The strategy of providing girls with targeted support and resources. This can include offering extra one-on-one help, providing additional practice materials, and tailoring instruction to meet their individual learning needs.

Teachers can also work to identify and address any biases or stereotypes that may be impacting girls' performance in the classroom”.

Some teachers suggest that it is important to involve parents and guardians in the process of improving girls' grades. This can include regular communication about their child's progress, as well as providing resources and strategies that parents can use to support their child's learning at home.

The aim of the study was to identify effective strategies that can be implemented to improve girls' performance in mathematics at secondary school level. Teachers were asked to suggest methods to help girls who struggle with mathematics. The HOD responded by stating that:

“encouraging girls to develop more interest in mathematics by teaching them in a way that matches boys' performance, using a variety of teaching methods that involve hands-on learning, motivating them by telling them that it is possible to get a distinction in mathematics, and reassuring them that no one is dull, and they too can excel if they put in the effort:

It's interesting to note that many teachers prioritize the practical application and real-life situations when helping their students. Additionally, a lot of them focus on improving their pupils' attitudes and interests in Mathematics by breaking down concepts into simpler terms and utilizing various teaching methods. By doing so, it seems that teachers can effectively engage their students and help them understand the importance of Mathematics.

4.3.5 Teaching Methods

According to some teachers, learners develop negative attitudes towards mathematics due to difficulties in understanding certain concepts and teaching methods used by teachers. The lack of interest in the subject, caused by poor teaching methods, is also said to contribute to negative attitudes towards mathematics. It appears that many teachers believe that Mathematics is naturally a difficult subject, which can also contribute to negative attitudes.

According to most teachers, negative attitudes towards Mathematics among learners can be attributed to certain teaching methods used by the teachers. As per the teachers' perspective, about 90% of the learners were found to have negative attitudes towards Mathematics. Only 10% of the teachers believed that their students did not develop negative attitudes towards

Mathematics. The table above confirms that secondary school students tend to have negative attitudes towards Mathematics.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.0 Introduction

In this chapter, the major findings presented in chapter four will be discussed in relation to the literature reviewed in chapter two and the theoretical framework in chapter one. The aim is to shed light on the three objectives of this study. The findings will be discussed under three headings, which were derived from the research questions. The purpose of this discussion is to provide comprehensive answers to the objectives of the study.

5.1 Challenges faced by girls in learning Mathematics.

The results of the research conducted to explore the challenges faced by girls in learning Mathematics indicate that lack of female role models and high teacher-pupil ratio are major contributors to poor performance in Mathematics at the secondary school level. The qualitative analysis is consistent with the literature as reviewed by Wales et al (2016). This is in contrast to the quantitative results. It suggests that other factors may have influenced the overall picture despite the significance of these variables at the bivariate level.

Girls face several challenges in learning Mathematics. One of the most significant challenges is the stereotype that Mathematics is a subject more suited for boys than girls. This stereotype can discourage girls from pursuing Mathematics and can lead to a lack of confidence in their abilities. Additionally, girls may face societal pressure to focus on other subjects, such as the humanities, rather than Mathematics. This can limit their opportunities and lead to a lack of interest in Mathematics. Another challenge is the lack of female role models in the field of Mathematics, which can make it difficult for girls to envision themselves pursuing careers in Mathematics, most of the mathematics teachers are males. Girls may face subtle biases from teachers and peers, which can impact their performance and confidence in the subject.

There are common factors that affect girl's performance in mathematics, which include teacher content knowledge, teachers are struggling with some of the topics in the subject, which has a significant impact on the performance of the learners. Most mathematics teachers teaching at secondary schools are diploma holders, teachers need to upgrade their qualifications. A study in Lesotho based on learner mathematics performance revealed that some teachers had majored in disciplines other than mathematics but were employed to teach mathematics. This means

that most of the mathematics teachers may not have enough mathematics knowledge and skills, which affects their teaching methods and leads to learners' deficient performance in mathematics (Mogari et al., 2009, cited in Mampane, 2018).

The poor performance of girls in mathematics is attributed to ineffective teaching methods. Most teachers use teacher-centered due to the high numbers of learners in classes. Girls learn well when they are involved in the lesson, teachers should come up with different teaching methods such as question and answer, discussion and group work.

The study findings indicate a general lack of interest in mathematics among learners. This negative attitude towards the subject is often influenced by societal and parental beliefs that mathematics is a difficult subject. Similarly, Kenya faces similar challenges where learners' performance in mathematics is consistently poor, and various factors contribute to this inferior performance. Lack of parental involvement in their children's academics is a significant factor, with most parents not having progressed to secondary school, which hinders their ability to act as role models for their children. Inadequate resources, including textbooks, are also a significant concern in most countries, including Tanzania and Kenya, (Erikson, 2020).

5.2 Causes of low performance of girls in Mathematics

The education system is influenced by various environmental factors that can contribute to girl's poor academic performance in Mathematics at the secondary school level. These factors can include but are not limited to the socio-economic status of students, inadequate learning resources, teacher quality, and the school's physical environment. These factors can have a negative impact on the learning experience of learners, resulting in poor academic performance.

The study found that a lack of motivation to learn mathematics, ill-discipline, and language barriers were identified as the learner-related factors that contribute to poor performance in mathematics among girls. The findings showed that learners who bunked classes had poorer performance in the subject. Additionally, the use of social media for WhatsApp and Facebook instead of using the internet to research mathematical problems and other relevant information based on mathematics was also identified as a contributing factor to poor performance. The misuse of cell phones by learners resulted in disappointing performance in mathematics, and it also disrupted lessons. The study also revealed that the behaviors of parents and their lack of involvement played a significant role in learners' poor performance in mathematics. As learners

were not motivated from home, they did not see the importance of attending mathematics lessons.

The factors that were found to affect the teaching of girls Mathematics were related to the teachers. According to the study, inadequate experience in teaching the subject and a lack of pedagogical content knowledge and skills were the main factors that contributed to poor learner performance. That is lack of understanding of learner's conceptions of the subject and learning, lack of the curriculum knowledge and lack knowledge of the purpose education. To effectively engage learners in mathematical practices, it is important that teachers possess expertise and experience in the subject. This enables learners to develop a deeper understanding of mathematics. Teachers have a duty to teach learners mathematical instructions or language and its meaning based on the topic.

The findings of the research show that teachers' attitudes towards learners had an influence on performance. Majority of the managers said that if there is no good relationship between teachers and girls' learners then learners will grow negative attitudes towards mathematics these teachers teach and this will make it problematic for them to learn. This is in line with Wekesa (2013) who said that teachers' attitude towards Mathematics influence learners' attitude towards Mathematics as well as their success. In the same vein, Yara (2009) deep-rooted that teachers' attitudes towards the teaching of Mathematics plays a critical role in determining the attitudes of girls towards the learning of Mathematics. Adino (2015) who claims that a teacher's principles will inspiration his choice of Mathematics content, which he perceives contented or easy to teach, supports this. This finding is supported by the assertion that learners care more about how much a teacher relates to them than how much the teacher knows.

The literature confirmed that a significant factor that affects learners' performance in mathematics is the medium of instruction or language of learning and teaching in the subject and the learners' home language. It is difficult for the learner to read the questions with understanding and interpret the questions in the correct way since the language used in the question paper is English. This leads to girl's poor performance, because learners will give incorrect answers because they do not understand the language. The literature also confirms that when learners are taught in a language that is not their mother tongue, learning becomes more difficult for them (Baker & Jones, 2011).

It has been observed that there is a lack of physical resources for demonstrating concepts to learners, leading to teachers using the question-and-answer method, which does not fully engage learners in lessons. The results of this study are significant as they shed light on the problems affecting mathematics teaching and learning.

The research revealed that teacher factors contributing to poor learner performance of mathematics are also encountered by international countries. For instance, in Pakistan, teachers' rigid teaching styles while teaching mathematics and students' lack of commitment and concentration in learning mathematics were identified as the major causes of poor achievement in mathematics (Hafiz & Hina, 2016). Similarly, in West Indies, factors such as ineffective teacher-centered methods that are employed in the classrooms were identified as contributors to girl's poor performance in mathematics (Harries & Bourne, 2017). It is evident that the traditional approach to teaching and learning is still dominant in these countries and has a negative impact on the teaching and learning of mathematics.

Most of the girls did not seem to identify shortcomings from their side. Blame was for example apportioned to parents, who according to Bandura, (2009), their perceptions of girls 'competence predict girls own mathematics self-concept and performance. According to Schunk, (2009) if teachers attend to boys more than they do with girls in mathematics classes, then girls are likely to have negative attitude towards the learning of mathematics. May be girls were right to say whatever, the teacher was unable to see and recognize the presence of girls in his class. Even when a girl raised her hand first, the teacher would wait until there was a boy whose hand was up so that he could point at him for an answer.

Most girls might have problems in comprehending mathematics using the teacher centered teaching strategy most teachers use and also the study established that during the questioning, most of the teachers directed questions more to boys than to girls. When girls failed to give the correct answer in most instances, most of the teachers shifted the question to the boys without or even giving a second chance to the girls to reflect on their answer. This narrative does not help girls improve in mathematics. Teachers should give girls enough time to answer questions and involve in problem solving during class discussion.

5.3. Strategies to improve girl's performance in Mathematics.

Findings further showed that female learners admired good personal qualities and techniques as well as teachers who are patient and explained things clearly. Desirable teacher qualities are reportedly linked to good subject knowledge, teaching skills and classroom managements, relationships with learners, dedication, accessibility, and hard work. It has been argued that “a common maximum in the educational profession is that one teaches the way one is taught” Thomas and Pedersen (2003). This suggests for example that an educator who was educated in an incompetent manner will have learnt bad practice and is likely to use such in teaching others. About this, Hiebert, Morris and Glass (2003:201) have stated, “People learn to teach, in part by growing up in a culture by serving as passive apprentices for 12 years or more when they themselves were students. When they face the real challenges of the classroom, they often abandon new practices and revert to the teaching methods their teachers used.

Van de Walle (2007), suggests that a learner-centered approach to teaching and learning mathematics is more effective than a teacher-centered approach. According to Mensah et al. (2013), positive attitudes towards mathematics are fostered by teacher-related factors such as teachers' enthusiasm, resourcefulness, and thorough knowledge of the subject matter. On the other hand, a lack of pedagogical knowledge in the subject can have a negative impact on learner performance, as a teacher who is not knowledgeable in a particular topic is less likely to teach it effectively. Teacher-centered methods can also contribute to low learner performance, as they often rely on a question-and-answer format without allowing learners to work collaboratively or find solutions on their own. However, traditional professional development that is offered as a once-off event is often insufficient in providing teachers with the necessary pedagogical content knowledge (Chapman, 2015).

It is important for parents to assist their children with homework and assignments, as their involvement can have a significant impact on the performance of learners. When parents do not assist with mathematics, learners may assume that the subject is difficult because their parents are not good at it. Parents serve as role models for their children, and their involvement can help to encourage a positive attitude towards learning. The media exposure and lack of resources can also contribute to poor learner performance.

Additionally, language plays a crucial role in the performance of learners. When students use their home language during the learning and teaching of mathematics, they may struggle with

understanding questions during formal assessments. This can lead to poor performance and hinder their progress in the subject.

It was suggested that government employ more teachers (especially females) of Mathematics to handle the increasing number of pupils in schools. The government should provide all the necessary teaching and learning materials and give incentives to teachers of Mathematics as a way of motivating them so that they can effectively teach the subject.

The other strategy which is vital in improving girl's performance is motivation. Motivation plays a crucial role in teaching mathematics. It is the driving force that encourages girls to engage and persevere in mathematical activities. Motivation is a goal-directed behavior that involves the development of expectations, values, and habits that constitute the reasons why learners choose to engage and persevere on the one hand or disengage and avoid on the other, in mathematics and mathematically related pursuits.

Other strategies that teachers can use to motivate students in mathematics include, creating an engaging environment that connects learning to real-world meaning can help students to dream big and be lifelong learners, effective teachers focus attention on the less interested students as well as the motivated ones and teachers can develop creativity by encouraging students to think outside the box and come up with their own solutions to problems.

Making mathematics fun can help girls to enjoy the subject and stay motivated

In conclusion, motivation is a key factor in teaching girl's mathematics. By using effective strategies, teachers can help girls to engage and persevere in mathematical activities, and develop a lifelong love of learning mathematics.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

The preceding chapter presented the major discussions of findings the study on strategies of improving girls' performance in mathematics. This chapter draws conclusions from the study, provide recommendations based on the research findings and make suggestions for further research.

6.1 Conclusions

The purpose of this study was aimed at coming up with strategies which can improve girls performance in mathematics Based on the findings and discussions, the following conclusions were drawn: After a careful analysis of the findings in the light of the study purpose, the researcher is of the view that, the strategies of improving girls performance in mathematics at secondary school level has the potential to improve the results in Mathematics drastically, the following major findings pose a serious threat to learner academic achievement: Poor pupil attitude, High Teacher-Pupil Ratio, low Parental Involvement and high Exposure to Social Media influence poor academic performance in pupils. The large classes of pupils have a negative bearing on the teaching and learning process in relation to quality of teaching. Consequently, the massive enrolment of school pupils leads to shortage of resources both human and material resources which constitute problems in the overall teaching and learning process in secondary schools.

Furthermore, learners at Secondary School seem to participate actively no longer in the learning process and exhibit poor attitude to the detriment of learning outcomes. Lack of interests and negative attitudes towards Mathematics affect the pupils' performance in Mathematics. The study further established that motivation has an impact on pupils' performance in Mathematics. Teachers' attitudes towards pupils' and towards Mathematics as a subject have an impact on pupils' performance. If teachers have positive attitudes towards pupils', they will create a good learning environment that will make it easier for pupils to approach them. Socio-economic factors of the pupils' parents have an impact on the pupils' academic performances and school-based factors; like teacher experience and The International Journal of Multi-

The study further established that the qualification of the teachers equally has an effect on the academic performance of the pupils' and the big numbers of pupils' in classes make it difficult for teachers to attend to all the pupils' individual needs.

Remedies to improve girl's performance in mathematics as mentioned in the findings of the study include, proper guidance to change the girls' negative attitude towards mathematics, Motivating the girls' and employing more qualified teachers of Mathematics to reduce the teacher pupil ratio in schools. Reducing the amount of paper work for the teachers to give them time to prepare and to increase the number of hours for the final examination will also help to improve the performance of the pupils. Use of variety of teaching methods and the formation of mathematics clubs in the schools would be a great booster to the achievement of students in the subject.

6.2 Recommendations

In the light of the major findings above, the following recommendations are being proposed to ensure good academic achievement for girls in Mathematics at the school. Moreover, Parental involvement in education management must be strengthened and encouraged in order to enhance and improve pupils' performance. Other than that, Parental involvement must further be enhanced in order to regulate abuse of social media by pupils. Over and above, the enrolment of pupils in schools by the administrators must be commensurate with available human resource in order to minimize the high teacher-pupil ratio. In the same line, there is need to build more secondary schools in the country by both the government and cooperating partners to absorb the high number of pupils in the existing secondary schools and those in the out of school.

Furthermore, there is need for the administrators in schools to see to it that teachers in secondary school stimulate interest in Mathematics with different teaching methods. In a similar manner, there is need to train more teachers by the Examination Council of Zambia in the marking of Grade 8 and 12 mathematics examinations so that they could get insight of what is needed during marking. Since the findings in line with supply factors, pose a challenge, it would be prudent to enhance teacher training in marking to enhance quality instruction; to empower them with knowledge that would be transmitted to the pupils, who are key in the equation of academic performance in mathematics. In that way, pupils would know what to expect, which approach to use and how to present the work in the examinations for better results at Grades 8 and 12 level.

The immediate supervisors should monitor the student teachers closely and teachers should enhance remedial work for slow learners. The school administrators and teachers suggested that pupils' increase their study time and develop positive interests in Mathematics. It was also suggested that ECZ should increase the number of hours in which the exam is conducted and that they should allow schools to repeat the learners who are not performing better without the fear of the examination numbers expiring.

It is highly recommended that a similar study be conducted to investigate strategies of improving girls' performance in mathematics at primary level. This may allow comparison of the results of studies between different levels of education in Lusaka District. The studies could pave way for a deep clear check on how Primary education impacts the result output at Grade 9 and 12 level in mathematics. This implies that there would be balance checking whether the mathematical concepts learnt at primary school really have a bearing on the mathematical concepts at Secondary school level and consequently, a bearing on results at Grades 9 and 12 level.

Furthermore, it is recommended that an experimental study be conducted where clear interventions, such as close monitoring of staff and intensification of CPD in secondary school A could be put in place. Thereafter, a follow-up of result comparative analysis could be done to ascertain what indeed affects poor academic performance in mathematics at Grade 12 level

As indicated in the introduction, girl's poor performance in mathematics has been a global concern that has prompted developing countries to participate in initiatives to bring positive change in their communities. Mathematics can bring positive change to communities in the developing countries to develop their education systems for shaping the future and prospects of young people, to develop infrastructure, economic knowledge, culture and morality as well as the living standards of their people.

To enable positive changes to global communities, it is recommended that infusing ethics and moral education within the mathematics curriculum in schools should be a common practice in both developed and developing countries. Continuous development of teachers on

Collaboration of mathematics researchers should be encouraged and funded globally by governments to bring improvement to the teaching and learning of mathematics. Further research on teacher continuous development programs based on effective models relevant for mathematics teaching is needed

In view of the findings of the study, the following recommendations have been suggested Ministry of Education, should focus on making the education curriculum inclusive of more cross-cutting issues such as socio-cultural and curriculum issues affecting girls in their learning of Mathematics. The Government of Zambia should increase the number of public universities to help train more qualified personnel who in turn will be able to deliver the knowledge adequately to the learners so that performance improves in Mathematics.

Ministry of Education and all stakeholders should continue improving on the infrastructure in schools through increased funding towards the same and provision of teaching and learning materials e.g. text-books for pupils and teachers and any other teaching aid in Mathematics

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APPENDICES

APPENDIX 1: QUESTIONNAIRE FOR LEARNERS.

APPENDICES Appendix I

Girls' Questionnaire

Respondent no.....

The aim of this questionnaire is to obtain information on the performance of girls in Mathematics in Lusaka district Secondary schools. Please do not include your name. All information will be treated with utmost confidentiality. Please complete the following questionnaire to the best of your ability by placing a tick (✓) on the appropriate answer or writing the requested information in the spaces provided.

Age..... Grade.....

1. What challenges do you face in Mathematics?

.....
.....
.....
.....

2. Do you attend Mathematics lessons?

a) Yes

b) Sometimes

c) No

If the answer in question 2 is either b or c, give reasons

.....
.....
.....

3. Is Mathematics a naturally difficulty subject for girls than it is for boys?

a) Yes

b) Sometimes

c) No

if the answer is either a or b, give reasons

.....
.....

4. Do you intend to pursue a Mathematics related career after your completion of secondary school education?

- a) Yes
- b) May be
- c) No

If your answer in question 4.is either b or c, give reasons

.....
.....

5. Do your teachers supportive when it comes to learning Mathematics?

- a) Yes
- b) Sometimes
- c) No

6. Do your parents check on your Mathematics work or help you in your Mathematics homework, project?

- a) Yes
- b) Sometimes
- c) No

If your answer in question is either b or c, give reasons

.....
.....
.....
.....

7. Do boys receive more attention in class than girls?

- a) Yes
- b) Sometimes
- c) No

If your answer in question 7 is b, give reasons

.....
.....

8. Do girls do more work at home than boys?

- a) Yes
- b) Sometimes
- c) No

9. Does your Mathematics teacher attend to your class regularly?

- a) Yes
- b) Sometimes
- c) No

10. Does your Mathematics teacher attend to your individual needs in Mathematics (individual assistance)?

- a) Yes
- b) Sometimes
- c) No

If your answer in question 10, give reasons

.....

11. Do you have good relationship with your Mathematics teacher?

- a) Yes
- b) Sometimes
- c) No

If your answer in question 11 is either b or c, give reasons

.....
.....

12. Do you understand Mathematics with the teaching methods used in Mathematics lessons?

- a) Yes
- b) Sometimes
- c) No

Thank you for participating in this study

APPENDIX 2: TEACHERS' QUESTIONNAIRE

Teachers' Questionnaire Respondent no.....

The aim of this questionnaire is to obtain information on performance of girls in Mathematics in Secondary school. Please do not include your name. All information will be treated with utmost confidentiality. Instructions Please complete the following questions to the best of your ability. Place a tick on the appropriate answer of your choice.

1. What is your level of education?

a) Diploma

b) Degree.

2. Which of your learners are doing better in Mathematics?

a) Boys

b) Girls

c) Both boys and girls

3. Which of your learners have more interest in learning mathematic?

a) Boys

b) Girls

c) Both boys and girls

If your answer in question 2 is either a) or b), give reason

.....

.....

.....

.....

3. What causes girls perform poor in Mathematics?.....

.....

.....

4. What strategies do you use to help girls who do not perform well in mathematics?

.....
.....
.....
.....

4. Do you involving learners in the lessons when teaching?

- a) Yes
- b) Sometimes
- c) No

If your answer in question 4 is either a) or b), give reasons

.....
.....
.....
.....

5. Suggests solutions which can help improve Mathematics grades among girls?

.....
.....
.....
.....

Thank you for participating in this study

APPENDIX 3: Interview Guide School Manager

1. Does the school provide adequate teaching and learning materials to support teachers to improve girls' grades in Mathematics?

.....

2. What causes the girls poor perform in Mathematics?

.....

3. What strategies have you put in place to help girl's performance in Mathematics?

.....

.....

4. Are parents for girls who perform badly involved in strategies to improve learner's performance

.....

5. What type of motivation do you give to Mathematics teachers?

.....

.....

6. What could be some of the major problems that hinder good pupils' performance in Mathematics at this school?

.....

7. Which strategy do you think can remedy the poor academic performance of learners in mathematics in secondary schools?

8. What should parents do to improve on the academic performance of their children in Mathematics at this school?

.....

9. What are your suggestions for improving academic performance in Mathematics at this school?

10. Has pupil performance improved in Mathematics as a result of Mathematics teachers acquiring higher qualifications?

.....

Thank you for participating in this study

APPENDIX 4: Interview guide for Head of Department Mathematics.

1. How has been the Teacher-Pupil Ratio in this school?

.....
.....

2. Does the teacher pupil (girl) ratio have an influence on pupil performance? If yes explain briefly.....

3. How would you rate the quality of instruction in Mathematics in the school?

.....
4. Do you think the teachers of Mathematics are competent enough to handle the subjects in the school?

5. In your opinion do you think peer pressure has an influence on pupil performance in secondary schools?

6. If so, how

7. Do you involve the parents of learners who fail your Mathematics?

8. In your opinion how does parental involvement influence academic performance in Mathematics?

9. What is the response of Parents to school issues when asked for help?

10. Are teachers motivated because of students' performance in Mathematics at this school?

.....
Teacher qualification have an influence on pupil academic performance? If yes explain.....

11 Which strategy do you think can remedy the poor academic performance of learners in Mathematics in secondary schools?

Thank you for your cooperation

APPENDIX 5: THE BUDGET

A) Stationary

10 pens	K50.00
3 reams of paper	K360.00
Two highlighters	K50.00
2 Correction fluid	K20.00
One note book	K20.00

B). Typing and printing

Typing and printing	K600.00
Binding proposal	K80.00
Photocopying	K100.00

C). TRANSPORT

Home to Various Secondary schools.	K1,000.00
Home to Libraries	K400
Total	K 2,680

APPENDIX 6: WORK PLAN

Activity	June	July	August	September	October	November
Identification of the problem	✓					
Formulation of the Topic	✓					
Proposal development			✓			
Development of instruments				✓		
Data Collection and Analysis					✓	
Submission of the report						✓